THE OXFORD GEOGRAPHIES

IRELAND

BY

O. J. R. HOWARTH

OXFORD: AT THE CLARENDON PRESS


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THE OXFORD GEOGRAPHIES

EDITED BY A. J. HERBERTSON

A GEOGRAPHY OF IRELAND

BY

O. J. R. HOWARTH, M.A.

OXFORD
AT THE CLARENDON PRESS
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PREFACE

In various respects an island, being (so to say) self-contained, is the most convenient unit for detailed geographical study. The justification of this statement is one object of this volume; another will be served if it is found to suggest directions in which further geographical investigation is possible, whether on the physical, the historical, or the economic side. The absence, for the most part, of textbooks for such study points to the opportunity for research. My own indebtedness, however, to the works of Professor E. Hull on the physical and Dr. P. W. Joyce on the historical side must be acknowledged.

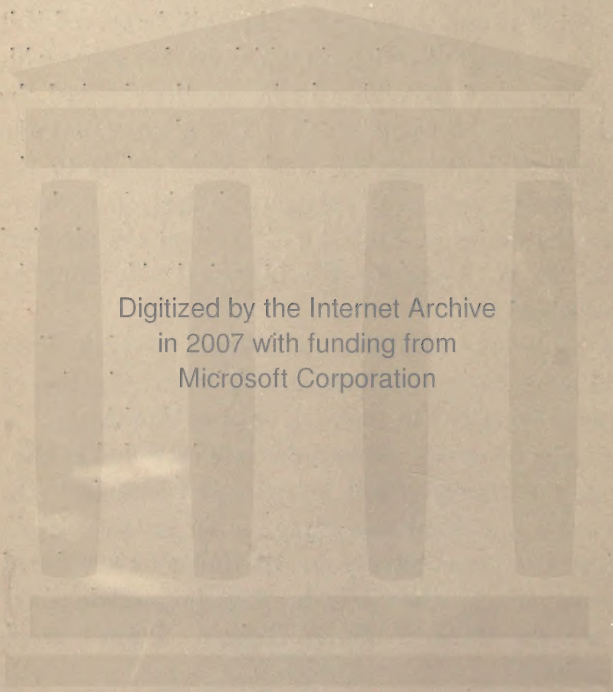
The book may also serve to indicate possible lines of field-work, as, for example, the sight-investigation of land-forms described in the text, or of antiquities.

The maps of course assume, and are intended to supplement, the topographical knowledge which is to be learnt from any good atlas-map, or, in greater detail, from the Ordnance Survey or Bartholomew's reduced survey map of 4 miles=1 inch. The large-scale page-maps are the work of Mr. W. Bisiker. I constructed the remainder.

I must thank my wife for help on certain points, and Professor A. J. Herbertson for the original suggestion of the book and for assistance at every stage of its preparation.

O. J. R. H.

January, 1911.



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INTRODUCTION

THE SITUATION OF IRELAND

THE island of Ireland lies to the west of that of Great Britain. It is separated from it by the Irish Sea, which is 140 miles wide at its widest point between Dundalk Bay in Ireland and Morecambe Bay in England. This sea is connected by comparatively narrow channels to the north and south with the Atlantic Ocean, which bounds Ireland on the north, west, and south. Of these channels, the North Channel divides Ireland from Scotland. Its narrowest part is only 13 miles across, between Torr Head in the County Antrim (Ireland) and the Mull of Cantyre in Argyll (Scotland). Again, from Donaghadee in the County Down (Ireland) to Portpatrick in Wigtownshire (Scotland) is only 21½ miles. The southern channel, called St. George's, is wider: its narrowest part, between Carnsore Point in the County Wexford (Ireland) and St. David's Head in Pembrokeshire (Wales), is close upon 50 miles across.

To the west the whole breadth of the North Atlantic Ocean intervenes between Ireland and the nearest land; this land, in due westerly direction along a parallel of latitude, is found to be the southern part of the coast of Labrador (North America), which is some 1,700 miles distant by the shortest sailing course.

Ireland is a 'continental', as distinguished from an 'oceanic' island; that is to say, it is not surrounded on all sides by very deep sea, as oceanic islands are.

A distinct physical connexion exists between the British Isles and the continent of Europe, inasmuch as the seas between them and Europe are very shallow in comparison with the Atlantic Ocean to the west. If the surface of the sea were lowered only some 50 fathoms

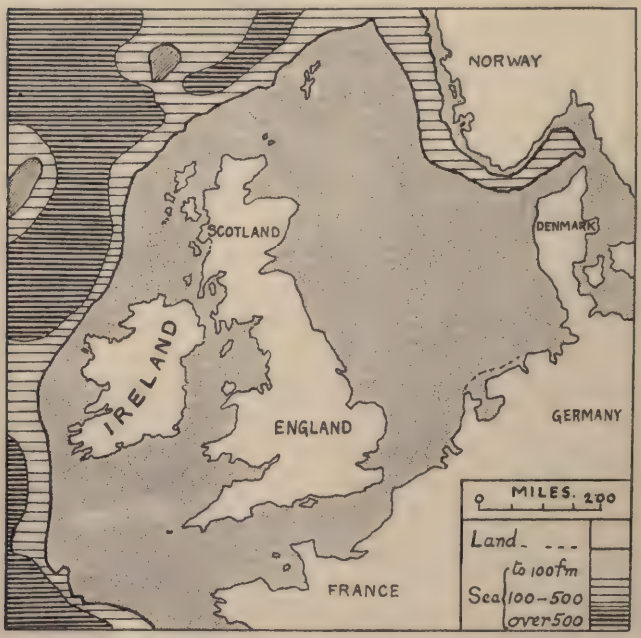


Fig. 1. Depth of the Sea round Ireland and Great Britain, showing Position of Ireland on the Continental Shelf.

(300 feet), there would be at least a narrow strip of dry land connecting Ireland with Great Britain at more than one point, while there would be a wide area of dry land between Great Britain and Europe where the North Sea and the English Channel actually lie. If the sea were lowered 100 fathoms (600 feet) we should find that

not only were Ireland, Great Britain, and the continent completely united, but there was a great extent of dry land to the north-east and south-west of Great Britain, and to the north and south of Ireland. To the west of Ireland there would be no such extent of land, for in this direction the floor of the Atlantic Ocean sinks very steeply to a great depth at no great distance from the land. In Fig. 1 all the area which is covered by sea less than 100 fathoms deep, and would therefore be dry under the condition we are imagining, is dotted. Such an area, whether only a narrow belt between the coast line of a continent and the greater depths of the sea, or very broad as in this case, is known as the 'continental shelf'. Ireland, therefore, stands on the extreme edge of the western European continental shelf, and is the most westerly of the great European continental islands. It will be seen later that this geographical position has an important bearing on the history of the island.

PART I

GENERAL PHYSICAL AND BIOLOGICAL FEATURES

CHAPTER I

CHIEF PHYSICAL DIVISIONS

THE first step in the study of the physical geography of Ireland is to look closely at a map on which the physical features or 'relief' or varying height of the land is clearly shown (Fig. 2 and appended explanation). From this we find that—

(1) One fact stands clearly out at once. It is this—that, broadly speaking, the high-lying parts of Ireland lie to the north and to the south of a central low-lying portion.

(2) A second fact is that the Central Lowland or plain runs right across the island from the Irish Sea to the Atlantic. It is true that it is almost cut off by highlands from the Atlantic; but it does reach it at the head of Galway Bay.

(3) This shows that Ireland has not a central spine or backbone of mountains, as some large islands have. From the shape and distribution of the high-lying areas, and their appearance in Fig. 2, as almost or completely detached each from its neighbours, it is seen that Ireland has no long 'ranges' of mountains, unless in the south-west, but merely detached masses of highlands. These highland masses are separated by lowlands winding

among them, and connecting the Central Lowland with the coasts, as well as by the valleys of the greater rivers and their tributaries which do not belong to the plain.

The following river basins and highland masses should be traced and examined on the map showing physical features (Fig. 2), an ordinary map being used to find the names :—

(1) The basin of the Shannon, the largest river in Ireland. This basin coincides almost entirely with the western part of the Central Lowland.

(2) The Western or Connaught Highlands, lying west of the basin of the Shannon.

(3) The North-western or Donegal Highlands, with the valley of the Erne to the south of them.

(4) The Northern Highlands, marked off by the valleys of the Foyle and the Bann, to the west and east respectively.

(5) The North-eastern or Antrim tableland, east of the Bann Valley, and north of—

(6) The Eastern Highlands (Mourne Mountains, &c.).

(7) The basins of the Rivers Boyne and Liffey, corresponding to the eastern part of the Central Lowland.

(8) The South-eastern or Wicklow Highlands, south of the Liffey.

(9) The basin of the Barrow, lying west of the South-eastern Highlands, with a number of highland masses between it and the Lower Shannon, which may be called the South Central Highlands.

(10) The South-western Highlands, south of the Shannon estuary. These highlands consist of parallel ridges and valleys, and are drained by the Blackwater, Lee, and other rivers.

When the map of physical features (Fig. 2) is compared with one showing the nature of the rocks, it is

easily seen that there is a close connexion between them. Fig. 3 illustrates the geology of Ireland very simply.

Fig. 2. Relief of the Land. Land elevated above 500 feet is shown in black.

There we find a large area in the centre covered by Carboniferous Limestone (except where patches of other

rocks remain). The limestone sends out branches to the north and south, between the masses of other rocks,

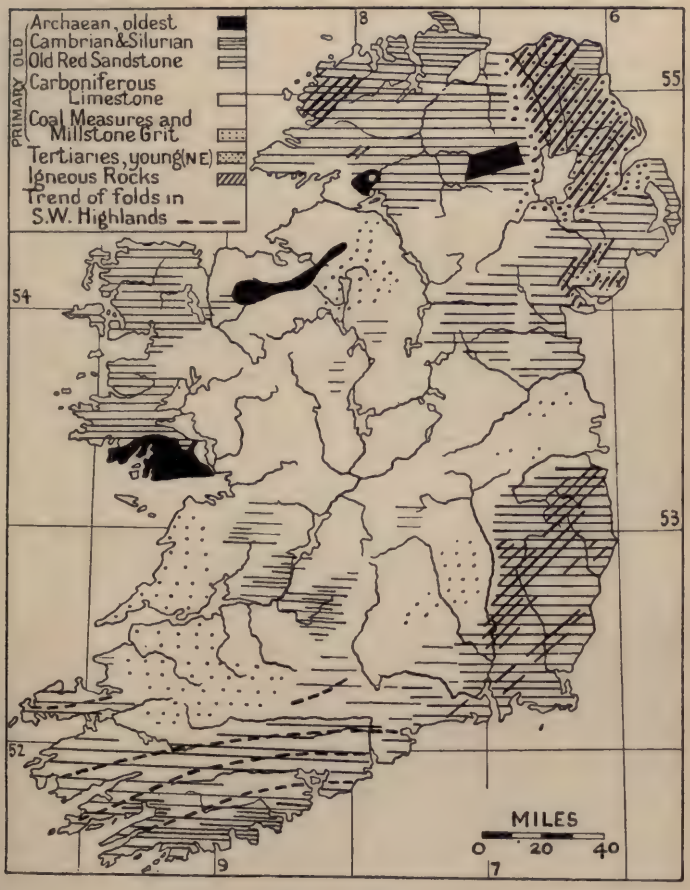


Fig. 3. Geology.

which are shown on the map by various shadings. Now we have seen that there is a great Central Lowland in Ireland, from which there are branches between the

highland masses which lie to the north and south. We may therefore infer that limestone is the characteristic lowland rock.

The shadings on the geological map over the areas corresponding to the highland masses are of different kinds. Let us examine them. In the first place, from the west to the north, about the boundary of the Central Lowland there are some black patches, which show the oldest rocks of all, called Archaean from a Greek word meaning 'old'. Secondly, in the South-western Highlands another rock predominates—the Old Red Sandstone, which is older than the Limestone, and does not often occur elsewhere in Ireland. This should be borne in mind in connexion with the statement made above, that these highlands are an exception to the rule that the Irish mountains do not form ranges but rather masses.

Keeping in mind, then, the idea of a Central Lowland of limestone bounded by highlands of other rocks of different types, we shall now try to find out what are the chief causes which have shaped the rocks into these various forms.

CHAPTER II

GLACIATION

THE grand process of denudation and erosion—the slow carving of the land-surface into hills and valleys by the action of water (whether rain or river), wind, heat and cold—is common to all lands. We need not describe it here, as we shall later meet with some striking examples of it. But there is one process of the formation of physical features which must be considered here, because, while not common to all lands, its effects are especially well seen in Ireland. This is the process of glacial or ice action—glaciation.

A glacier is a river of ice. On mountains like the Alps, or on comparatively low lands in the cold arctic regions, wherever more snow falls than is melted, it accumulates in great masses, the lower parts of which, by the weight of the snow above, are compressed into ice. Although ice appears to the touch quite solid and brittle like glass, it is really not so, and those parts of these great masses of ice which lie upon a sloping surface flow down it—very slowly indeed, it is true, but still they move. These moving masses are called glaciers.

There are no glaciers in Ireland now. The mountains are not nearly high enough to reach the upper part of the atmosphere in which it is cold enough for snow to lie continually without melting. But there was a period in the history of the Earth when the climate of a large part of the northern hemisphere resembled that of the arctic regions now. Just as snowfields and glaciers cover most

of the land surface of those regions to-day, so in that distant age they covered practically the whole northern half of Europe, and Ireland with the rest.

Distant as this Glacial Period[1] (as it is called) is in time, it is not so distant but that the bulk of the different rocks of which Ireland is composed were in existence, and therefore they preserve to this day many evidences of the effect of the glaciers upon them. This effect can easily be imagined. If the clenched hand is pushed along the surface of sand, a depression is made in the surface, and a ridge of sand is raised in front of the hand as it moves. If the hand is pushed hard downwards as well as forwards a deep trench is formed, and pieces of sand will break off from its edges, fall down upon the hand, and be carried along on it. Now imagine that the hand represents a glacier, moving slowly but with great force (for a glacier moves under pressure and is very heavy) along the surface of the land. As the hand grooved the sand, so the glacier grooves the land; carrying along fragments of rock, it rubs them along the surface of the land, as we may use a file on wood or metal, and so it grinds the surface, and adds to its load of loose material. The rivers which flow from the melting foot of glaciers are always turbid with this loose, finely-ground rock. As the edges of the trough hollowed by the hand break off and fall in, so do the edges of the glacial valley, and the broken material, which may include huge boulders, falls upon the upper surface of the glacier and is carried along by it.

When the climate grew warmer and the glaciers gradually receded, the rocks and fine material which they carried were deposited on the surface of the land, the

[1] There were really more periods than one when glaciers were extensive, with intervening periods when they receded.

finer material forming the ridges known as moraines. Let us now see what marks these operations of the glaciers have left to the present day.

Lakes of glacial origin. The formation of many of the rock-basins occupied by lakes is attributed to glaciers. In some instances it appears that the glaciers hollowed out the surface of the land[1] more deeply at one point than at another, and that hollows were thus left, in which lakes afterwards formed. It may be supposed that if the downward pressure of the glacier were harder at one point than at another (as it might be if its slope were greater), or if its load of grinding material were greater than at the first of such points, the surface would be hollowed out. In other instances moraines were left heaped up across valleys, and lakes were formed just as one may form a pool by damming up a little stream. Lakes of glacial origin are numerous in Ireland, but we describe later the region most remarkable for them—this is the lake-studded district south of the Twelve Bens (Chapter VI), where both the basin and the moraine-dammed forms of lakes are found. Moreover, although most of the great lakes of the Central Lowland are due to dissolution of the limestone, the result of glacial action is also seen in some of their basins, as in Loughs Erne, Derg, Mask, and Corrib.

Fiords. In cases where the hollowing action of glaciers took place near the coast, when the ice melted the hollows formerly filled with ice were filled with sea-water. The ice would wear away the surface below sea-level, for it does not float until almost five-sixths of it is under water. Then fiords were formed. 'Fiord' is the Norwegian term, which has been adopted into English,

[1] Some authorities, however, doubt whether glaciers can form such hollows.

for those long inlets of the sea which are so numerous on the Norwegian coast, and of which Killary Harbour and Carlingford Lough are Irish instances. Unlike such inlets as Clew Bay, which are shallow at the head, and deepen steadily towards the sea, a fiord is deeper at its middle than at its mouth, where there is a shallow sill. It is in fact a rock basin, like the first type of glacial lake above described.

Erratics. In many parts of Ireland there may be seen great rocks rising up from the general level of the land, either singly or in groups, which will be found to be merely resting on the ground below them, as if (it may be imagined) a giant had thrown or carried them there. Good examples are found near the Pontoon, Lough Conn; others to the south of Swinford, County Mayo, where they are so numerous that they might be mistaken for the actual surface of the land itself. Others occur on the Mourne Mountains above Carlingford Lough, and on the seaward side of the Wicklow Mountains. Frequently these rocks are not of the same formation as the surface on which they rest, and this proves that they have indeed been carried to their present positions by some giant force. This force is that of the glaciers, which, as we have already seen, carried great loads of rocks and fine material along with them, and then, when melting and receding, left these loads behind them. These carried rocks are called 'erratics' because they travelled on the glacier some distance (sometimes a very long distance) from their native place. Sometimes, too, when they have been left, by the glacier, poised in curious positions on rocky slopes, they are known as 'perched blocks'.

Again, when the glaciers did their rasping work on the rock-surface beneath them, they naturally not only tended to hollow it out, but to polish or leave long

'scratches' upon it. Such polishing and marking may be seen on many of the exposed rock-surfaces in the district of the Twelve Bens.

Eskers. Finally there is a curious form of the deposition of the finer material carried by glaciers, which is not the same as a moraine. This is the 'esker' (see Fig. 5). An esker is a long ridge of glacial gravel, which, while not (in Ireland) generally over 40 feet high, may often be traced running for many miles, with a winding course, over the surface of the country. A line of eskers extends almost across the Central Plain from County Dublin to County Galway, and such ridges may be particularly well seen in the neighbourhood of Clonmacnoise, and between Maryborough and Mountmellick. It is not quite clear exactly how they were formed, but broadly speaking the process must have been similar to that of the deposition of erratics—the receding glacier leaving behind it its load of rocky material. In some cases, too, both eskers and erratics may have been deposited from icebergs floating and melting in a sea which covered parts of what is now the island of Ireland.

CHAPTER III

THE LIMESTONE REGION AND ITS PHYSICAL CHARACTERISTICS

It is not to be supposed that the Central Lowland is a perfect plain. There are many flat parts, but the Lowland is best described as a slightly undulating or gently sloping expanse. In the general map (Fig. 2) there are few contours on the lowland, but on Fig. 4, which is on a larger scale, the area lying above 250 feet in elevation is marked and tinted. Here we see that while a great part of the Central Lowland lies at this elevation or above it, a height of 500 feet is seldom reached. We may assume gentle slopes, but that they are frequent we may infer from following a line across the map from east to west and noting how often it crosses the contour lines of 250 feet.

Fig. 4. Relief of the Central Lowland. Areas covered by dots are above 250 feet in elevation. The profile below shows the slope of the land (greatly exaggerated in scale) along the broken line across the map.

Denudation. The whole of the land surface of the earth is constantly being worn away by the rain which falls upon it and feeds the rivers which flow over it, by

the wind which carries away light dry particles, and by the action of heat and cold, which tend to break up the rocks. In the previous chapter we have studied the similar, though not continuous, action of glaciers. Therefore, though difficult to realize, it is not hard to believe, that with this process of 'denudation' going on through vast ages an immense thickness of rock must have been removed from above the present surface of the Central Lowland. Geologists tell us that upper layers of carboniferous rocks once covered the whole of Ireland, even the parts which are now highlands, except some portions of the Western, North-western, and South-eastern Highlands, but that these layers have been removed, stripped off, as it were, by this slow but steady process.

A study of the course of the River Shannon helps us to understand at once the cause and the effect of this process. We see on the map (Fig. 2) that the Shannon, in its lower course from Lough Derg, cuts its way between hills on either side, and these hills are of the same kind of rock, and, if the river had not cut through them, would have formed a single unbroken group. But if we look on the map north of the Slieve Aughty mountains, we find that there is the point where the Central Lowland extends right to the sea in Galway Bay. Between the Shannon and the bay the plain does not rise high; there is even one well-marked depression (on a line between Killimor and Athenry) where the land never quite reaches 250 feet in height. We know that running water generally follows the line of least resistance; it runs where it finds the easiest passage, and we may think it would have found it easier to flow across the low plain to Galway Bay than to cut a way through the high hills at the foot of Lough Derg.

But let us look at any river or stream, especially when

it is running full after a flood. We see that the water is not clear, and the reason is that it is always carrying along a greater or less amount of particles of earth. If it carries much, we say it is muddy; if little, we call it clear, but it is never really quite clear. Every stream is always wearing away, however slowly, the land over which it runs, and every shower of rain helps a little to wear away the land on which it falls. The sea beating on the shore tends to do the same thing. Therefore in the course of ages the whole surface of the land is lowered, unless there are other causes acting in the opposite way. Soft rocks are naturally worn away faster than hard rocks. So we may believe that, ages ago, the surface of the plain over which the Shannon flows was higher than the Slieve Bernagh and Arra hills now are, though it was still a plain. The hills, in fact, did not exist, though the hard rock of which they are composed was there, below the surface of the plain. The Shannon at that time did follow the easiest course it could find to the sea. The surface of the plain wore down very slowly —so slowly that the river, when it had worn its channel down to the hard rocks of Slieve Bernagh and Arra, had time as well as strength to wear a narrow channel through them, on the same line as it had always followed. But it could not wear those hard rocks flat like the plain, so they were left standing as hills on either side, as we now see them.

In the process of denudation, then, the carboniferous strata have been worn down far enough to expose the older rocks which lay below them, not only in the principal highland groups already defined, but also at some points in the midst of the lowland itself. The hills south and west of Lough Derg and those near the head of Lough Ree on the Shannon are instances. But, on the

contrary, there are instances of the upper carboniferous layers not having been wholly removed. These are shown by the patches of fine dots on the map (Fig. 3) about Lough Allen at the head of the Shannon, about the estuary of that river, to the west of the Barrow, and elsewhere. Now these upper layers included the coal-measures, and in some of the patches which are left are found a few small coalfields. If the coal-measures had been left undisturbed in Ireland as they were in England, Ireland's wealth of coal must have been very great instead of very small as it is.

Scenery. The characteristic scenery of the Limestone Lowland is somewhat monotonous in agreement with its geological formation. The green fields of the higher and firmer ground contrast with the brown bogs which lie at the foot of the gentle slopes. In the flatter parts of the plain slight eminences, such as the gravel eskers described in Chapter II, are visible from afar. Villages and towns are distributed over the more fertile and firmer parts, and the lines of communication (railways and roads) have only the bogs to avoid. The rivers flow slowly with winding courses.

Lakes of the Lowland. Within the limits of the Central Lowland and its branches, there are numerous lakes (loughs), such as the Westmeath group; to the north and west of these a number of lakes formed by the Erne and the Shannon and its headstreams, and further west, on the margin of the plain, the great loughs Mask and Corrib. The prime reason for the formation of these lakes is the solubility of the limestone. As water will dissolve a hollow in sugar, so these lakes occupy hollows dissolved out of the limestone. They are never of any great depth, and are often of exceedingly irregular form, and dotted with islands (Fig. 6; the Erne). This

Fig. 5. View over the Central Lowland, from Keshcorran Cliffs near Ballymote, Sligo. Esker-ridges in the foreground of the lowland. Mouth of cavern in the limestone cliff. (*Photograph by R. Welch.*)

is largely to be accounted for by the fact that the limestone is partly covered over and protected from dissolution by insoluble material; the irregular distribution of such a covering accounts for the intricacy of the upper lakes of the Erne. Moreover, we can see another effect, of a similar character, in cases where the limestone and other rocks meet. Thus in its lowest part Lough Derg is narrow and hemmed in by rocks which are not limestone, and have resisted dissolution; but above this it widens in both directions over the soluble limestone. Dissolution is a gradual process, and the flatness of the plain, and consequent slow flow of the rivers over it, enable them to do their work of dissolution thoroughly. Another result of the ease with which the limestone can be dissolved is that the watershed on certain parts of the plain (as between the various basins to which the Westmeath lakes belong) is by no means easy to define; and yet another is that watercourses often run beneath the surface, the water having hollowed out underground passages rather than cut out open valleys. The most notable examples of these underground watercourses, or caves, are not to be found in the Central Lowland, but in some of the mountainous districts which are also of limestone, as we shall presently see.

The Erne. The process of dissolution of the limestone, resulting in the formation of lakes, is remarkably illustrated in the valley of the River Erne, which affords an outlet from the plain, where it rises, through the surrounding mountain rim to the Atlantic Ocean in Donegal Bay. The innumerable lakes and devious water-channels of this curious valley are illustrated in Fig. 6, where the water, for the sake of clearness, is shown in black, but even this figure is very much generalized, that is to say that the lesser ramifications of the larger lakes and in-

numerable smaller pools are omitted as they cannot be shown on a map of so small a scale. The Erne has its headwaters in the small streams which flow into Lough Gowna; not counting its minor windings, its length

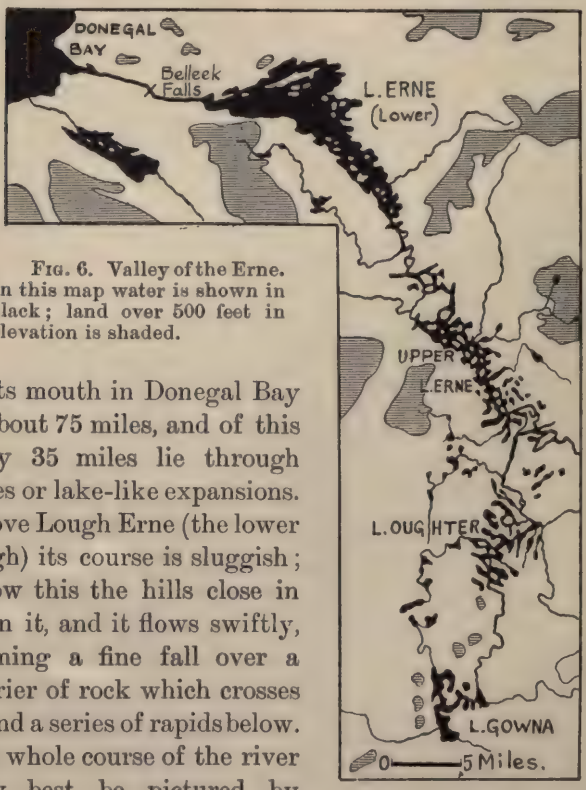


FIG. 6. Valley of the Erne. In this map water is shown in black; land over 500 feet in elevation is shaded.

to its mouth in Donegal Bay is about 75 miles, and of this fully 35 miles lie through lakes or lake-like expansions. Above Lough Erne (the lower lough) its course is sluggish; below this the hills close in upon it, and it flows swiftly, forming a fine fall over a barrier of rock which crosses it, and a series of rapids below. The whole course of the river may best be pictured by imagining it as permanently in flood, as if the barrier at Belleek held up the waters above, so that they spread out of their natural channel and formed the shallow loughs and channels which we have described. The scenery among these is very pleasant.

Caverns. In many parts of the Irish limestone region rivers have hollowed out underground channels, owing to the solubility of the limestone. Frequently streams at first flow over the surface of an insoluble rock overlying the limestone, and then, on reaching the limestone, disappear in swallow-holes (locally called sluggas). Some reappear after flowing a distance underground; others cannot be traced. Some again first appear as streams of considerable size from caves in the limestone—the River Fergus, near Ennis, is an instance. Not infrequently the roofs of the caves formed by underground rivers have fallen in at various points, and hollows are found on the surface, which in times of flood are filled up and overflow, making temporary lakes called turloughs, which at dry seasons disappear.

Sometimes the caves can be entered, and are found to be of great extent and magnificence. On the side of the Galty Mountains are the Mitchelstown Caves, the most famous of the well-known caverns of Ireland. They extend deep into the mountain, and afford many beautiful examples of the action of water on the limestone. They seem to be of very old formation, for no stream, such as must have formed them, runs through them now, and the inference is that they were formed when the relief and river-system of the district differed from that now existing. The Marble Arch, near Enniskillen, and the Toomeens, a series of natural arches through which the River Ardsolla flows in County Clare, may be mentioned as other remarkable examples of the action of water on limestone. The hilly country bordering the Lowland between the head of the Shannon and the Erne, and the whole district north of the Shannon estuary (County Clare) abound in these curious forms. The river connecting Loughs Mask and Corrib runs underground.

Fig. 7. The Giant's Causeway, showing basaltic columns, and on the extreme left (sky-line) the level of the tableland. (*Photograph by R. Welch.*)

CHAPTER IV

THE NORTH-EASTERN TABLELAND AND THE EASTERN HIGHLANDS (MOURNE MOUNTAINS)

Two Types of Volcanic Formation

(i) *The North-eastern Tableland; a type of basaltic plateau.*

We have now to consider the various highlands of Ireland, and the North-eastern or Antrim Tableland may form a starting-point, because it is the highland developed most lately in geological time, and has unique characteristics.

North of Belfast Lough and east of Lough Neagh and the Lower Bann, and excepting the valley of the Main, and a few smaller valleys, the land is an unbroken upland. Properly speaking, however, the same formation extends across the Lower Bann, including the hills which form a northward continuation of the Sperrin Mountains, and nearly encircles Lough Neagh. It is volcanic; that is to say that though there are no volcanoes now, yet in a long-distant age volcanoes poured forth the rock of which this district is composed. The rock is called basalt. The County Antrim consists of a plateau—that is, an elevated tract with no very prominent summits, but with steep sides. Trostan in the north (1800 feet) is the highest point in the county. Hereabouts, and in fact all along the coast from Larne northward, the rocks are not volcanic, but from Fair Head westward along the north coast the volcanic rocks

reach the sea at intervals, and it is here that they influence the scenery in the most remarkable manner. Where the 'escarpment', or steep face of the basalt plateau, falls towards Lough Foyle, it can be seen from the irregular piles at the base how great landslips have taken place. One reason for this is that the hard basalt

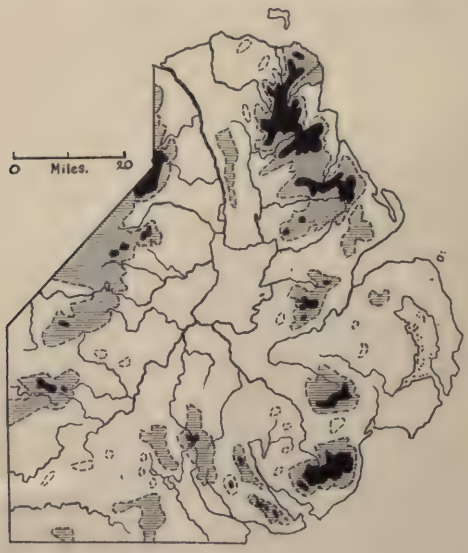


Fig. 8. North-eastern Highlands of Antrim and Down, with Plain of Lough Neagh. Land from 500 to 1,000 feet in elevation is enclosed in broken lines, and the larger areas are shaded. Land over 1,000 feet is shown black.

overlies softer rocks which have given way under its weight, as a result of 'weathering' and water-action.

One of the rocks which the basalt overlies is white chalk, and as basalt is very dark the line of demarcation between the two, and the manner in which the basalt has been forced up through the underlying rock, can be

clearly seen at many points in sea-cliffs, quarries, and the flanks of valleys. The basalt flowed up through cracks which are now marked by hard bands known as dykes between the softer rocks. Generally it flowed and spread itself gently, but there are some points where a true volcanic crater can be traced, now choked with fragments of both the volcanic and the older rocks, thrown together and mingled by violent eruption.

Giant's Causeway. On the landward side an escarpment or cliff, with broken fragments at its foot, marks the boundary of the volcanic flow. Towards the sea are magnificent cliffs. On the north coast, east of the estuary of the Bann, the most wonderful point is the celebrated Giant's Causeway, where the cliffs rise in a series of terraces, indicating a succession of outpourings of lava one above another from the old volcanoes. The lava, when cooling from its molten state, cracked into innumerable many-sided columns, much as mud cracks under the influence of a hot sun. No other process in nature results in these curious straight columns, which are grouped in many different ways resembling and named after works of man. Their character can best be imagined, perhaps, from the knowledge that one group is called the 'Organ', because the columns are thought to resemble organ-pipes. On Rathlin Island off the coast, and at Fair Head, the same columnar formation is seen, and Fair Head especially well shows the manner in which the basalt overlies the older rocks below.

South of Fair Head, the east coast of County Antrim is not basaltic until near Larne Lough. It is, however, frequently cliff-bound, and throughout the hills descend steeply to it, and landslips are not uncommon. At Ballygally Point, a little north of Larne Lough, the basalt is seen again. Larne Lough itself is a deep inlet

FIG. 9 (*a*). North-eastern Tableland. The table-form may be judged from the scarcity of contours above 1000 ft.; Fig. 9 (*b*), showing the dissected Eastern Highlands, should be contrasted.

between the mainland and the so-called Island Magee, really a peninsula.

Lough Neagh. This, the largest lake in Ireland, lies south-west of the volcanic area, and may owe its existence to the volcanic disturbances. Its origin is due, not to dissolution, nor to glacial action, but to 'faulting'. 'Faults' in geology may be defined as cracks in the earth's crust, which though not obvious to sight (for they do not lie open) are discovered by the geologist when he finds that along a certain line the strata or layers of various rocks are broken off, and continue at different levels. This shows that the land on one side of the crack may have risen, or on the other it may have sunk; on the sunken, or lower side, therefore, there will be a depression of the surface, and such depression offers the chance for a lake to be formed. The Lough Neagh fault occurred when the sheets of volcanic rock cracked and sank, as they did at many points. Here, then, we have a third method of lake formation. It is much less common than those of dissolution and glacial action, but Lough Allen, at the head of the Shannon, is another example of it. Lough Neagh is of no great depth, but geologists, by examining the deposits near its shores, are able to prove that it once extended much further than it does now.

Towns and villages are numerous all round the Antrim plateau, both on the coast and in the valley of the Bann. On the high open plateau itself there is none. The valleys penetrating the plateau, narrow, steep-sided, and sheltered, also afford place for settlement. At a few points they afford lines of communication right through the plateau, and from Ballymena on the Bann a railway runs nearly to Cushendall on the coast. The plateau rises very sharply from the sea as a rule, and it may be

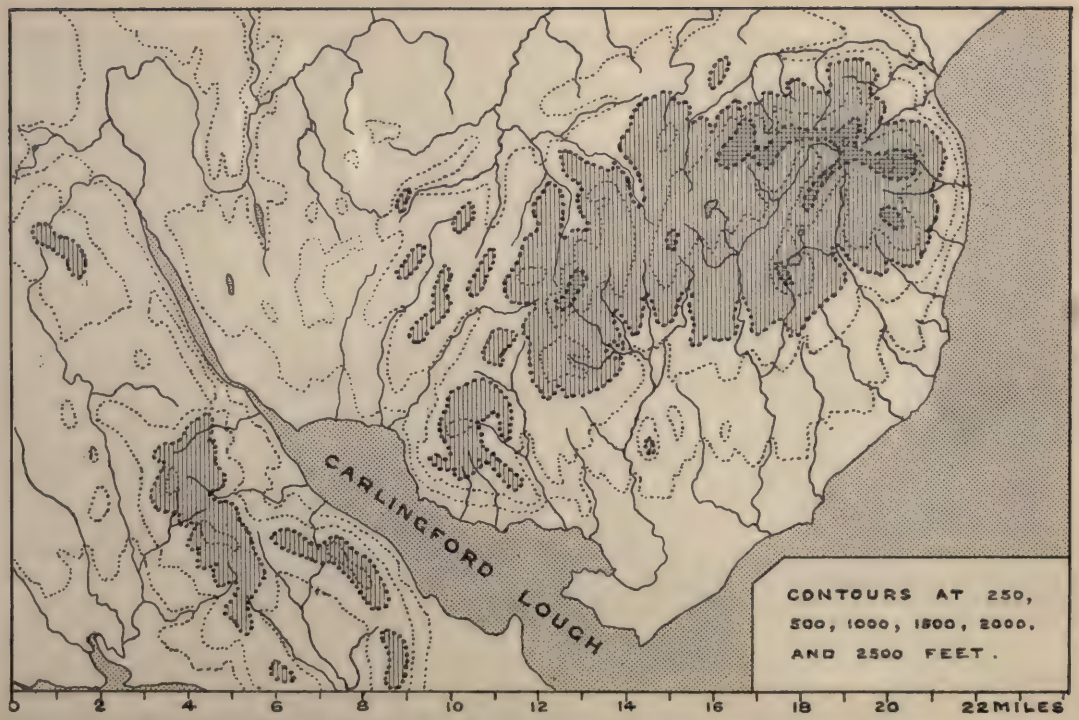


Fig. 9 (*b*). Eastern Highlands. Fig. 9 (*a*) should be contrasted (see note thereto).

noted how closely the coast road hugs the shore from Belfast as far as Cushendall. Several of these sheltered coast-villages have become favourite holiday resorts.

(ii) *The Eastern Highlands* (*dissected volcanic*).

Mourne Mountains. The beautiful group of the Mourne Mountains rises directly from the sea in long slopes without sea-cliffs. These mountains and the lesser groups to the north and west of them are also volcanic in origin, but their formation is not the same as that of the Antrim Highlands. In Antrim the volcanic basalt generally flowed and spread quickly, and formed a plateau as we have seen. In the Mournes the rocks are principally granite, and there is much more evidence of violent eruption. These mountains are in fact the roots of volcanoes, of which the upper parts and flanks have been dissected and worn away by denudation, leaving the roots exposed. Geologists can trace more than one period of volcanic activity in these highlands—there is an ancient basalt, through which the granite which forms the main mass was extruded later, while the granite itself is broken through by dykes of rock which penetrated it later still. But for this general description we may group all the volcanic outbreaks in Ireland together as a 'volcanic period', and we know that it was later in geological time than the period of the limestone and other characteristic Irish rocks. The hard granite of the Mourne Mountains has not been exposed long enough to have all its roughness smoothed away by denudation, and on the flanks of the mountains there are often steep cliffs and crags. On the other hand, the process of denudation has continued long enough to give the mountains the typical outline of a denuded volcanic highland, with long regular slopes and domed summits.

The action of the ice during the glacial period (Chapter II) is strongly marked by erratic boulders, moraines, scratches on the rocks, and other evidence. To the south-west of the highland is the inlet of the sea called Carlingford Lough, a true fiord (see Chapter II). Fine crystals, characteristic of volcanic rocks, and including beryl, topaz, and emerald, are found in some places in the granite.

The relationship of the Mourne mass and Carlingford Lough to human settlement and lines of communication may be compared with that of the Antrim plateau and Belfast Lough. The coast road from Newry to Newcastle hugs the shore in exactly the same way as that from Belfast to Cushendall, and there is a similarity even in the short cuts which both roads make over the lowlands at the mouths of the loughs. On both coasts there are villages which have become seaside holiday resorts. As the Bann Valley forms an important north-and-south line of communication west of the plateau, so does the Newry Valley west of the Mourne mass. This valley is one of the most striking natural lines of communication in Ireland. It carries two lines of railway, a road and a canal, and has always formed the main gateway between Ulster and the south. The Mourne highland offers no easy crossing for railways—the round-about route from Newcastle to Newry by Banbridge and Scarva may be observed, and even this line is in great part comparatively new.

CHAPTER V

THE SOUTH-WESTERN HIGHLANDS

Parallel Folded Ranges

Under the name of the South-western Highlands we include all the mountainous country which lies south of the Shannon estuary and the Golden Valley and south-west of the basin of the Barrow, and is bounded on the south and west by the Atlantic Ocean. It thus covers the greater part of the province of Munster, corresponding very nearly, as we shall see later (Part II), with the counties of Limerick, Kerry, and Cork.

The south coast of Ireland, which is closely bordered by hills almost throughout, is distinguished by a number of branching estuarine inlets, some of importance as harbours, and bold projecting promontories. Westward from *Waterford Harbour* the principal inlets and promontories or 'heads' are—Brownstown Head, *Tramore Bay*, *Dungarvan Bay*, Mine Head, *Ardmore Bay*, Ram Head, *Youghal Bay*, Knockadoon Head, *Cork Harbour*, *Kinsale Harbour*, Old Head of Kinsale, *Courtmacsherry Bay*, Seven Heads, *Clonakilty Bay*, Galley Head, *Glandore Harbour*, Cape Clear on Clear Island, *Roaring Water Bay*, and Mizen Head. Rounding this last promontory, on the south-west coast a series of much longer mountainous promontories separates, one from another, a series of much deeper inlets which penetrate the land in a north-easterly direction, and give a clue to the arrangement of the leading physical features of the land. For although the mountains of the south-west, as

elsewhere, are arranged in short ranges or groups, yet the principal of these fall into a series of parallel lines, running nearly west and east. These are separated by parallel valleys having the same general direction. Of these valleys, those sloping east are watered by rivers which, though having their mouths on the south coast, run nearly due east, as we shall see, for the greater part

Fig. 10. The South-western Highlands. Land from 500 to 1,000 feet in elevation is enclosed in broken lines, and the larger areas are shaded. Land over 1,000 feet is shown black.

of their courses. The westward-sloping valleys have short rivers in their upper parts, while their lower parts are 'drowned' in the great inlets of the south-west coast. We thus have the following parallel arrangement of the leading physical features of this region :—

Estuary of the River Shannon (with the short tributaries flowing north to it).

Dingle promontory (Beenoskee Mountain, &c.), Slieve Mish, Glenaruddery Mountains, Mullaghereirk Mountains, Ballyhoura Hills (Galty Mountains).

Dingle Bay, River Laune, Lakes of Killarney, River Flesk, and River Blackwater.

Macgillycuddy's Reeks, &c., Mangerton, Derrynasaggart Mountains, Boggeragh Mountains, Nagles Mountains.

Kenmare River (this is really one of the great inlets), *Roughty River, River Lee.*

Slieve Miskish, Caha Mountains, Shehy Mountain, and hills east thereof.

Bantry Bay, Bandon River.

South coastal hills.

Folding. The South-western Highlands, in fact, afford a fine example of a certain process of mountain formation, to understand which we must bear in mind these parallel lines of their arrangement. The earth is a body in a condition of cooling down from intense heat, which is believed still to exist in its centre. The process of cooling causes shrinkage, and as the inner mass of the earth shrinks, its rocky crust wrinkles. The usual simple illustration of this process is a drying apple, the skin of which gradually wrinkles as the fruit shrinks. This wrinkling of the surface of the earth has resulted in a thrusting force being applied to some parts of it, so that the strata or layers of rock are seen to be violently bent, crushed or broken, and a series of elevated ridges and depressions were formed. Such, subject to subsequent denudation, was the origin of the parallel arrangement of the rocks in the South-western Highlands of Ireland. The effect is seen not only in these highlands but in the adjacent South Central group, Slieve Bernagh, and the Silvermine Mountains, Devilsbit,

Slieve Bloom, the Galtees, and the mountains of County Waterford.

This period of contraction and folding of the earth's crust took place later than that at which the carboniferous rocks were formed. But all these have since been worn away by denudation, and only the harder Old Red Sandstone has resisted that process more successfully. Hence the upward folds were gradually carved into the broken ridges here characteristic of the scenery, while the downward folds were deepened into the steep-sided, narrow valleys of the present time. The folds lay along lines from west by south, to east by north. They are shown by broken lines on the map (Fig. 3).

Scenery—the Lakes of Killarney. The South-western Highlands are generally thought to afford the finest scenery in Ireland. The centre of interest is the district between the heads of Kenmare River and Dingle Bay. Here, in the Macgillycuddy's Reeks, the summit of Carrantuohill or Carntual reaches the highest elevation in Ireland, 3,400 feet.[1] Other points over 3,000 feet surround it, and in the neighbouring groups—Purple Mountain, Mangerton, and others,—there are many over 2,500 feet. This range of mountains 'rises abruptly from the borders of the beautiful Lakes of Killarney, where we have a combination of natural features rarely to be met with. . . . The rugged heights of the Reeks, as they slope downwards towards the water of the lakes, are clothed with forests of timber and underwood, chiefly natural, amongst which the arbutus is conspicuous, and at the base stretch away the placid lakes, studded with islets, and their banks clothed with verdure. Those islets and rocks which rise out of the lakes are often intensely

[1] 3,414 feet exactly.

Fig. 11. Upper Lake of Killarney and Macgillicuddy's Reeks. (*Photograph by R. Welch.*)

glaciated, and appear above the waters near Muckross Abbey in long smooth backs of limestone polished and striated.'[1]

The Lakes of Killarney are drained by the River Laune to Castlemaine Harbour, the uppermost part of Dingle Bay. Lough Leane is the largest of them; Muckross Lough lies immediately above it, and the Upper Lake above again. Drained by a feeder of the Flesk, which enters Lough Leane, is Lough Guitane. Each of the promontories which separate the great inlets of the south-west has a backbone of lofty mountains, which often descend in cliffs to the sea, as notably at Brandon Head (1,240 feet), the northward flank of Brandon Mountain (nearly 2,800 feet). Numerous islands, such as Dursey, the Skellig Rocks, Valencia, and the Blaskets, lie off each headland.

The Skelligs and Blaskets are lofty and precipitous—detached fragments of the mountainous promontories of the mainland.

Valley-courses. In this region also, the courses of the Rivers Blackwater and Lee should be studied. The Blackwater is seen on the map to run due east, for the greater part of its course, till its reaches Cappoquin, where it turns at a right angle southward to Youghal Harbour, instead of following an apparently more natural course to Dungarvan Bay. It is probable that a change in level of the surface of the land caused this deflection. This, in the case of the Blackwater, may be attributed to faults (compare Chapter IV—Lough Neagh) running north and south to the east of the Cappoquin-Youghal Valley. The Lee, similarly, might have been expected to continue its course eastward to Youghal Harbour instead of turning

[1] E. Hull, *Physical Geology and Geography of Ireland.*

Fig. 12. Part of the South-western Highlands (about Killarney and the Kenmare River), showing, in the north, their greatest elevation in the Macgillycuddy's Reeks.

south for a similar reason through the estuary of Cork Harbour. Another reason for this strange course is also suggested. It is that at the original period of folding the streams ran from north to south down the slope of the fold which ran from west to east. Later tributary valleys were cut along the lines of the fold, at right angles to the main valleys, and the tributary valleys ultimately became the longer. But though the old tributary streams thus became the new main streams, the lower parts of the old main valleys still offered them the easiest course, and hence their sudden turns near their mouth.

Passes. While the main structural arrangement of the south-western ranges is (roughly) from west to east, it must not be forgotten that the water-shed between the east and west sloping valleys follows a line running roughly north from Skibbereen, and that therefore the highlands are continuous along a line in this direction. Moreover, each east-and-west line of hills is at many points broken by depressions into distinct short ranges or groups, as may be inferred from the several different names occurring in each line. Of these cross-depressions the most important as a line of communication is that which runs nearly due north from Cork, and is followed by the railway between that city and Limerick, which crosses the Blackwater at Mallow.

The three natural lines of communication east and west through the South-western Highlands, are the valleys of the Blackwater, the Lee, and the Bandon. Each has a railway along it. In these valleys and at the heads of the great sea-inlets are the majority of the towns and villages. As to the cross-depression above mentioned, it not only determines the position of Mallow, but it happens to lead almost directly to the finest har-

FIG. 13. Lower course of the Blackwater River, showing also the three ranges of the Galtees (north-west), Knockmealdown (centre), and Comeragh (east), with the great bend of the River Suir (pp. 135, 136).

bour on the south coast—that of Cork, and the City of Cork has grown up here to the position of the third port in the island. As another example of a pass which has determined the position of towns, that further west, with Millstreet and Macroom at either end, may be observed.

CHAPTER VI

THE WESTERN AND NORTH-WESTERN HIGHLANDS

Types of Denuded Highland Masses

The remaining chief highland areas of Ireland, the Western, North-western, and South-eastern, have much in common as regards their structure, and much in contrast with the other highlands. We find in them the results of a system of folding, as in the South-western Highlands, but of an earlier geological age. Moreover, it is more massive, that is to say that the higher parts of the highlands have the original form of masses rather than ranges.

The folding of these highlands, being older, has had its effects obscured by other movements, denudation, &c., to a greater extent than the folding of the South-western Highlands. But the lines of it, running from south-west to north-east, can still be traced in certain leading features of the three highland areas. The Partry and the Ox Mountains in the west lie in that direction, so do the Derryveigh Mountains and Glen Veagh in Donegal, and so, nearly, does a line along the greatest elevation of the South-eastern Highlands.

In all these highlands the rock is largely metamorphic. Metamorphic rock is that which has been changed from its original condition by being crushed when it was raised up into mountain form, or by being subjected to great heat from the internal fire of the earth, and has become

crystalline, so that its surface often shines as if composed of crystal.

It is instructive to notice that the Western and Northwestern Highlands, which have the most features in common in their physical geography, have this feature

Fig. 14. The Western Highlands. Land from 500 to 1,000 feet in elevation is enclosed in broken lines, and the larger areas are shaded. Land over 1,000 feet is shown black.

among others: an almost exact likeness in their greatest elevation, 2,400 feet.

Western Highlands. We must go more closely here into the topography of the Western Highlands, because their general rock-formation is more complicated than in the other highland areas. Broadly speaking there are

three different sorts of rocks arranged in belts, from south to north, and as many different sorts of scenery.

West of Lough Corrib is the district known as Iar-Connaught. There are a succession of isolated groups of hills, of no great height, between Lough Corrib and Slyne Head. One such group, between Kilkieran and Bertraghboy Bays, nearly reaches an extreme height of 1,200 feet. All around these hills extends a boggy plain, the surface of which consists almost as much of water as of land, for it is covered with small lakes. A depression extending along the north of this tract from Oughterard near Lough Corrib to Clifden on the coast, and followed by the road and the railway between those towns, marks pretty nearly the boundary between two of the different rocks just mentioned, and also the boundary between two totally different types of scenery. The base-rock of the lake-plain is Archaean, which the map (Fig. 3) shows to be the oldest of all. To the north of the boundary line, in place of a flat boggy tract with many little lakes and few isolated hills, there is a Silurian tract of metamorphic rock consisting of ranges or groups of magnificent mountains, divided only by narrow valleys, containing lakes few in number, but comparatively large, and in proportion to their size very deep in comparison with the solution-lakes of the limestone.

As the northern boundary of this tract we may take the valley of Joyce's River, which flows into the north-western arm of Lough Corrib, and is separated only by a low divide from the waters which run into the long narrow inlet of the Atlantic called Killary Harbour, which completes the boundary.

Connemara. West of Joyce's River is the range of the Maamturk Mountains, with the Corcogemore group south-east of them ; their highest summit is Letterbreckaun

Fig. 15 (*a*). Ben Lettery, a summit of the Twelve Bens, with the lake-plain of Connemara beyond.

Fig. 15 (*b*). Killary Harbour (fiord) from Leenane.
(*Photographs by O. J. R. Howarth.*)

(2,200 feet). To the west of these is the valley in which lies Lough Inagh, the uppermost of a chain of fine lakes (Derryclare and Ballynahinch are the others) which half encircle and wash the foot of the celebrated mountains called the Twelve Bens or Pins. The district in which they stand is called Connemara, a name which is also extended to cover the whole area west of Lough Corrib, and between Killary Harbour and Galway Bay.

The principal summits of the Twelve Bens are disposed in three short chains radiating from a centre, and separated by deep wild glens. Benbaun (2,400 feet) is the highest[1] of them. The term 'Pins', as a form of their name, is misleading; the summits are not sharp peaks, but rather of cone or dome shape. They stand up boldly, however, from the lofty, narrow ridges which unite them. Their sides are steep and in great part bare. The glistening of the metamorphic rock is remarkable, and sometimes the rock is brightly coloured.

The coast-line of this district, as in other parts of Ireland, suggests a war between the sea and the land, continuing through the ages. From the outer end of Galway Bay round to Clew Bay the coast is fretted into a continuous series of inlets, irregular of form and studded with islands. This is a description we have used of the lakes of the limestone plain, but the cause of the resemblance is not at all the same—here we must think rather of the constant wearing action of the waves on the land.

Two great bays, Kilkieran and Bertraghboy, broad, shallow and full of islands, indent the low, lake-studded tract south of the Twelve Bens. They open southward, while Mannin Bay, indenting the same tract, opens west-

[1] The others, in order of height, are: Bencorr, Bencollaghduff, Benbreen, Derryclare, Bengower, Muckanaght, Benbrach, Bencorrbeg, Benlettery, Benglenisky, and the Key of the Pins.

ward. North of this, Streamstown Bay, long and narrow, runs between foothills of the Bens themselves. Ballynakill Harbour, the next great inlet northward, receives the waters of a stream draining a valley which isolates the Bens on the north and contains the beautiful Lough Kylemore. North of this valley a detached group of hills rises to nearly 2,000 feet in Garraun; north again is the valley in which lies Lough Lee, Little Killary Bay, and at last Killary Harbour.

Killary. This is a remarkable inlet, unlike the others just mentioned, being long, narrow and deep, and closely beset with mountains on each side. It is 9 miles long, but seldom over half a mile wide. It resembles a fiord of Norway, and is so easily navigated, and offers such splendid shelter for ships, that it has often been proposed to establish a great port for ocean shipping on it. It is known as a 'drowned' valley; that is to say that an infinitely slow sinking movement of the land has taken place here, so that the bed of the Killary, which was formerly that of a river, is now submerged by the sea.

The Killary Harbour roughly marks the limit between the north and middle types of rock in this region, and north of it we have another change of scenery, the rock being Silurian, but not metamorphic. The Partry Mountains, which extend from the head of Killary to the western shore of Lough Mask, form a complete contrast to the Twelve Bens. They are a wide range, not broken into ridges and well-defined summits, but having a broad flat top—in fact a tableland. Their highest point is Benwee (2,240 feet). Their sides are steep, as are those of the ranges west of them and immediately north of the Killary, where Muilrea reaches the height of nearly 2,700 feet. At some points precipices descend from the summits of these mountains, notably in the face of Ben-

FIG. 16. The Twelve Bens (in centre) and adjacent highlands, with part of the lake-plain to the south.

bury towards Dhulough, a deep narrow lake drained to Killary Harbour by the Bundorragha River, which flows south in a beautiful valley between the Muilrea range and Bengorm.

To the west of Muilrea the coast is low, sandy, and unbroken as far as Clew Bay, and the hinterland is a boggy plain sloping gently up to low hills which connect Benbury and the Sheefry Mountains (east of Dhulough) with the mountain of Croagh Patrick, where, however, we leave the rock of the northern belt and find again that of the middle belt, the metamorphic Silurian. The further topographical description of the Western Highlands may be left to its place in Part II (p. 113).

The Western Highlands are very sparsely populated. The Central Lowland having found its outlet to the sea at Galway, there is not much to tempt settlement further west. There are, however, several small towns and villages along the west coast on the inlets, and the sheltered valleys have a few scattered farms in the south of the district. But in the north the bare moors of County Mayo are one of the most desolate tracts in Ireland; the cliff-bound unbroken north coast is scarcely inhabited, and the isolated town of Belmullet is 40 miles from the nearest railway.

North-western Highlands. The highest part of the Donegal Highlands, which is found in the extreme north-west, preserves, as we have seen, the same lines of folding as the Western Highlands, and preserves them more clearly. We find therefore, on a small scale, something like the orderly arrangement of valley and range which appears in the South-western Highlands, in the Errigal range, the Owenbeg valley, the Derryveigh range, Glen Veagh, and the Glendowan range. The rock is mostly metamorphic Silurian, the softer rocks having been

FIG. 17 (*a*). Mount Errigal, the highest point of the North-western Highlands.

FIG. 17 (*b*). Part of the Cliffs of Slieve League, North-western Highlands.[1]

(*Photographs by R. Welch.*)

removed by denudation, and the remaining ones carved into bold prominent domes and deep valleys. The crystalline formation is clearly seen on Mount Errigal and elsewhere, as it is on the Twelve Bens. The coast is generally much indented, though the north horn of Donegal Bay is an exception, and is mostly bounded by cliffs which culminate in the tremendous wall of Slieve League. At one point, at the western foot of the highest

FIG. 18. The North-western Highlands. Land from 500 to 1,000 feet in elevation is enclosed in broken lines, and the larger areas are shaded. Land over 1,000 feet is shown black.

hills, there is a lake-studded coastal plain not unlike that at the south of the Western Highlands. There are also a number of mountain loughs. The two highland districts have therefore much in common in their structure. The most notable difference lies in the occurrence in the west of Donegal of a large tract of granite, a rock not common in the Western Highlands.

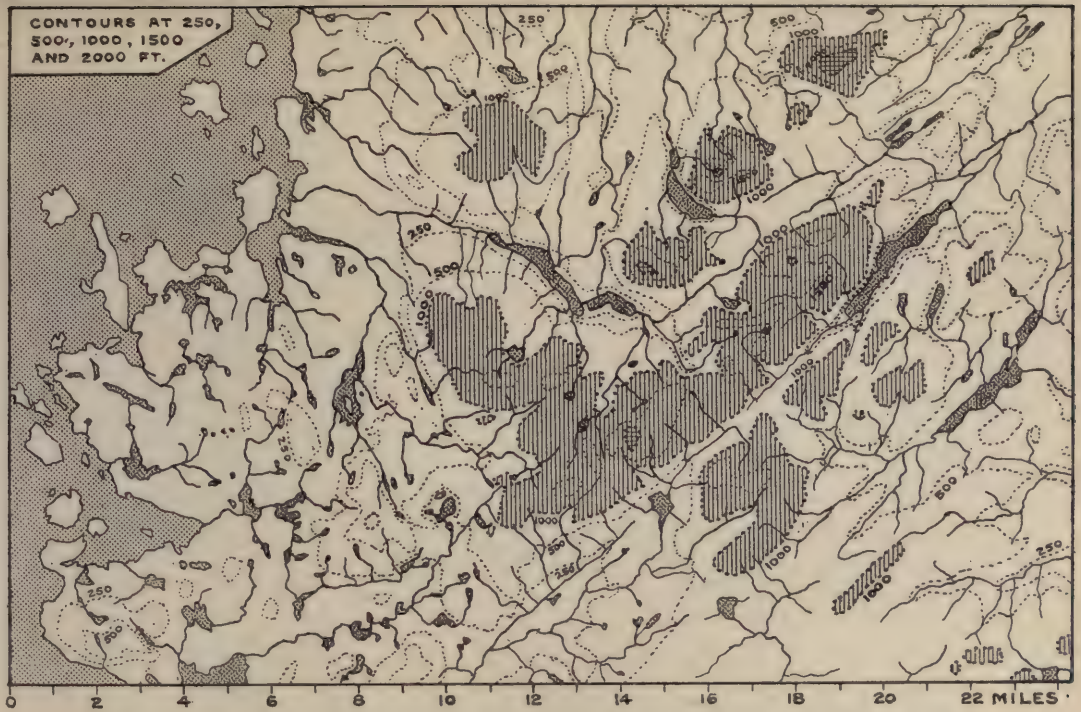


FIG. 19. Part of the North-western Highlands. Derryveagh Range (p. 119) in centre.

CHAPTER VII

THE SOUTH-EASTERN HIGHLANDS

The South-eastern Highlands, as we have said, lie along an axis of folding from north-east to south-west, the same as the highlands of the north-west and west. But while this is clearly seen on a geological map, it is not so easy to follow on a relief map. The whole mass is so cut up by the valleys of a large number of rivers and streams flowing in various directions that it appears rather as a group of short connected ranges, not having a common direction. The mountains rise close to the coast, and at Bray, Wicklow, Arklow and a few other points their spurs are cut off in cliffs which fall directly to the sea. But elsewhere there is a low narrow foreshore. North of Wicklow, for example, the Dublin and South-eastern railway at first finds a difficult way along the face of the cliff, and then runs along a flat tract, grassy and marshy, traversed by winding waterways, and only a few feet above sea-level. Off shore is a chain of sandy shoals. The coast offers no shelter to ships, excepting the small harbours at Wicklow and Arklow, till in the south the sea breaks into the broad, irregular and shallow inlet on which Wexford is situated. A low spit of land nearly closes the entrance to this bay. Carnsore Point, south of Wexford Bay, is the meeting-point of the east and south coasts of Ireland.

Leaving out of account the short streams which are tributary to the Barrow on the left, and the few which reach the sea independently between Carnsore Point and Waterford Harbour (the estuary of the Barrow), the

Fig. 20. Glendalough, Co. Wicklow, showing the characteristic plateau-like summits and steep flanks of the South-eastern Highlands, also an example of the ancient round tower. (*Photograph by R. Welch.*)

drainage system of the South-eastern Highlands is divided about equally between (1) the basins of the Liffey and the independent streams reaching the sea between Dublin and Wexford Bay; (2) the basin of the Slaney. This latter river rises in the highest part of the Wicklow Mountains, and flows south nearly parallel to the Barrow, to Wexford Bay. From the west it has practically no tributaries except the Boro, the watershed between it and the Barrow lying close above its right bank. From the east it receives the Derreen, Derry, Bann and other streams. The other principal streams are the Dargle, Vartry, Avoca or Ovoca, and Owenavorragh. Their narrow wooded valleys form the chief feature in a district famous for the beauty of its scenery.

The mountains of Wicklow and Wexford rise to domed summits, with broad expanses of moorland and frequent bogs. Their highest elevation is found near the centre of county Wicklow, where Lugnaquilla exceeds 3,000 feet. On the Wexford-Carlow boundary another eminent group culminates in Mount Leinster (2,600 feet). The central part or core of the mountain-system consists of the rock which we have already met with in the Mourne Mountains and in Donegal—granite. It has been extruded or thrust up by volcanic action through older rocks, which, near the granite, are themselves greatly 'metamorphosed' or altered in character. The flanks of the mountains are steep and often precipitous. The results of glacial action are frequently to be seen. For example, on Cronebane ridge above the Vale of Avoca, at a considerable distance from the granite core of the Wicklow Mountains, there is a huge boulder of granite carried down and set there by the glacier. Again, the slightly higher land which holds up the waters of the two loughs of Glendalough has been shown to be a glacial moraine.

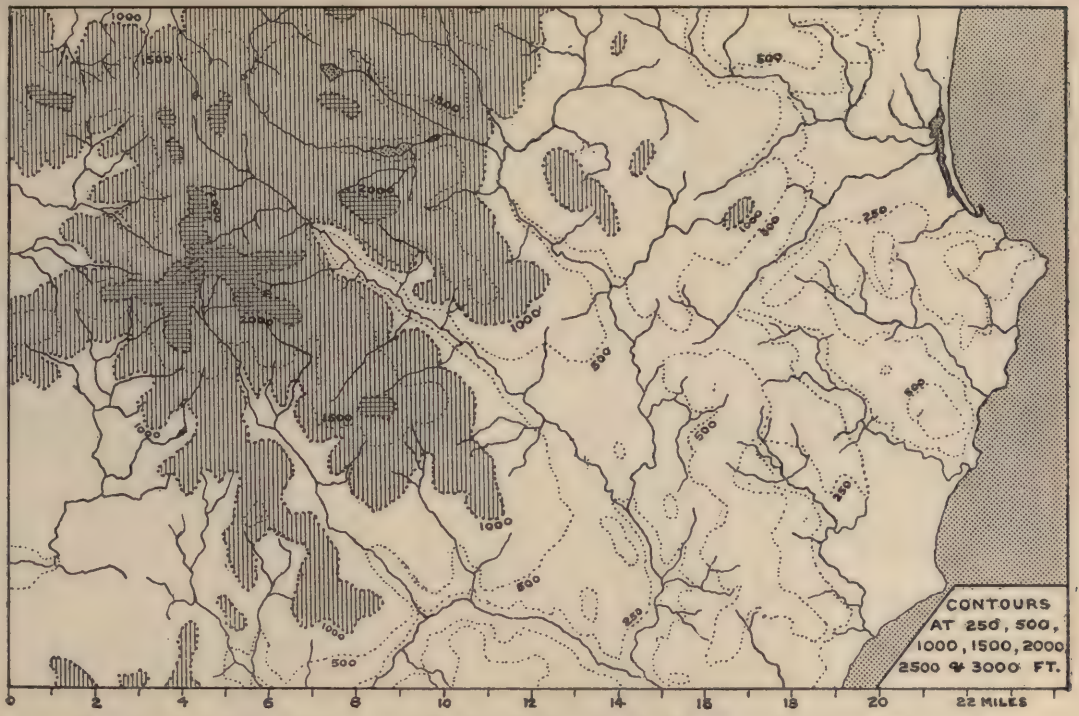


FIG. 21. Part of the South-eastern Highlands, showing their greatest elevation. (For general physical map, see p. 132).

The valleys which cut deep into the South-eastern Highlands are proved by geologists to be of very old formation. In this connexion it may be noted that we find here instances of valleys having been deserted by the streams which formed them, owing to changes in the level of the land. There is an exactly similar case in the Gap of Barnesmore, in County Donegal. In the South-eastern Highlands the Scalp, a deep cleft through a granite ridge south of Dublin, followed by the road to Laragh, is an instance of a valley thus 'deserted' by its river. The Glen of the Downs, south of Bray, is another, and the gorge of the Dargle is a third. The little streams which now flow through these deep valleys are too small to have formed them.

CHAPTER VIII

WEATHER

If we look at a river flowing not too slowly to be sluggish and not too quickly to break into waves, we may often see eddies breaking the surface in little circles or swirls, and then dying away. Elsewhere there will be almost still backwaters. If we think of the atmosphere as a river of vast size, flowing with eddies and backwaters each covering great areas of the earth's surface, we shall have a rough general idea as to its behaviour.

The principal factor in weather conditions is the condition of atmospheric pressure. Given an area of high pressure and an area of low pressure, and there will be a movement of the atmosphere, i. e. a wind, from the high to the low. The atmospheric pressure, as shown by a barometer, is reported at the same moment from a number of places in Ireland, Great Britain, and Europe to the Meteorological Office in London. There each figure is written in its place on a map, and it is found that the places reporting nearly the same pressure always lie in belts, and moreover that these belts, or some of them, form concentric ovals or circles, or at least arcs. Therefore lines can be drawn through all places reporting the same pressure to within $\frac{1}{10}$ of an inch. Such lines, which can never cut each other, are called isobars. Now the diagrammatic form of a river eddy would be a circle, so here we see the similarity of form between the eddy and one type of atmospheric movement, the low-pressure area.

Such an area is called a cyclone or low-pressure system or depression, but it often covers so large an area that a map does not show the whole system. None of the maps here given shows a complete cyclone, but if the innermost curve on Fig. 23 were completed, it would be realized that the centre of the depression lay over and east of the borderland of England and Scotland.[1]

Fig. 22. Approach of Cyclone.

A cyclone or depression has a forward movement as a whole. A great number of depressions reach the British Isles from the Atlantic, from some point of west, and pass across them to some point of east. This is the commonest

[1] The fuller study of weather types and their causes will help the understanding of this chapter. As an exercise, the student may draw on a map of North-western Europe and the neighbouring seas an imaginary completion of the cyclonic system of pressure and winds partly shown on Fig. 23.

type of atmospheric circulation over the British Isles. It is therefore illustrated in Figs. 22 and 23. The first shows a depression approaching the south-west of Ireland at 7 o'clock on a certain morning. The second shows the centre of the depression having passed north-eastward over Ireland and the Irish Sea, by the same time next morning. We have now to follow out the successive

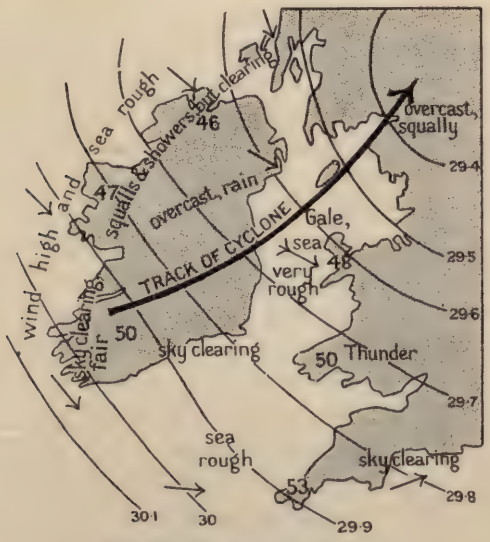


Fig. 23. Passage of Cyclone.

changes of wind and weather conditions caused by this passage.

Besides a forward motion, a depression has also a rotary wheel motion, but this rotary motion is in the opposite direction to that of the hands of a watch.

Therefore the direction of the winds, represented on the maps by arrows (→ light breeze, → fresh, ➤→ strong), if followed out, takes nearly the form of a circle, as does

the distribution of pressure. But it must be remembered that the direction of the wind may be changed by a number of causes. The rotation of the earth deflects it to the right. Its force and its direction may be changed when it passes over the land; for its passage over the open level sea is uninterrupted, but a land-surface offers more friction, and mountains may deflect its direction. So may local secondary depressions of the atmosphere, within the main depression.

At the centre of a low-pressure system the air has naturally a tendency to rise. As it reaches a higher level it cools, and the water vapour it contains is condensed and falls as rain. A cyclone therefore commonly brings rainy weather with it.

Let the student ask himself how often, in the course of a few hours or from day to day, he has known a succession of weather conditions of this sort—calm air, with high thin clouds, perhaps a halo round the sun or moon, and a misty atmosphere; the temperature rising, the air becoming muggy and the sky overcast; rain threatening and then falling steadily; the wind rising a little and perhaps changing its direction rather suddenly, with a time of calm between, then increasing in force, perhaps to a gale, with driving rain and heavy clouds; the clouds breaking, the temperature falling, the air becoming fresh and clear, the gale 'blowing itself out', and finally the sky clearing and beautiful weather setting in. This is a very common succession of weather in the British Isles, and it is caused by the passage of a cyclone or depression across them.

The weather-reporting stations quoted in the daily weather report of the Meteorological Office, from which the accompanying maps are compiled are, for Ireland, Malin Head, Blacksod Point, Valencia, Roche's Point

(near Cork), Birr, and Donaghadee. The maps also show reports from various stations on the English side of the Irish Sea, &c.

Cyclonic Weather. On the morning illustrated by Fig. 22, a depression had recently passed away to the north of Scotland. Its effect on pressure is shown by the eastward bend of the isobars or lines of 29·6, 29·7 and 29·8 inches of pressure, and the wind over the ocean north-west of Ireland was still answering to it in direction. Birr and Donaghadee were reporting quiet atmospheric conditions, the sky overcast and temperature rising. At Valencia and Roche's Point and off the Bristol Channel conditions in the cyclonic system were more advanced; it was showery or raining heavily; the wind was freshening from the south or south-west, and the sea was getting up. Clearly the centre of a new depression was approaching South-western Ireland from the ocean.

In the next twenty-four hours the centre had passed across Ireland and the Irish Sea in the direction shown by the heavy arrow on Fig. 23. In the evening the Western Irish stations had reported a rather sudden change of wind to north or north-west as the centre of the depression passed over them. The map shows the pressure and weather conditions on the following morning. In the Irish Sea the wind had risen to a gale from the west-north-west. Over the north-west of Ireland the weather was squally, with 'clearing' showers. Every station in the rear of the depression reported the sky to be clearing, though the wind was still high and the sea rough, the gradient of pressure remaining rather steep. The wind had now a general north-westerly instead of a southerly direction, and the unsettled conditions commonly following in the wake of a depression were revealed by a thunderstorm in South Wales. The tempera-

ture, as may be seen by comparing the two maps, had generally fallen in the rear of the depression.

Secondaries. Secondary depressions are frequently formed in a cyclone. In these the distribution of pressure often does not take a circular form on the map, but rather the form of a tongue or V. Such an arrangement is thus known as a V-shaped depression. There is frequently one

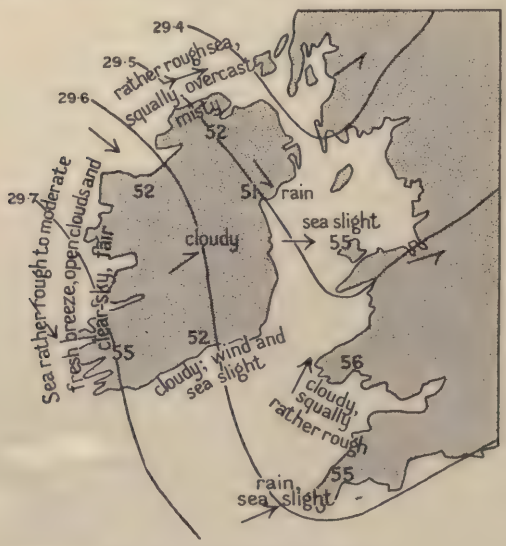


Fig. 24. V-shaped Secondary.

between two high-pressure areas or anticyclones. But in Fig. 24 a 'V-shaped secondary' is shown which followed in the wake of a cyclone which had passed away to the north of Scotland. The resulting weather is like that of a cyclone. The winds draw in towards the trough of the V, subject to the usual rotary motion and deflection. In Fig. 24 the trough lies over the north part of the Irish Sea, where winds are generally light, the sea is little

disturbed, and rain is falling. The wind is from the west, or, further south, from the south-west, but the Western Irish stations, being now under the influence of the retreating side of the depression, had reported a sudden veering of the wind to north-west, the weather moderating, the sky clearing, and temperature falling considerably.

Fig. 25. Anticyclone.

Anticyclonic Weather. Conditions exactly opposite to those of a cyclone are provided by an anticyclone or high-pressure system. The wind-movement is outward from the centre; the gradient of pressure is slight as a rule, so that the winds are not strong, but in both strength and direction they are more easily influenced by local conditions than in a cyclone. They move in a direction the same as that of watch-hands. The general conditions

make for fine calm weather, hot in the daytime in summer, bright and frosty in winter. The atmosphere being still, there is a tendency to fog. The down-pressed descending air is ready to take up moisture instead of depositing it as rain. Finally, an anticyclone, once established, moves slowly away, whereas cyclones move forward more rapidly and often follow one after another in succession. Over the southern part of the North Atlantic there is a permanent area of high pressure which is known as the Atlantic anticyclone. This sometimes extends so far as to cover the British Isles, which on the other hand sometimes come under the influence of a continental anticyclone. But Fig. 25 shows conditions when the actual centre of a small anticyclone was established over England. Here we find light breezes generally circling round and outward from the high-pressure centre. There is a diversion from the normal at Roche's Point, the wind being north-north-easterly. This was probably the land-breeze characteristic of anticyclonic conditions, when the wind draws out from the local area of higher pressure over the colder land to that of lower pressure over the warmer sea. The Irish Sea was calm; the open ocean nearly so. Fine weather was reported almost everywhere, but in St. George's Channel and off the south coast of Ireland there was the characteristic haze or fog. The morning temperature was rather low for the season (spring), but as the day advanced it became warm.

These examples should guide the student in the further study of weather over Ireland and the neighbouring seas. But it should be remembered that cyclones do not always follow the track of that in Fig. 23. This or a similar direction is the commonest, but there are also well-defined cyclone tracks from the north-west across the north of Scotland, or from the south-west northward over the

Irish Sea or eastward along the south of England or the English Channel. These would give arrangements of the isobars very different from those shown here. For an anticyclone of great extent the isobars would appear as practically straight parallel lines over our area.

CHAPTER IX

CLIMATE

Comparisons. When considering the climate of a country we must keep a clear idea of its latitude, so as to compare the case of other countries in the same latitude. The latitude of Ireland, then, is roughly that of Southern Labrador, Northern Manitoba, the south of Kamchatka, Southern Siberia, and the extreme northern parts of the Chinese Empire, and the central part of European Russia. Now in this list we have mentioned certain countries, especially Labrador and Siberia, which thought at once connects with very severe winter climates. On the other hand we know that in the northern parts of the Chinese Empire (Mongolia and Eastern Turkestan), in latitudes little if at all south of that of Ireland, there are vast desert areas which we associate with extreme heat and dryness.

In Ireland we find none of these features of climate. The climate of Ireland is moist, unusually mild in winter for its latitude, and throughout the seasons equable—that is, there are no extremes of cold in winter or of heat in summer. But Ireland is an island, with a vast expanse of ocean to the west of it. The Siberian-Chinese borderland runs through the heart of the great continent of Asia. This comparison points us to the contrast between the so-called 'oceanic' and 'continental' types of climate. A water-surface is far less susceptible than a land-surface to extremes of heat and cold. Ireland is under the influence of a water-surface and has the oceanic type

of climate; the Siberian-Chinese borderland has the continental type; so, in a modified degree, have central European Russia and Northern Manitoba.

Ireland, moreover, is more completely under the oceanic influence than might be supposed at first sight, when it is remembered that there is a great continental land-mass to the east of it. The climatic effect of this land-mass is reduced for the reason that Ireland, broadly speaking, gets its climate from the ocean, not from the continent; from the west, not from the east. There is a general movement both in the atmosphere over and in the waters of the North Atlantic Ocean from the south-west towards the north-east. The general 'drift' of warm water from equatorial regions joins the Gulf Stream (a warm current which passes from the Gulf of Mexico north along the American coast). The general drift of the prevalent winds which reach Ireland, mild and moist, from the south-west, and of this relatively warm water which they cause to drift with them bring to Ireland its singularly mild and equable climate. The average winter temperature is as much as 20° higher than that of some parts of America on the same latitude, but the average summer temperature is 10° or more lower.

Temperature. How equable the climate is may be judged from Fig. 26. This map shows the actual average temperature for the year as it is observed at the different elevations of the land, not as it would be if all the land were flat and at sea-level. The black patches show the lowest average temperature (44° Fahrenheit) and naturally coincide with the most elevated hill-tracts (compare Fig. 2). The tinted area shows an average from 44° to 48°, and the area left white has an average over 48°. Here, then, is evidence that there is no great difference of temperature between the highest and lowest parts of the

island. It may be observed that, setting aside the elevation of the land, the usual effect of latitude is seen, the

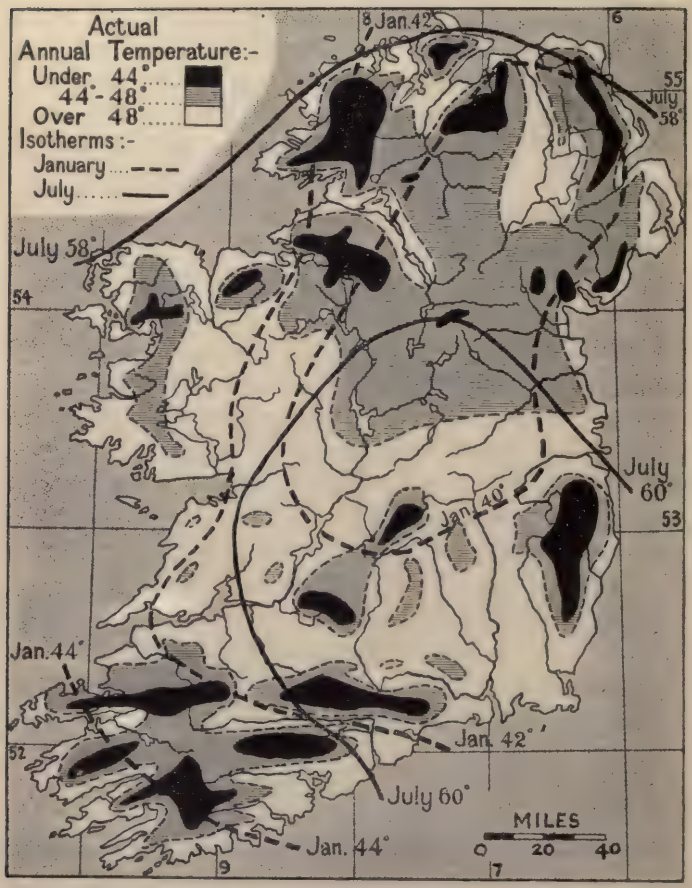


FIG. 26. Temperature. The isotherms for January and July are reduced to sea-level.

average temperature becoming lower in the north. While the southern half of the Central Lowland is left white,

the northern is almost covered by the tint. It may also be noted here that the great tracts of bog have the effect of somewhat lowering the temperature in their localities.

The same map shows certain summer and winter isotherms. These isotherms show temperatures reduced to sea-level, i. e. lines are drawn on the map through all places at which it is calculated that the average temperature for any given period would be the same if the places were all situated at the level of the sea. Thus if we have the isotherm showing a temperature of 44° we may take it that the temperature tends to exceed 44° on one side of the line and to be less on the other. On the map, the heavy broken lines show the isotherms of 44°, 42°, and 40° as average temperatures during the coldest winter month, January. The isotherm of 44° cuts across the extreme south-west of the island. The isotherm of 42° passes along the western side of the island from the extreme north-west to the estuary of the Shannon, and thence curves eastward to Dungarvan Bay. The seaboard of Donegal and Sligo therefore, with most of the Counties Mayo and Galway, the seaboard of Clare, and a great part of the Counties Kerry and Cork, have an average temperature in January of 42° or a little over. The isotherm of 40° forms a complete oval extending from Lough Derg nearly to the north-east coast, and from Lough Erne nearly to the east coast. The range of average temperature in January may therefore be taken as from about 39° in the north-east to about 45° in the extreme south-west. In July, the warmest month of summer, we have a still slighter range. The isotherms for this season are shown by a heavy unbroken line. An average temperature of 60° or slightly more is found over an area limited roughly by a line from Dublin to the headwaters of the Erne, along

the western side of the Shannon basin, and from Limerick to Youghal Harbour. Outside this line the average temperature is very little less; the July isotherm of 58° passes only along the northern extremities of the island, and touches the north-western promontories of the County Mayo.

From these lines the extreme range in the average temperature will naturally be found where the July line of 60° cuts that of January for 40°, and these two form a circle including a large area somewhat east of the centre of the Central Lowland. The extreme range of about 20° thus indicated is very small in comparison with that of a country under continental influence.

Rainfall. The oceanic type of climate is illustrated again by the rainfall. Let us take it that the prevalent winds come loaded with moisture from the ocean lying to the south-west, and see what result we should expect to find. Let it be remembered also that where such winds strike against the seaward faces of mountains the air currents are turned upwards, are cooled in the higher parts of the atmosphere which they thus reach, and have their moisture condensed into rain. We should expect to find, then, that the parts of Ireland subject to the heaviest rainfall are the west and south-west coast-lands, and especially those parts where mountains lie close to the sea, and that the rainfall decreases in amount in the east and north-east.

Fig. 27 shows this expectation to be correct. In the extreme south-west an area covering the most mountainous parts of the Counties Cork and Kerry is shaded by lines, indicating an average annual rainfall of 60 to 80 inches, and within this is a small area, shown black, where the average of 80 inches is even exceeded. At Mangerton, near Killarney, the heaviest average rainfall

in Ireland is recorded. There is another similar but smaller area in Western Galway, in the district of the

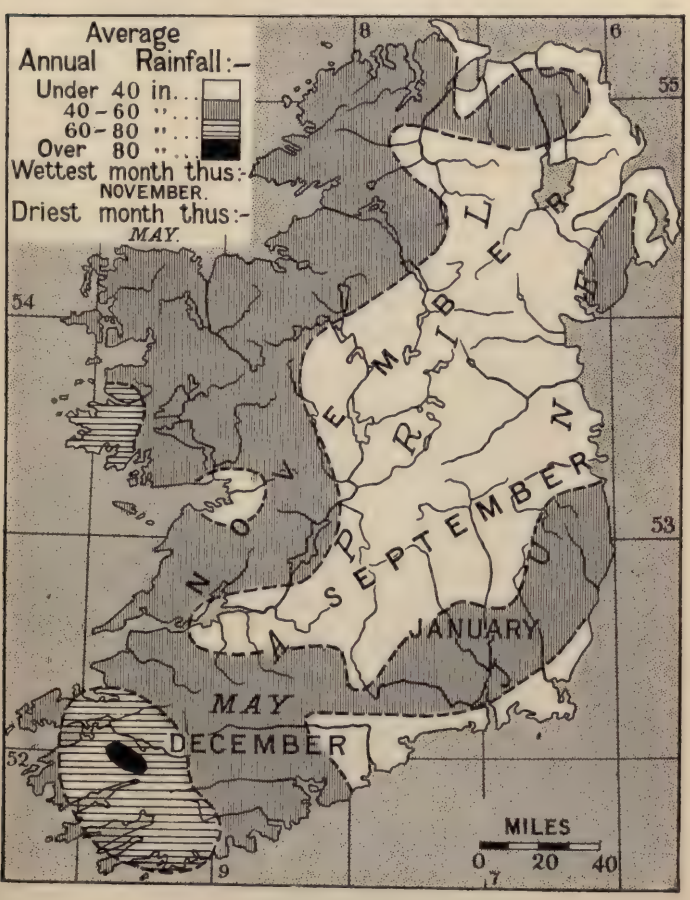


Fig. 27. Rainfall.

Twelve Bens and adjacent mountains, where an average of over 60 inches is recorded; at Kylemore in this district

it is about 77 inches. The great western and southern area more lightly tinted has a fall of only 40 to 60 inches; at Killybegs in Donegal, where the heaviest fall in that locality is recorded, the figure is 57 inches. Over the area left white the fall is less than 40 inches. At Dublin and Dundalk less than 30 inches is recorded. The distinction between west and east is thus clearly seen; the only important departure from the rule is that of the part of County Down where an isolated tract of rainfall over 40 inches occurs (50 inches at Newcastle), and here again we have the physical arrangement of a mountain group (the Mournes) rising close to the sea. The opposite of this arrangement—the coast bordered by a low plain—is seen to have the opposite effect, as in the case of that part of the Central Lowland which abuts on the head of Galway Bay, where the map shows a small area of low rainfall. Elsewhere, over areas too small to appear on the map, the same effect may be seen. Often, for instance, when clouds hang over the summit of Muilrea in County Galway, and rain is falling in the valley of the Bundorragha River to the east of it, the sky is seen to be clear over the lowland bordering Clew Bay to the north.

CHAPTER X

SOILS, VEGETATION, AND ANIMALS

THE moist climate of Ireland is in some respects unfavourable to the fertility of the soil. This in many parts tends to become too moist, and the heavy drainage tends to soak out of the soil and carry away its natural fertilizing matter. But the mildness of the climate assists towards an opposite tendency. Grasses and vegetation generally have a long season of growth on this account.

Soils. There are three good physical reasons why Ireland should be an agricultural country. Firstly, the great extent of lowland. Secondly, the great extent of limestone formation. Soil derived from limestone is almost invariably rich. Thirdly, the effect of the ice-action to which the country was subjected in the glacial period. This last needs some explanation. We saw in Chapter II how ice-action results in the grinding of the surface of the land, and how glaciers and the streams flowing from them carry along large quantities of rock in a more or less finely ground condition. This material is called drift, from the fact of its having been 'drifted' by the ice from its original position, and spread out where the ice finally deposited it. A vast amount of fertile drift was carried from the great limestone region of Ireland by the ice, and spread over large areas where the underlying formations would have produced a less fertile soil. A map giving the distribution of drift over Ireland shows that drift soils of one sort or another cover

Fig. 28. A Bog near Grange, Co. Sligo, showing roots of old trees and method of cutting and stacking peat. Observe also the characteristic table-form of limestone hill. *(Photograph by R. Welch.)*

not only the larger part of the Central Lowland, but also most of the north and great tracts of the south and south-west.

Considering the soils according to the chemical components which serve as fertilizers, we find that the limestone soil contains not only lime but phosphates. The basalt of the north-east, the Old Red Sandstone of the south-west, and the Silurian rocks of other mountainous districts (see Chapter I) produce soils containing a certain amount, but much less, of the same chemicals in a form suitable for plant growth. The igneous rocks, such as the granite of the south-east, east, and north-west, give soils rich in potash.

Bogs. One result of the moist Irish climate is found in the great extent of wet land and bog. The bogs (the distribution of which is considered in Chapter XXIV) form one of the most remarkable features of Irish physical geography. They are estimated to cover about one-seventh of all Ireland, and this estimate gives them a collective area of between 4,600 and 4,700 square miles (an area somewhat larger than that of the Counties Galway and Mayo together). Their average depth is 19 feet; some of course are much less, while others are as deep as 30 or even 40 feet or more.

Bogs are formed by the accumulation of marshy vegetation. As this grows upwards the lower growth, dying, becomes compacted or pressed together, to form turf or peat, which is used for fuel and other purposes. Where a bog has been dug in order to obtain peat, there may sometimes be seen in section the various stages of the formation of peat, ranging from loose spongy material at the top, to the compact brown or black peat at the bottom. The spongy surface of bogs is often dangerous to walk upon, for even a light weight will sink into it.

Moreover, bogs are commonly intersected by strips of firm ground (as the Bog of Allen is) and often it is difficult to distinguish between the firm ground and the soft surface, so that even a single incautious step may bring one into a position of danger. Bogs often represent the basins of former lakes, which have been choked with decaying vegetation. Elsewhere, and very frequently in Ireland, the bogs contain the stumps and roots of trees, showing that forests formerly covered these bare open areas. The wood of these trees is well preserved, for peat has chemical properties which preserve from decay not only wood but also other materials. Therefore the skeletons of extinct animals, such as the great Irish elk, human remains, and articles made by the early inhabitants, such as boats and household utensils of many kinds, as well as ornaments and other objects of gold, have often been found in the bogs in a good state of preservation.

A distinction is often made between red bogs and black bogs. The red bog, more common in plains than on high ground, has little woody fibre in its composition, consisting rather of mosses and other small growth, and is therefore of less value for fuel than the black or mountain bog, which is more common on high ground, where the peat is black, contains more woody material, derived from former forests, and is thus more suitable for burning. The rate of the formation of bogs is sometimes (in comparison with most geological processes) very rapid. An instance is quoted of a forest of dead trees in Scotland, the wood of which was no longer to be seen after fifteen years, the site being covered by a morass, while after forty years peat, firm enough to be cut and burned, had been formed. A notice of the industrial uses to which peat has been put is given at the end of Chapter XXV.

Vegetation. If the natural vegetation of Ireland be

compared with that of England, a close connexion is found between its distribution and the physical geography of the island. The number of different kinds of flowering plants, ferns, club mosses, &c., found in Ireland is much less than in England—the proportion being roughly as seven to ten. In the highland type of plants, and still more in those plants which are taken as most typical of the parts of Europe nearest to Britain, Ireland is especially lacking. This is easily explained as regards the Highland type. The highest mountains of Ireland are generally lower than those of England and Wales. Moreover, the highest Irish mountains are mostly in the western or southern parts, where the influence of the ocean makes for a mild climate, whereas plants of the highland type are better suited to the less temperate climate of the higher parts of the British mountains.

But considerations of climate alone do not account for the absence in Ireland of continental types of plants. The physical history of the island provides the explanation of this. Geologists have been able to prove that in a distant geological age there was a land connexion between what are now the British Isles and the continent of Europe, and further, that Ireland was separated from this continental mass before Great Britain was. Therefore the migration of plants from the present continent to the present island of Ireland was checked before that from the continent to Britain, and many plants established themselves in Britain after Ireland had been cut off by the sea.

Certain plants, however, are found in Ireland but not in Britain. These include a group called by botanists the Cantabrian, because it is most fully developed in the Spanish coastal district of the Cantabrian Mountains. Well-known plants in this group are the strawberry-tree

of South-western Ireland, the beautiful bog-plant called the large-flowered butterwort, and certain saxifrages (including London Pride, common in English gardens but not growing wild there) and heaths. Their curious distribution is difficult to explain, but it is usually supposed that they represent a migration along the formerly continuous coast between Spain and Ireland, that this migration took place before the glacial period, and that during that period the group escaped destruction by the ice and severe climate. A few plants of North American type occurring in Ireland may perhaps be explained by a similar migration in an opposite direction.

Botanists have divided Ireland into twelve botanical districts according to certain differences in characteristic vegetation. It is found that the maritime districts are much richer in the number of different species of plants than the inland districts. Thus the richest districts are Kerry and Southern Cork, and Antrim, Down, and Londonderry. The poorest are covered by the Counties Carlow, Kilkenny, Westmeath, Longford, Northern Tipperary, and King's and Queen's Counties.

Again contrasting the vegetations of Ireland and England, we find that the difference in range of temperature has a great effect upon them. The mean summer temperature in Ireland is about 2° lower than in England generally. Therefore grain and fruit ripen later and with less certainty in Ireland than in England. But the winter average is about 2° higher in Ireland, so that some plants flourish here which will not bear the greater extreme of cold in most parts of England. The mild winter climate in the south-west of Ireland allows many foreign plants, especially evergreens, to be introduced and to flourish.

We have seen (Chapter XI) that the highest average rainfall in Ireland is found in the south-west and west,

and that the average decreases eastward. The distribution of moist-growing plants answers to this, being greatest in the west. The rushes are a case in point, and so are the ferns, for which the Western and South-western Highlands are especially noted.

Animals. The physical fact that Ireland became an island before Britain has its effect on the distribution of wild animals just as on the vegetation. Thus such common English animals as the weasel and the mole are not found in Ireland. There are here only two kinds of mice and seven of bats, as against four and fifteen in England. Again, there are no snakes in Ireland. Moreover there are differences between animals common to both islands. Thus the Irish hare is not the common English sort, but that which is confined in Britain to the Scottish highlands. A parallel to the Cantabrian type of plants above mentioned is found in the spotted slug of Counties Kerry and Cork, which is confined to this part of the British Isles, but is also found in the north-west of Spain. The insects (especially butterflies) and even the birds show the same sharp division between Ireland and England as do the animals and plants.

PART II

REGIONAL DESCRIPTION

INTRODUCTION

POLITICAL DIVISIONS

We have learnt and accounted for the structure of the chief physical divisions of Ireland. It is now time to fill in the details of topography. The rivers and the mountain-groups have to be considered more closely, especially those which have not been dealt with by name in Part I. Moreover, it is necessary now to consider the political divisions of Ireland, the provinces and counties, and to trace their connexion with the physical divisions.

Ireland is divided into four provinces, Connaught,[1] Ulster, Leinster, and Munster. These contain thirty-two counties in all. Their relative position is exactly shown on the map (Fig. 29), but they may be more easy to recollect from the following arrangement, which shows it roughly, reading the map across from west to east, and downward from north to south. It is necessary that their names and relative position should be known thus early, because the names, of the counties especially, are constantly used in locating places, mountains, &c.

[1] Also spelt Connacht.

The map should be studied side by side with Fig. 2. We shall see later (Part III) how far the formation of

FIG. 29. Counties and Provinces. (Boundaries of counties shown by broken lines; boundaries of provinces by dots.)

the provinces and counties is connected with, and the result of, the physical geography of the land.

WEST.

Province of Connaught. Counties Mayo, Sligo, Leitrim; Galway, Roscommon.

SOUTH-WEST.

Province of Munster. Counties Clare. Tipperary; Limerick; Kerry, Cork, Waterford.

NORTH.

Province of Ulster. Counties Donegal, Londonderry, Antrim; Tyrone; Fermanagh, Monaghan, Armagh, Down; Cavan.

EAST AND SOUTH-EAST.

Province of Leinster. Counties Longford, Westmeath, Meath, Louth; King's County, Kildare, Dublin; Queen's County, Carlow, Wicklow; Kilkenny, Wexford.

CHAPTER XI

THE CENTRAL LOWLAND—EASTERN SECTION

Counties of the Lowland. In describing the Central Lowland in detail, we shall find certain parts of it which are capable of treatment as physical units. Such are the valleys of the principal rivers, such tracts of country as the Bog of Allen and the Curragh, which present certain individual characteristics, and the few isolated hills (for there are a few such, compare Chapter III) which rise within the area of the plain as distinct from those on its margins. But for the rest, as it is desirable to proceed, in our description, in definite directions through the lowland—it may be imagined that we are taking a series of journeys across it—we shall make free use of the names of the counties in order to define localities. At the outset, therefore, the names may be given of those counties which lie, wholly or in part, within the lowland area, and in the following table they are set approximately in their geographical relationship:—

Mayo	Sligo	Leitrim		
Galway	Roscommon	Longford	Cavan	Louth
		Westmeath	Meath	
		King's County	Kildare	Dublin.

The County Louth belongs wholly to the lowland excepting its northern extremity, which includes the Carlingford mountains. These we shall have to describe later. For the rest, the surface of the county is undu-

lating and studded with little hills. As these frequently have plantations upon them, and as the county at large is fertile and well cultivated, its general aspect is pleasing. Here, in fact, at the outset of our detailed description of

Fig. 30. Eastern part of the Central Lowland, to illustrate the position of Dublin, Drogheda, and Dundalk. Land from 250 to 500 feet in elevation is ruled; over 500 feet, black.

the country, we are reminded of the poetic name by which Ireland is known—the 'Emerald Isle'. To a visitor from England this name appears surprisingly just; the rich grass-lands of Ireland are of a peculiarly

vivid green. From the south-west of the county a little isolated group of hills extends into the north-east part of the County Meath. The chief rivers of Louth are the Castletown, Fane, Glyde, and Dee, none of considerable size; and the important Boyne, whose course will presently be described, touches the extreme south.

On the estuary of the Castletown, which opens into Dundalk Bay, is the port of Dundalk, whose harbour, after the removal of a dangerous sunken reef near its entrance, has acquired considerable trade, principally with Great Britain. The position of the town is of historical interest; Fig. 30 shows how it lies at the entrance of passes leading through the hills to the north, while on the other hand the plain opens southward. For this reason it was fortified as a frontier town of the English Pale (see Chapter XXIII) in the reign of Henry II, and in the wars of the sixteenth and seventeenth centuries it saw plenty of fighting.

Drogheda, in the extreme south of the county, on the Boyne, occupies a position somewhat similar to that of Dundalk, and has still remains of its strong old walls. Its port, in the narrow estuary of the Boyne, carries on a fair trade.

The River Boyne. The County Meath, which borders Louth on the south-west, and has a short extent of sea-coast between that county and Dublin, is traversed from south-west to north-east by the River Boyne. This river rises in the slightly elevated district in the north-east of King's County, which is an important centre of river-heads, for headstreams of the Barrow, and the Brosna, a tributary of the Shannon, rise not far away. A spring called Trinity Well at Edenderry is taken as the source of the river; it is only 290 feet above sea-level, and as the river has a course of 70 miles it may

be inferred that no part of it is rapid. The river is celebrated for the beautiful scenery of its well-wooded valley, which (although the Boyne is a lowland river) is enclosed by considerable hills, and for the many sites of historical interest on or near its banks. The course of the river lies diagonally across the plain; Dublin lies within the angle formed by the river and the east coast; therefore, in order to reach from the capital any point in Ireland north-west of it and outside that angle, the Boyne must be crossed. It is clear, then, that in the warfare of earlier days the fords of the Boyne must have been of great importance; the force which held them could forbid the passage of the enemy across them and so defeat his plans. We find, therefore, a number of castles along the valley of the Boyne—besides the fortifications of Drogheda there are Trubley, Dangan, Scurlogstown, King John's Castle at Trim, Donore, Ticroghan, Carrick, Grange, Kinnafad, and others, on or not far from the river. Similarly it was always a practice to establish religious houses in the safe retreat of valleys, for in this way they could be the safer under the protection of the strongholds just mentioned. So we find ruins of a large number of monasteries by or near the Boyne—such are Slane and Bective Abbey, St. Mary's Abbey and the Dominican Friary at Trim, with the Abbey of SS. Peter and Paul near by, Clonard (a bishopric in very early times), Ballybroggan, and Monasteroris. Nor was the Boyne Valley of less importance, but rather of more, long before the period of these Christian buildings. For rising above it on the east, about the middle of its course, is the famous hill of Tara, for ages the chief seat of Irish kings, and the remains of antiquity which are still to be seen upon it are for the most part nearly seventeen centuries old.

Then by the river itself, on the left bank not far above Drogheda, are some of the great burial mounds, with chambers within them, left by prehistoric man—Newgrange is the greatest of them. Finally, taking a wide step from these distant times to a period little more than two centuries back, we should remember that 'the Battle of the Boyne' is the name given to that fight which took place on the 1st of July, 1690, at a spot close to Drogheda on the west, when James II was finally defeated by William of Orange and afterwards fled to France.

We see, then, that the valley of the Boyne is one of the most important of the physical features of Ireland in regard to historical geography, and the reason for this we shall understand by studying and remembering its position on the map.

Mention was made of a small group of hills in the south of the County Louth, extending into the County Meath. This group lies north of the Boyne Valley, between Slane and Ardee; the greater part of it is in Meath, but the highest point (nearly 800 feet) is just in Louth. Most of the remainder of County Meath is generally fertile and green.

The angle between the Boyne Valley and the coast is occupied principally by a wide upward swelling of the lowland. It cannot be called a range of hills, for only once, at the north-eastern extremity, does it exceed a height of 500 feet, but it forms a water-parting between tributaries of the Boyne and those of the Liffey together with the short streams which reach the sea independently to the north of Dublin. It is a tract sufficiently undulating to make the traveller from Dublin forget that he is crossing the lowland. These undulations extend into the west of the County Dublin and up to the boundary

of Dublin city. The county generally is open grass-land, somewhat lacking in woods as compared with the Counties Louth and Meath.

Dublin. There are clear geographical reasons why Dublin should have become the capital of Ireland. It is situated centrally on the eastern coast. The distance from it to Great Britain across the Irish Sea is lessened by the westward projection of the Welsh island of Anglesea. Moreover Dublin, situated on a sheltered bay at the mouth of a considerable river (the Liffey), is the first point north of the Wicklow Mountains or South-eastern Highlands, from which there is ready access in all directions across the Central Lowland to different parts of Ireland. There are other fine bays further north—Carlingford, Belfast, and Larne Loughs, and the two last of these are nearer to the nearest point of the British coast than Dublin is to Holyhead in Anglesea, but the journey from them to other parts of Ireland lies at first through mountainous country, and though this means little to us in the days of good roads and railways, in earlier times it meant much. Moreover, Dublin is nearer to London, the seat of government in England, than other points further north on the Irish coast. But its central position at the entrance (as it were) to the Central Lowland is the principal reason why it should become capital. It had been a capital before the English made it so. The ravaging Danish invaders, finding it a good centre for their trade, founded a settlement here in the ninth century.

The River Liffey. The River Liffey is famous as having the capital on its banks. It is not of great size. The length of the valley from the source to the mouth (i. e. omitting the minor windings of the river itself) is about 65 miles. From source to mouth in a straight

line is only about 13 miles, for the Liffey forms a wide curve, its course changing in direction successively from south-west to west, north-west, north-east, and east. It is not, as the Boyne is, a river entirely of the lowland, for it has its source in the Wicklow Mountains, in a marshy tract near Sally Gap, and it collects the waters of the western slope of the mountains as far south as Wicklow Gap. Near Ballymore Eustace the Liffey descends from its mountain-valley to its plain-valley, and in doing so forms the well-known cataracts of Pollaphuca, with a total fall of 150 feet.

The County Kildare, through which the middle and greater part of the course of the Liffey lies, belongs almost entirely to the Central Lowland, though along the eastern boundary the foothills of the Wicklow Mountains descend into it. About the centre a small elevated plateau, with its longer axis running from south-west to north-east, includes the Red Hills and the Hill of Allen (676 feet) which, though low, rises rather abruptly above the Bog of Allen, the largest of the Irish bogs. It is rather a collection of many, connected together but demarcated by strips of firm land. Eastward it extends within 20 miles of Dublin, westward it nearly reaches the Shannon. It includes the hydrographic centre (that is, the slightly elevated tract forming the water-parting) where the Rivers Boyne, Barrow, and Brosna have head-waters. It has an area of about 370 square miles (that is, somewhat larger than the County Dublin), and the counties which include the greater part of it, besides Kildare, are King's County, Queen's County, and West-meath.

Another noteworthy feature of the County Kildare is the open undulating tract called the Curragh, which lies east of the town of Kildare and south-west of New-

bridge. It is a tract of some 12 square miles covered with soft springy turf, untilled but affording pasture for many sheep, and noted also for its race-course and its military encampment. Its name signifies 'race-course' and indicates the ancient establishment of the sport here.

King's County, which adjoins Kildare on the west, has a larger share of the Bog of Allen and its branches than any other county, and the land, naturally unfertile, is for the most part bare and desolate. In the south the Slieve Bloom Mountains, bordering the Central Lowland, enter the county. There is some extent of woodland in this neighbourhood and the south-west, and there is evidence that the forests covered a much greater area in early times than they do now.

Loughs of Westmeath. The surface of the county adjacent to the north, Westmeath, differs considerably from that of King's County. It is more undulating, and as a whole, lies rather higher, though it has no mountains—only a few isolated hills reach heights above 700 feet. Though there is a great extent of bog, and woods are few, the country is not as a whole without beauty, which it owes in great measure to the group of large lakes which lies within it. In the north, on the border with County Cavan, there is Lough Sheelin, with the smaller Lough Kinale close by. The River Inny flows through these, and lower in its course to the Shannon it drains Loughs Derravaragh and Iron. To the north-west of Derravaragh are Loughs Lene and Bane, which bring us back to the basin of the Boyne, for they are drained by the Deel, a tributary of that river. Then to the south there are Loughs Owel and Ennel, which drain by way of the Brosna to the Shannon. Finally in the west the county boundary runs to Lough Ree, which is drained by the Shannon itself.

CHAPTER XII

THE CENTRAL LOWLAND—WEST CENTRAL SECTION. THE SHANNON BASIN

The central and west-central portion of the Central Lowland belongs to the basin of the Shannon, the largest river in Ireland. The physical problem of the course of this river has already been considered in Chapter III.

The Shannon basin is roughly an oblong in form, lying north and south, but with a bend towards the south-west. The river rises above Lough Allen, and its extreme head-waters are in the Owenmore stream which waters the valley between the mountains of Cuilcagh and Benbrack. But a tributary of this stream is actually known as the source of the Shannon; it rises in the 'Shannon Pot', west of Cuilcagh, where the water issues forth from the underground channel which conveys it from a small lake about a mile distant. The river presently turning south, enters Lough Allen, the uppermost of a series of great loughs drained by the Shannon; it lies at a height of 160 feet above the sea. Flowing south from this the river receives the drainage of a district full of lakes, extending from Lough Gara east to the divide between the Erne and Shannon basins. A little above the town of Carrick-on-Shannon the Shannon receives, in Lough Drumharlow, its first important tributary, on the right[1] or west; this is the Boyle, whose course, like that of the

[1] In distinguishing the banks of a river as right and left, one is supposed to be facing down stream, that is, towards the mouth.

Erne, lies in great part through loughs (Gara, Key, Oakport). The Shannon itself partakes of this character

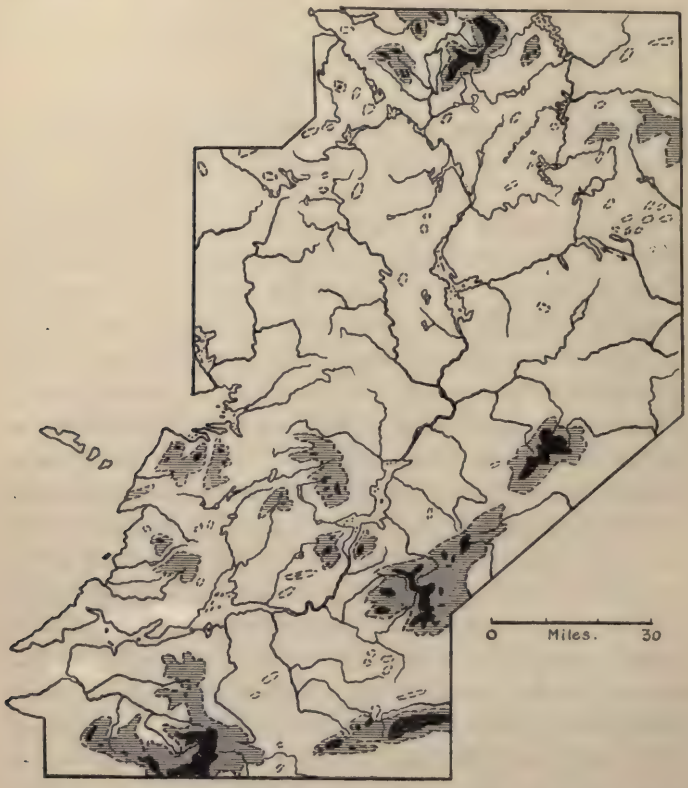


Fig. 31. Basin of the Shannon. Land from 500 to 1,000 feet in elevation is enclosed in broken lines, and the larger areas are shaded. Land over 1,000 feet is shown black. This map shows how the Shannon rises in the mountains north of the Central Lowland, and leaves it through those to the south.

hereabouts, for its channel widens and contracts alternately, so that it may almost be said to flow through a succession of small loughs between Carrick and James-

town, while below Annaduff there are Lough Tap on the main river and a number of small loughs connected with it by short streams. The Shannon now traverses the more important Loughs Boderg and Bofin, with the first of which Lough Kilglass is connected; all are exceedingly irregular of form, recalling Lough Gowna of the Erne Valley (Chapter III). At the foot of Lough Bofin is the village of Roosky, and below this the channel becomes more uniform in width, but on the other hand some large lakes are formed. Lough Forbes receives on the left the Rinn, which drains Lough Rinn, lying east of Lough Boderg. At Cloondara there enters from the east one of the two great canals which cross the central plain of Ireland. This is the Royal Canal, 72 miles in length (Chapter XXVIII).

Next, at Lanesborough, the Shannon enters one of the principal lakes of its course, Lough Ree, 16 miles long. It is studded with islands (many of which, from the ruins on them, are seen to have been retreats for the holy men of early times), and its flat shores (which are often well wooded like the islands) are broken by numerous deep bays separated by long narrow promontories, and clearly illustrate the process of the dissolution of the limestone which we have described in Chapter III. Not far below the outflow of the Shannon from the lake is the town of Athlone, and below this the river has a course of 38 miles across the plain uninterrupted by any lake, though at some points it divides into double channels enclosing islands, as at Long Island, Shannon Bridge, Shannon Harbour, and Meelick. Opposite Shannon Bridge the River Suck enters the Shannon on the right; this is its most important tributary, rising in a slightly elevated, lake-studded district west of Castlerea, in County Roscommon, and flowing with a course nearly

parallel to that of the Shannon itself, till at Ballinasloe it sweeps towards the east and towards the main river. The banks of the Shannon in this part of its course are flat and generally monotonous. At Shannon Harbour the Brosna enters on the left, and so does the Grand Canal, the second of the two canals which cross the Central Lowland (Chapter XXVIII). The canal actually crosses the river, for it continues up the Suck valley to Ballinasloe. There are docks for the repair of barges at Shannon Harbour. The Shannon passes the town of Banagher, where a short canal eases navigation by avoiding the ancient bridge with its narrow arches and great buttresses, and there is another canal on the opposite side of the river from Meelick, avoiding the tortuous channels hereabouts. The Little Brosna River enters at this point on the left.

Now, passing Portumna Bridge, the Shannon enters the principal lake on its course, Lough Derg, a sinuous sheet of water, about 25 miles long, but not generally more than two or three miles wide. The Slieve Aughty mountains rise not far from its western shore. Its lower end, above the town of Killaloe, where the river quits it, is a narrow arm about 7 miles long, between the Slieve Bernagh and the Arra groups of hills; immediately north of these the lake throws off deep bays to east and west, named respectively Youghal and Scarriff, and it is to this typical broadening over the limestone of the plain, in contrast to the narrowing between the hills, that we have already alluded in Chapter III (Lakes). The lough contains several wooded islands; as in Lough Ree these have sometimes remains of ancient religious foundations upon them. There are others on the mainland, especially on the east, and there are several ruined castles also.

The remaining course of the Shannon as far as the

head of its estuary at Limerick, differs considerably from the course above Lough Derg. The river is no longer traversing the Central Lowland; its valley is bounded by the Slieve Bernagh Hills on the west, and the Silvermine, Keeper, Slieve Felim, and other hills on the east, and whereas between Loughs Allen and Derg the Shannon falls only about 60 feet in a course of nearly 100 miles, it has to fall the remaining 100 to sea-level in 20 miles. The river is therefore more swift in this lowest part of its course, and as its volume is at the same time increased it forms some very heavy rapids, notably at Doonass, below Castleconnell, which like Killaloe is a well-known centre for salmon-fishing. Above the Doonass rapids the river is normally 300 yards wide and 40 feet deep; it then surges over a rugged bed of great rocks, so that the spectacle of this huge volume of broken water is very fine. Navigation is carried on over the greater part of the distance between Limerick and Killaloe by canal, avoiding the rapids and windings.

Limerick, at the foot of the inland navigation of the Shannon and its connexions, and at the head of sea-navigation by way of the estuary, has the natural geographical situation of an important port. In fact, if the Shannon navigation tapped a great industrial district there would have been no limit to the development of Limerick as its port; it is even now the chief port of the western seaboard of Ireland, though its quays are not accessible to ships of any great size.

The Shannon estuary runs nearly east and west from Limerick to its mouth in the Atlantic Ocean between Loop Head in County Clare to Kerry Head in County Kerry, its length being 64 miles. Several considerable rivers enter it—the Bunratty on the north and the Maigue on the south, the Fergus River, which enters the broad

branch estuary on the north, and the Deel on the south, and thereafter, on the south, the White River and the Feale, which in its estuarine course is called the Cashen.

The total length of the Shannon is about 230 miles, exclusive of its minor windings, and it may be divided into the following sections:—

Shannon Pot to Lough Allen	12 miles
Lough Allen	9 ,,
Lough Allen to Lough Ree	44 ,,
Lough Ree	16 ,,
Lough Ree to Lough Derg	38 ,,
Lough Derg	25 ,,
Lough Derg to Limerick	22 ,,
Limerick to the mouth	64 ,,
Total	230 miles

The drainage area of the Shannon basin, that is to say the area of that part of Ireland which sends its waters into the sea through the Shannon, either directly or by tributary rivers, is estimated at 4,500 square miles—about one-seventh of the area of the whole island.

The Shannon forms a boundary between counties over its whole course from Lough Allen to the sea. It separates the Counties Leitrim, Longford, and Westmeath and King's County from County Roscommon; King's County and Tipperary from Galway, and Tipperary, Limerick, and Kerry from Clare.

CHAPTER XIII

THE CENTRAL LOWLAND: WESTERN SECTION—LOUGHS CORRIB, MASK, AND CONN

The Central Lowland west of the Shannon is generally a dreary country, full of bogs, and on the whole flatter than the eastern part, though in the north, towards Lough Conn and the Ox Mountains, its surface becomes more broken, with a low range of hills (750 feet) extending west of Lough Gara. But between the Shannon and the mountains of Connemara there is no hill, excepting the little range (hardly over 500 feet) west of Lough Ree, and an occasional isolated eminence like that north of Monivea (550 feet). However, we find the water-parting between the Shannon basin and streams flowing towards Galway Bay, in the slight uplift to be traced from Ballyhaunis in the north past Glennamaddy, and thence due south. The land sinks to a very low level in the wide open valleys of the Clare and other streams running westerly from this parting to the great loughs, Mask and Corrib, which extend north and south along the eastern foot of that group of mountains which we have termed the Western Highlands of Galway and Mayo. These two loughs, as well as Lough Curra in the plain north of Lough Mask, are connected by short streams, and drained by the short river Corrib to Galway Bay at the town of Galway. They are of the form which we know well, irregular and studded with islands—further instances of the effect of the dissolution of the

limestone. But it is also to be noticed that Loughs Mask and Corrib lie along the line where the limestone of the Central Lowland is bounded by other rocks. These rocks are not soluble like the limestone; yet bays of both the loughs penetrate into them. For this one reason may be found in the constant wearing action of the waves, which frets the shores of the loughs as the sea-waves fret the coast. But there are other possible reasons, as we have seen in Chapter II. These arms on the west of Loughs Mask and Corrib really belong to a mountainous district (the Western Highlands), not to the lowland. The hills rise closely nearly all along the western shores of the loughs. Returning to the limestone, however, we find the remarkable result of the effect of water upon it, referred to in Chapter III (Caverns), namely that these two great loughs are connected by a river under ground. This is common enough in the case of small loughs, but not in the case of large ones.

The very low-lying part of the Central Lowland, which has been mentioned as extending north from Galway Bay and along the east shores of Loughs Mask and Corrib, is continued northward between the Ox Mountains and the hills of Western Mayo, to Killala Bay. The low level is practically maintained all the way. The water-parting between streams flowing north and south, which is found near Castlebar, hardly reaches 150 feet above sea-level. But where the depression is narrowest, at the south end of Lough Conn, the lowland limestone is interrupted by a belt of an older rock extending from the western highlands. The River Moy, flowing into Killala Bay, drains the large Lough Conn with its smaller appendage Lough Cullin. It was thought that from Galway to Killala Bay, through these great loughs (Corrib, Mask, and Conn) and over this low flat country, a canal could

be made, which would save ships sailing round from Galway to Donegal Bay, a dangerous coast. Lough Corrib (which, like other limestone loughs, is very shallow) was deepened in some parts, and a channel marked through it, but the scheme was never carried out.

The relation of Lough Conn to the plain on the east and the mountains on the west is not unlike that of Loughs Mask and Corrib, the great isolated mass of Nephin (2,646 feet) rising close to its western shore. The relation to the Moy, the river which drains it, is very curious, and so is the course of the river itself. It rises in the Ox Mountains, and collects the waters of a large number of streams from these mountains and from the low hills west of Lough Gara. After flowing at first south-westerly, it bends, about four miles south of Foxford, due north, forms an estuary below Ballina, and enters Killala Bay. Between the bend and Foxford it receives on the left a stream not a mile long, which drains Lough Cullin. This lough has been mentioned as an appendage of Lough Conn; the two are connected on the north by a short narrow strait, which is crossed by a bridge called the Pontoon. Thus the two loughs lie nearly parallel with the Moy, and if the slope of the land were very slightly changed the river might enter Lough Cullin at the south, and leave Lough Conn at the north-east. Moreover, the difference of level between Lough Conn, Lough Cullin, and the Moy is so slight that any abnormal condition reverses the flow of water under the Pontoon, and whereas the usual flow is, of course, from Conn to Cullin, it is sometimes reversed from Cullin to Conn.

CHAPTER XIV

BOUNDARIES OF THE CENTRAL LOWLAND

On the east the boundary of the Central Lowland is the Irish Sea, and the low coast extends from Dundalk Bay in the north to Dublin Bay in the south. An exception is found in the prominent peninsula—almost an island—of Howth, which shelters Dublin Bay on the north. This is joined to the mainland by a very narrow neck of low land. It rises to a height of 590 feet, and has considerable cliffs on the seaward side. To the north is Lambay Island, small but high (400 feet). Both are remnants of hard rocks, which have resisted denudation better than the limestone. Lambay represents the neck of a volcanic vent. The low coast is unbroken in the northern half by any considerable inlet, except the estuary of the River Boyne. In the southern half there are shallow inlets north of the Howth peninsula, near Rush, at Malahide, and at Baldoyle. Then there is Dublin Bay, into which flows the River Liffey.

The northern boundary of the Central Lowland is formed of groups or masses of hills, generally of no great height. It is not very easy to determine exactly, because the hills are separated into detached groups. The lowlands between them do not rise at their highest parts much above the higher parts of the Central Lowland itself, and may be regarded, in a physical sense, as extensions of it. We may take the contour line of 500 feet as roughly indicating the boundary. In the north-

east this begins to the south of the broad tongue-shaped promontory between Carlingford Lough and Dundalk Bay, where Carlingford Mountain reaches a height of over 1,900 feet. Thence a bow-shaped line of hills may be traced north-west, west and south, interrupted as already indicated.

The more important depressions have high-roads and in some cases railways running through them from the Central Lowland into Ulster, and in most of them there is a town or considerable village. Thus to the west of the Carlingford Mountains a depression carries the road (which passes the village of Jonesborough) and the railway between Newry and Dundalk, continuing the great natural line of communication between Ulster and the south referred to at the end of Chapter IV. Following the bow, we have next the isolated mountains of Slieve Gullion (1,900 feet); then lower hills in the neighbourhood of Newton-Hamilton, County Armagh (Carrigatuke, 1,200 feet); then a wide depression to less than 500 feet, with the railway between Dundalk and Clones, and the town of Castleblayney at the narrowest point, close to the shore of Lough Muckno; then a more elevated tract rising to about 780 feet; then the lake-studded depression in which lies the small town of Shercock (County Cavan), and finally the more extensive elevated tract about the town of Bailieborough (County Cavan), where the hill of Moyer reaches over 1,100 feet. High ground now continues due west without much interruption as far as a point a little south of the town of Cavan, and Slieve Glah reaches a height over 1,000 feet, but at this point there intervenes the remarkable valley full of the loughs formed by the River Erne and its tributaries. The Erne rises to the south in Lough Gowna, which is one of the greater loughs of the Central Lowland itself, and finds

its way between the mountain-groups bounding the plain north-westward to the Atlantic Ocean at Donegal Bay, as the Shannon does south-westward to its estuary (Chapter III).

We must therefore now look further north for hills high and continuous enough to be considered as bounding the lowland. We find them north of Ballyconnell, on the frontier of the Counties Fermanagh and Cavan, where Slieve Rushen reaches 1,280 feet. Continuing westward, there is a pass in which is the town of Swanlinbar, between these hills and the higher mountains which culminate in Cuilcagh (2,200 feet). Here the great river Shannon takes its rise, and running south-west soon enters Lough Allen, which has the Cuilcagh mountains on its eastern shore, and the Braulieve range (1,500 feet) on the west.

Although broken heights of considerable elevation extend west and south-west of this point as far as Swineford and Kilkelly in the County Mayo, the Central Lowland may almost be said to reach the western sea at Ballysadare and Sligo Bays, for the broad depressions in which lie Loughs Key and Arrow, and Lough Gara, converge northward upon a gap between the hills south of Lough Gill and the Ox Mountains. At the mouth of this gap is the town of Collooney, upon which three lines of railway converge, from east, south, and west, to form a joint line through the gap to the important port of Sligo.

The Ox Mountains bound the Central Lowland on the north-west; their greatest height is 1,780 feet. They carry the boundary on to Lough Conn (County Mayo). This lies in a depression through which the plain extends to the north coast of County Mayo at Killala Bay, but there is the high ground of Nephin (2,650 feet) and Croagh Moyle to the west of the lough. The plain, how-

ever, may be said to reach the sea at the head of Clew Bay, which is shallow, and has many islands at its head. In this natural gateway from the plain to the ocean are the two small towns of Westport and Newport. Thereafter (to the south) the western boundary of the plain is clearly defined by Loughs Mask and Corrib, from the western shores of which the Partry Mountains (2,240 feet), and the hills of Joyce's Country, and Iar Connaught (County Galway) rise rather steeply. South of these, however, the Central Lowland finds its principal extent of coast on the west, reaching and extending round the head of Galway Bay, with the port of Galway. South of this the terraced hills in the Burren district of County Clare form a boundary, but the plain sends a branch southward to the estuary of the Shannon—the lowland in which stands the town of Ennis.

The southern boundary of the plain is easier to describe than the northern. There are four well-defined groups of mountains, separated by three depressions. East of the Ennis depression is Slieve Aughty, which has an extreme height a little over 1,300 feet. East of this range, the valley of the Shannon intervenes, with Lough Derg occupying the depression. From near Killaloe at the foot of the lake a range of hills extends north-east, broken by a pass in which the town of Roscrea is situated. In this range, Keeper Hill in the south-west reaches 2,280 feet, while the Slieve Bloom Mountains at the other extremity, beyond the pass of Roscrea, reach a height of 1,730 feet. We now reach the depression in which Maryborough stands, east of which is a cluster of hills, with an extreme height of 1,100 feet, in the south of which is Castlecomer with its coalfield. These hills bound the Barrow valley on the west, as do the foothills of the Wicklow Mountains on the east. The Barrow valley has

much the same relation to the Central Lowland as has the Erne valley in the north (though entirely different in character, for it is without lakes); the river rises in the plain itself, and makes its way between the hills southward to Waterford Harbour.

The mountains of the County Wicklow, with their foothills in Kildare and Dublin, which bound the Barrow valley on the east and complete the southern boundary of the Central Lowland, have been indicated above (Chapter VII) as forming one of the principal mountain groups or physical divisions of the island, under the name of the South-eastern Highlands. They reach the Irish Sea at Bray, close to the southern horn of Dublin Bay, so that we have now completed our circuit of the Central Lowland.

Having done so, we are in a position to estimate its area. If we take a line along the foot of all the groups of hills we have mentioned, and carry it straight across the intervening depressions, so as to leave out of account the northward and southward branches of the lowland, we shall find its area to be 8,000 square miles in round figures, or, taking an expression easy to remember, we may say that it covers a quarter of the total area of Ireland.

CHAPTER XV

THE HIGHLANDS AND ISLANDS OF THE WEST

In studying the physical geography of the highland districts, it was necessary to go most closely into the topography of the Western Highlands. With these, therefore, as the most familiar, we may begin the regional description of the highlands, which will afterwards be followed from west to north, east and south.

The Western Highlands occupy a projection of the west coast of Ireland which is washed on three sides by the Atlantic Ocean. North and west it faces the open sea, southward it is bounded by Galway Bay. The eastern limit has already been defined—it is the line running from Killala Bay in the north, through Loughs Conn, Mask, and Corrib, to the town of Galway and the mouth of the River Corrib. The highlands thus occupy the western parts of the Counties Mayo and Galway. Within this area there is a division into northern and southern halves, where the narrow belt of lowland extends to the head of Clew Bay. The Western Highlands are thus divided into two districts, of which the southern, by far the more important and interesting, containing the Twelve Bens of Connemara, Killary Harbour, Muilrea, and the Sheefry and Partry Mountains, has been described in Chapter VI.

Only two railways reach this isolated region. One runs along the south of it from Galway to the little

town of Clifden. Another serves Westport and Newport, and is continued along the north shore of the bay and round the north side of the lofty Curraun Peninsula, to Achill Sound.

Having reached this strait between the mainland and the island of Achill, we are led to consider the islands which fringe this part of the Irish coast. They are numerous, and some of them—such as Inishark, Inishbofin, Inishturk, and Clare Island—are of considerable size and height. Knockmore on Clare Island is 1,520 feet high, and presents great cliffs to the sea. These islands are inhabited, and agriculture, fishing, and burning seaweed for kelp[1] are carried on. We shall find that here and elsewhere off the Irish coasts the islands, like those in the lakes of the Central Lowland, were used as retreats by holy men who established their cells and chapels in these secure places. There was an abbey, founded in 1224 for Carmelites, on Clare Island. On the mainland, it may be added, the mountain of Croagh Patrick is a sacred spot. This beautiful cone-shaped hill rises almost alone from the south shore of Clew Bay to a height of 2,500 feet. It is dedicated to St. Patrick.

Achill Island. The largest and most remarkable island off the Irish coast is Achill, divided from the Curraun Peninsula by Achill Sound, a strait so narrow that it is bridged for a road. Achill (a name meaning 'eagle') is a triangular island, measuring in greatest length and breadth 15 miles by 12. It has two distinct ranges of hills, separated by a boggy lowland. That in the middle and southern part reaches an extreme height of 1,530 feet, and on the seaward (south-

[1] Kelp is the ash obtained from the burning, and produces iodine and other chemicals.

western) side is cut off in a series of fine cliffs, the cliffs of Minaun. The north-western range has two summits, Slievemore and Croaghaun (2,200 feet). Here again the seaward side falls in great cliffs. Croaghaun, in fact, has almost the appearance of having been cut in half, for its seaward slope is very steep and craggy from the summit to the foot. To the west of it Achill Head projects far into the Atlantic Ocean—a lofty promontory, with a jagged crest like the teeth of a saw, with cliffs sheer or nearly so on both sides, and a summit so narrow as at some points to afford only bare room to walk along it. The island has a population of nearly 5,000, collected in several villages of which Dugort is the chief. Achill supports its inhabitants poorly, being unfertile.

The northern part of the Western Highlands includes a considerable tract of lowland fringing the west coast and forming the curious peninsula of Mullet, which is joined to the mainland by a narrow strip of land on which stands the town of Belmullet, flanked by Blacksod Bay on the south and Broad Haven on the north. Belmullet is another point which, like Killary Harbour, has been suggested as the site for a great port, but we saw above that it is 40 miles from the nearest railway, at Ballina, from which it is separated by a very desolate and sparsely inhabited country.

Between Lough Conn and the coastal lowland there is a mountainous tract, which may be divided into four groups—(1) the isolated summit of Nephin, rising from the western shore of the lough to a height of 2,650 feet and to be compared as regards its isolation and form with Croagh Patrick; (2) a much lower range south of it (Croaghmoyle, 1,400 feet); (3) the range including Birreencorragh (2,300 feet), separated from (1) and (2)

by the valley in which lies Lough Beltra; and (4) the range in which Cushcamcarragh reaches 2,350 feet, separated from (3) by the valley of Lough Feeagh. North of these we have the desolate tract mentioned above; Carrowmore Lough lies in it, and a low range of hills extends northward to the coast near Ballycastle. Here it sweeps westwards, and like the mountains of Achill is cut off on the seaward side in a range of lofty cliffs, which extend along the coast westward to Benwee Head, where they reach an extreme height of 830 feet. They generally fall sheer into the sea, and are full of seaworn caves, in some of which the roof has collapsed, so that one may look from the top down a deep pit, and see the water surging at the bottom.

CHAPTER XVI

THE NORTH-WEST OF IRELAND

Slieve Gamph and the Ox Mountains form a chain running from south-west to north-east, to the east of the lower Moy valley, from County Mayo into County Sligo. Knockalongg in the Ox Mountains reaches a height of 1,780 feet. The range forms the first link in a chain of hills extending along the coast and connecting the Western and the North-western Highlands. North-east of the range is Sligo Bay, branching at its head into Ballysadare Bay and Sligo Harbour. The latter has on it the port of Sligo. This is, geographically, an obvious situation for a port, for as already shown (p. 110) it is one of the natural outlets seaward from the Central Lowland by way of the narrow pass through the coastal mountains at Collooney. Sligo is beautifully situated on the Garvogue River, a short, broad stream between Lough Gill and the sea. High hills rise on either side of the valley. Those on the south are broken by the pass already mentioned, but Knocknarea reaches nearly 1,100 feet. To the north is a wild mountainous district, separated from Donegal Bay by a low, narrow coastal plain. Benbulbin reaches 1,720 feet, Truskmore 2,100. To the north the mountains extend as far as the Drowes River, draining Lough Melvin, after which we reach the lower course and mouth of the River Erne. The mountains lying east of Truskmore and south of Loughs Melvin and Erne consist largely of limestone, and are noted for their

waterworn caverns (see Chapter III). These underground channels are situated in the mountains of Tiltibane and Cuilcagh. There are others in Belmore (1,300 feet) to the north. The steep sides and flat summits characteristic of limestone hills are well seen in the locality.

Donegal—the North-Western Highlands. The land boundary of the County Donegal extends from the mouth of the Drowes River to Lough Foyle, a great inlet of the north coast. Compared with the great extent of coast-line this land boundary is short. If we take a physical boundary extending from the head of Donegal Bay (at the town of Donegal) to that of Lough Foyle it is shorter still, and we see Donegal as a peninsula, mountainous throughout, with a steep broken coast. This physical boundary may be drawn by following the railway from Londonderry to Donegal town. This at first runs up the valley of the River Foyle (which enters Lough Foyle), branches at Strabane up that of its tributary the Finn, and at Stranorlar branches again south-west. Never rising higher than 600 feet, it traverses the so-called Gap of Barnesmore, a narrow pass between hills up to 1,700 feet high, which is supposed to be an old river-valley, which the river has deserted owing to one of those changes in the level of the land which have been spoken of before.

Donegal consists of a series of short mountain-ranges, indented or separated by series of parallel valleys (Chapter VI), in which the rivers flow either east to the Foyle, or north-east or south-west to the Atlantic Ocean. The principal east-flowing river is the Finn. South-west of this, and west of the Gap of Barnesmore, a range of mountains extends along the north shore of Donegal Bay, and is deeply scored by streams running into the bay—the Eask (draining Lough Eask), the

Eany Water, the Oily, Glen, and others. The shore of the bay is indented by several branch bays—Inver, McSwyne's, Fintragh, Teelin. These afford good harbourage for boats, and a fishing industry is centred at Killybegs, on a sheltered arm of McSwyne's Bay. The highest point in the range behind this coast is 2,220 feet in Croaghgorm or the Blue Stack Mountains. At the south-western extremity is the remarkable mountain of Slieve League (1,980 feet), which like the mountains of Achill Island is cut off on the seaward side in tremendous cliffs. Beautiful colours are seen in the rock when the sun shines on it. The whole coast is cliff-bound from this point round to Loughros Bay.

North of this bay the principal river flowing south-west is the Gweebarra, which enters the bay of that name. The line of its valley is continued north-east by that of the Owencarrow, draining Glen Veagh and Lough Veagh, and entering Sheep Haven on the north coast. The depression thus formed separates the Glendowan Mountains (Moylenany, 1,700 feet) from the Derryveagh Mountains, in which Slieve Snaght reaches 2,240 feet. Next to the north-west, separated from the Derryveagh Mountains, and from each other by the valleys of the Clady, Tullaghobegly, and Ray streams, are Errigal, the highest summit in the North-western Highlands (2,470 feet), Wee Errigal, and Muckish (2,200 feet). Between the two first of these heights is Lough Altan, drained by the Tullaghobegly, and at the foot of Errigal on the south-west are Lough Dunlewy and the two Loughs Nacung, drained by the Clady. The coast north of Loughros Bay is much indented, and has a number of islands off it, among which is Aran, one of the largest off Ireland, with cliffs on its seaward coast.

The coast-line rounds the Bloody Foreland and Ranaghroe Point, and turns east, facing north. Tory Island lies seven miles out to sea; its inhabitants cultivate it, keep livestock, and fish. The island is so remote that they live to some extent beyond the law. Even here a religious house was founded in early days by St. Columba, and there are ruins of two churches and other buildings. At Horn Head, on the mainland, sheer cliffs descend to the sea. The parallel valleys which open upon the coast east of this point are deeper than those opening south-west, and thus the land is penetrated by a succession of long inlets of the sea—Sheep Haven, Mulroy Bay with its branches, the wider and longer Lough Swilly, and finally Lough Foyle, which almost resembles a land-lough, being broad and shallow within, but narrow at its entrance from the sea.

The Foyle Basin. The great peninsula of Inishowen, between Loughs Swilly and Foyle, projects northward to Malin Head, the most northerly point of Ireland. The peninsula is generally mountainous; Slieve Snaght in its centre is 2,020 feet high, and a range along the west shore of Lough Swilly reaches nearly 1,600 feet. Lough Foyle has a greater importance than the other inlets of the coast, as it receives the large River Foyle, on which the port of Londonderry is situated. The name of Foyle is given to the river only below the junction of the Mourne and the Finn at Lifford. The Mourne, also known higher up as the Strule, is the main stream. Its basin or drainage area (as distinct from that of the Finn) coincides pretty closely with the County Tyrone, which, however, extends beyond it in the south-east, to the shore of Lough Neagh. For the rest, the county consists of a series of roughly parallel ranges of hills, cut through by the Mourne and separated by its tributaries, which enter

it at right angles. The chief of these tributaries are, from the west the Derg, Fairy Water, and Owenreagh, from the east the Owenkillew and Canowen. The hills are higher in the north of the county than in the south the range at the head of the river does not much exceed 1,000 feet, whereas Mullaghcarn in the next range north is 1,780 feet, and in the Sperrin Mountains, northward again, Sawel reaches 2,240 feet. The lowlands of Tyrone are fertile and particularly well cultivated, and in the Mourne valley there is a succession of considerable towns at natural situations where the branch valleys converge upon the main valley—Omagh at the junction of several headstreams, Newtown Stewart near the junction of the Owenkillew and the Derg, and Strabane and Lifford at the junction of the Mourne and Finn. As the valleys of the Foyle and its tributaries offer an outlet to the sea from so large an area a considerable port would be expected towards its mouth, and we find this in the ancient city of Londonderry. Most vessels sail right up to it, but the large steamers call at Moville at the entrance to Lough Foyle. Londonderry (shortened to Derry) has not only a good shipping trade, but is a centre for the shirt-making industry which is carried on over a large part of Ulster, and is, in fact, one of Ireland's most important manufactures. There are various other industries, among which bacon-curing may be specially mentioned, and the salmon fishery in the Foyle is valuable.

CHAPTER XVII

THE NORTH-EAST OF IRELAND

The Basin of the Bann.—The Coast of Antrim.—County Down.—The Mourne Mountains

The district next to be considered, passing east of the Foyle basin, covers the north-east part of the province of Ulster. It thus includes the North-eastern Tableland and the Eastern Highlands (Chapter IV). Excepting the very short valleys draining to the coast of Antrim it coincides with the basin of the Bann. This basin includes not only the greater part of County Antrim, but also the east part of Counties Londonderry and Tyrone, the north of Monaghan and Armagh, and a part of County Down. The Bann rises in the Mourne Mountains, runs north-west to Lough Neagh, forms Lough Beg immediately below, and enters the sea below Coleraine by a long estuary, the next important inlet eastward after Lough Foyle. The Bann drains an area of 2,300 square miles. Its salmon fisheries are valuable, and the Upper Bann (that is, the river above Lough Neagh) used to be noted for the pearls found in the freshwater mussels which were common in it.

Lough Neagh. The centre and principal feature of the basin is Lough Neagh, the largest lake in Ireland (see Chapter IV), into which flow all the principal rivers of

the basin. It is oblong in form, being 18 miles long and 11 broad. Its area is 150 square miles, so that it is about half the size of the County Louth. The Bann enters the lough at the south and leaves it at the north. Other rivers which enter the lough are the Main from the north, the Ballinderry from the west, and the Blackwater from the south-west. There is no large stream from the east, for the hills of County Antrim lie near this shore. The south-west of the basin is bordered by the slight hills (seldom over 1,000 feet), or broad upland, which we took as the northern boundary of the Central Lowland (Chapter XIV). We found that they were broken by depressions or passes affording lines of communication from the plain northward. The most important, carrying the main Great Northern railway between Dublin and Belfast, is that in which the towns of Newry and Poyntzpass are situated. The watershed between the Newry, Upper Bann, and Lagan Rivers, which flow respectively to Carlingford Lough, Lough Neagh, and Belfast Lough, is quite low. South of Lough Neagh there is, in fact, an undulating plain of which the valleys of the Blackwater on the one hand and the Lagan on the other practically form continuations. A main railway of the Great Northern system, and the Ulster Canal, connecting the Erne, Lough Neagh, and the Lagan and the port of Belfast, traverse this plain, in which a number of important towns are situated.

This is, in fact, one of the most populous parts of Ireland, and is devoted principally to the linen industry, besides being fertile and well cultivated. Passing through it from west to east we have the towns of Monaghan, Armagh (in the neighbourhood of which brown holland is produced), Portadown, noted especially for lawn and

cambric, Lurgan with its bleaching-greens, and Lisburn, noted especially for damasks, besides a number of smaller industrial towns. Water-power is provided by the Upper Bann and other streams. A natural harbour is found as an outlet for the trade of this district in the deep, sheltered inlet of Belfast Lough, on which, at the mouth of the Lagan, is situated the port of Belfast.

Belfast is not only the metropolis of the linen industry, but is famous for shipbuilding among other industries, and is the principal commercial port in Ireland.

The same linen industry extends northward throughout the district we are considering; the towns of Dungannon and Cookstown, west of Lough Neagh, Ballymena in County Antrim, and the considerable part of Coleraine near the mouth of the Bann, all have a share in it. Dungannon, besides, is in the centre of one of the few coalfields in Ireland. It is a somewhat difficult field to work owing to the formation of the rock, and for this and other reasons has never been fully developed, and is little worked, though the district is otherwise industrial, Dungannon and Coalisland having not only linen, but earthenware and other manufactures.

The western boundary of the Bann basin is a pretty regular chain of hills, separating it from that of the Foyle. Slieve Gallion, north-west of Lough Neagh, reaches 1,620 feet. Further north the range is a lower continuation, with a bend northward, of the Sperrin Mountains.

We have already an idea of the topography of the basaltic plateau of County Antrim (Chapter IV) with its sea-cliffs and coast villages. Ballycastle, a railway terminus on the north shore, is near a small coalfield. Larne, at the mouth of the lough of that name, is a port

of some consideration, because between it and Stranraer is the shortest sea passage between Ireland and Great Britain. From the isthmus of the Magee peninsula the coast sweeps south-westward, where Belfast Lough indents it.

Down. The County Down extends west to include part of the plain south of Lough Neagh, but if we subtract this westward extension, and add the mountainous promontory in County Louth between Carlingford Lough and Dundalk Bay, we have a clearly marked physical division of the country. It is bounded on the west by the pass or depression between Dundalk, Newry, and Poyntzpass, north-west by the Lough Neagh plain and the Lagan valley, north by Belfast Lough and east by the Irish Sea. It is mountainous in the south, the Carlingford range occupying the area in County Louth, and being separated by Carlingford Lough from the Mourne Mountains in County Down. The Mournes are continued north in a line of lesser heights (Slieve Croob, &c.) which have the valley of the Lagan on the west, and on the east sink to an undulating lowland, deeply penetrated by Strangford Lough. This is a shallow, island-studded arm of the Irish Sea, expanding inland and northward from the narrow strait between Strangford and Portaferry which forms its mouth. Between the lough and the sea is the peninsula of the Ards. The Quoile, entering an estuary at the south of Strangford Lough, is the chief of a number of small rivers.

The plain of Down is a well-cultivated and populous tract, which shares with the rest of north-west Ulster in the linen industry. The towns of Bangor (on the shore of Belfast Lough), Newtownards, Comber and Killyleagh

(by Strangford Lough) and Saintfield may be mentioned in connexion with this industry. The sandstone quarries of Scrabo Hill, west of Newtownards, are valuable. This hill may also be noticed as of physical interest, for the basalt reappears here. There must have been at one time a volcano in this vicinity. A huge erratic boulder (see Chapter II) of basalt appears near Mount Stewart on the north-east shore of Strangford Lough.

The sea-fisheries of County Down are important. Ardglass, Kilkeel, and other small seaside towns have harbours from which this industry is carried on. The principal port in the district, however, is Donaghadee. The passage between this and Portpatrick in Scotland is the shortest between Ireland and Great Britain (21½ miles), and the mail packets formerly used this route. But Portpatrick harbour became unfit for them, and hence the Larne and Stranraer route was preferred.

In County Down there are well-known mineral springs at Newcastle and Ballynahinch, and several others besides, among which those of Struel, near Downpatrick, used to be the scene of religious pilgrimages and ceremonies.

Of the Mourne Mountains the highest, Slieve Donard (2,800 feet), rises directly from the sea south of Newcastle. The other principal summits are Slieve Commedagh (2,500 feet), Slieve Bingian (2,450), and Slieve Bernagh (2,400), and a number of others exceed 2,000 feet.

Carlingford Lough is a fiord, penetrating the land for 11 miles. The Newry River enters its head, through a narrow valley between the foothills of the Mourne Mountains on the east and the Newry Mountains and Slieve Gullion on the west. This valley has already (p. 38) been

pointed out as an important line of communication between the Central Lowland and the north-east of Ireland. Near the mouth of the lough is Greenore, the port for a line of passenger steamers from Holyhead in Wales. The lofty promontory on which Greenore and Carlingford are situated, between the lough and Dundalk Bay, reaches its highest point in Carlingford Mountain (1,930 feet).

CHAPTER XVIII

THE SOUTH-EAST

From the Carlingford promontory southward to Dublin the coast belongs to the Central Lowland and has already been described (p. 108). It may, therefore, be passed over, and we may turn to the south of Ireland, and continuing our circuit consider the South-eastern Highlands.

The South-eastern Highlands may be taken for our purpose to coincide with the Counties Wicklow and Wexford, and to extend also over the greater part of Carlow and a small part of Kildare. As a matter of geological fact the rocks which compose them extend nearly to Dungarvan Bay on the Waterford coast, and over the south of County Kilkenny. But for geographical purposes it is simpler to take the district as lying between the Irish Sea and the River Barrow as far up as Athy. The north-western boundary is, of course, the Central Lowland.

In Chapter VII we found this area to consist of a highland mass with flanks deeply scored by beautiful wooded valleys or glens. Those most famous for their beauty may now be mentioned. Glencree, north of Kippure, and the glens of the Dargle and the Downs are in the north of County Wicklow. Further south is the Devil's Glen (part of the valley of the Vartry) near Wicklow. The exquisite Vale of Avoca, opening upon the coast at Arklow, is traversed by the Avoca River, which is formed by

the junction of the Rivers Avonmore and Avonbeg (the 'Meeting of the Waters'). The Avonmore drains the small loughs Tay and Dan in its upper course, and rises in a boggy tract east of Kippure, which also gives rise to the Liffey, Glencree, and Dargle. In the neighbourhood of Laragh a series of lovely glens converge upon the Avonmore valley—Glenmacnass, Glendasan, and, most famous of all, Glendalough, with its two lakes, and the early religious establishment which has left the ruins of the Seven Churches and a lofty round tower. The Avonbeg traverses Glenmalure, and the upper part of the Slaney waters the Glen of Imaile.

In the Vale of Avoca mining has been carried on for many years (with intervals) for copper and iron pyrites. Moreover, in the neighbourhood of the mountain of Croghan Kinshela (1,987 feet), on the Wicklow-Wexford boundary, gold has been mined, and a stream which flows hence to the Avoca at Wooden Bridge is called the Gold Mines River. The gold was first mined in modern times at the end of the eighteenth century. No great amount has been obtained since. But in this connexion may be mentioned the interesting subject of the early use of gold in Ireland. There is frequent reference to this in the old chronicles, and so many beautiful ornaments and other objects of gold have been discovered that we know that the early inhabitants of the island must have used the metal extensively. There are many in the museum at Dublin. Mention is made of mines not only in the Wicklow district but also near Kildare, on the Moyola River (a feeder of Lough Neagh), and in several other places. It is clear, therefore, that Ireland was formerly much more rich in gold than now, though it is also known that gold used to be imported from foreign countries (see Chapter XXV).

The River Slaney, which flows through a deep and well-wooded valley, is navigable to a point a little above Enniscorthy, and that town has some trade in agricultural produce with Wexford on the estuary. Wexford harbour has a considerable trade carried on by small vessels, but it is too shallow to admit large ships. Geographically, however, it is favourably situated at the point of Ireland nearest to the great ports of South Wales, Bristol, &c., and this is the reason for the construction of the new harbour at Rosslare, outside the mouth of the bay. Like other Irish rivers the Slaney has a salmon fishery. Wexford, Arklow, and Wicklow are the chief ports in the south-east for sea-fisheries.

CHAPTER XIX

THE BASIN OF THE BARROW

The Basin of the River Barrow is the next division to be described. It is the largest river basin in Ireland after that of the Shannon, having an area of about 3,500 square miles. The counties which are chiefly included within it are King's County, Queen's County, Carlow, and Kilkenny, Tipperary, and Waterford.

It has already been seen (p. 97) that the Barrow is one of those rivers which draws some of its headwaters from the Central Lowland but has most of its course between the surrounding hills, which it penetrates on its course to Waterford Harbour, its estuary. The Barrow receives no considerable tributary from the east, the watershed with the Liffey and the Slaney being confined within a narrow tract. But from the west it receives the Nore, a river little inferior in size to itself. Finally it shares its estuary with the River Suir, and as both are so large, and both estuarine in character when they unite, it is unjust to call one a tributary of the other. Moreover, the city of Waterford, which gives its name to the estuary, Waterford Harbour, is situated on the Suir. To the whole drainage area, however, which has its outlet through this estuary, it is convenient to give the name of the Basin of the Barrow.

Around the margin of the basin there rise several important groups of mountains. With the Wicklow

Mountains and the Mount Leinster group we have already made acquaintance. On the north there are no mountains, as the basin embraces part of the Central

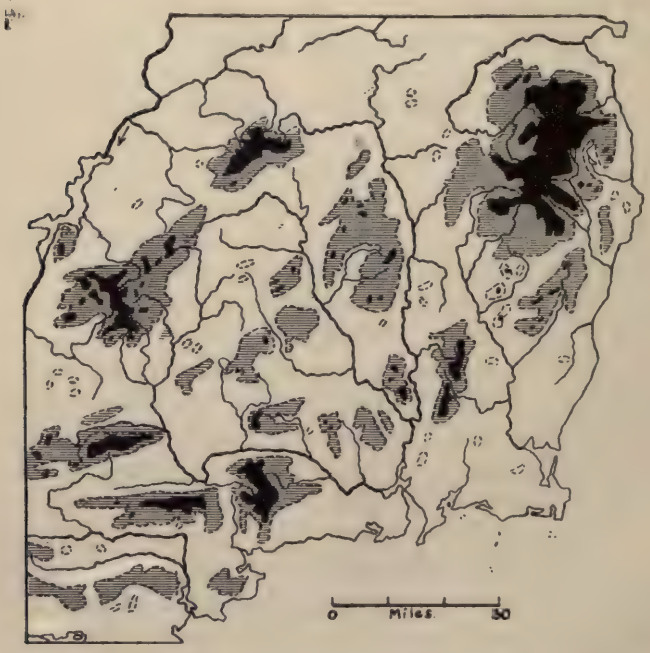


FIG. 32. South-eastern Highlands and Basin of the Barrow. Land from 500 to 1,000 feet in elevation is enclosed in broken lines, and the larger areas are shaded. Land over 1,000 feet is shown black. The map shows how the Barrow flows from the Central Lowland through the hilly country to the south.

Lowland. To the north-west and west are the detached groups of mountains which may be considered as outliers of the South-western Highlands, and were classified in Chapter I as the South Central Highlands. On the

north-west is the Slieve Bloom range, where the Barrow has its source. On the west are the Devilsbit group, where the Nore and Suir rise close together, with other hills of the ranges extending eastward from the Shannon above Limerick. On the south-west are the Galty or Galtee Mountains, and on the south the several ranges of the County Waterford—Knockmealdown, Comeragh, and Monavullagh. Within the basin, too, separating the principal valleys, are several less elevated but still important groups of hills.

The Barrow rises at the north-east end of the Slieve Bloom Mountains, a short, broad range which has its highest summit in Arderin (1,730 feet). The river flows north-east at first, but soon bends to the east and passes near the town of Mountmellick and through that of Portarlington. Shortly afterwards it receives the Figile River, that headstream which rises to the north in the Central Lowland. As if taking its direction from its tributary, the Barrow now turns abruptly south, and maintains this direction to its mouth. A branch of the Grand Canal from Dublin also enters the valley here, and runs along it as far as Athy, where it joins the river, which itself becomes navigable here. The county hereabouts is generally boggy and low, and the Barrow, in its course from Athy to the sea, a distance of 80 miles, has to fall barely 200 feet, so it may be inferred that its current is generally sluggish. The next important town on the river is Carlow, county town of the county of the same name, situated at the junction of natural routes through the hills on either side of the valley, and formerly defended by a strong castle. With the river open to navigation, Carlow is the centre for a considerable trade in the agricultural produce of the fertile surrounding country.

The group of hills which bounds this part of the Barrow valley on the west is of considerable interest, though of no great height (1,100 feet at most). In form it is a broad isolated tableland between the valleys of the Barrow and the Nore. Its importance lies in the fact that it contains the largest coalfield in Ireland. Later we shall have to consider the coalfields of Ireland as a whole (p. 188). But we have seen (p. 23) that though the 'coal-measures', or layers of rock in which coal occurs, once overlay all the great area now covered by the limestone of the plain, they do so no longer, having been gradually wasted away by denudation, till only the few isolated tracts are left where they now survive. Of these the largest is this 'Leinster coalfield', or Castlecomer field, as it is called from the small town of Castlecomer (County Kilkenny) which is the centre of the small mining industry. The coal measures are found again on the further side of the Nore.

In the neighbourhood of Bagenalstown granite and the sandstone 'Carlow flags' are quarried. Not far above New Ross the River Nore joins the Barrow. Both rivers in this lower part of their course are tidal. New Ross is the principal shipping place on the tidal portion of the Barrow, having quays where vessels of moderate size can lie.

The Nore rises, as has been seen, in the Devilsbit group of hills, and flows generally south-easterly to its junction with the Barrow. Its valley is as a rule narrower and more picturesque than that of the Barrow. The chief place on its banks is the ancient city of Kilkenny, capital of the county of the same name, situated on the middle course of the river, where the valley breaches the hills of the Leinster coalfield. In this neighbourhood there

are quarries of a beautiful black marble. The town has some trade by the river. The chief tributary of the Nore is the Kells, which joins it on the east in the middle part of its course.

The Suir has its source quite close to that of the Nore, but the courses of the two lie far apart. For more than half its course the Suir has a general southerly direction. The Devilsbit Mountain, the culminating point near the sources of both rivers, has a height of nearly 1,600 feet. From it the Suir runs through the centre of the County Tipperary, its broad valley being notably fertile, though the depression which extends west from Cashel towards Limerick, and is known as the Golden Valley, is still more so. In the group of hills which broadens south-westward from the Devilsbit and borders the Suir valley on the west, the highest points lie on the west towards the valley of the Shannon, and reach nearly 2,300 feet in Keeper Hill, 1,800 feet in Mauherslieve, 1,520 feet in the Slievefelim Mountains, and 1,600 in the Silvermines. This last range takes its name from the silver which used to be mined in it—another instance of the former mineral wealth of Ireland.

Galty Mountains. The fertile Golden Valley separates the Slievefelim Mountains from the Galty Mountains. In its midst stands the county town of Tipperary. The Galty range is one of the most important in the south of Ireland. Their highest point, Galtymore, reaches over 3,000 feet. They extend along a line westward from the valley of the Suir (which runs close to their eastern spurs, near Caher) and are continued in the same direction, at a lower elevation, by the Ballyhoura Hills. Their appearance is the more striking as they rise so abruptly from the plain. Their flanks are scored with steep

gullies. The fine glen of Aherlow, a lateral valley tributary to the Suir, runs deeply into the mountains along their north side, and separates from them the spur-range of Slievenamuck. The bold southern flank of the Galtys falls to a depression drained eastward by the Tar to the Suir, and westward by the Funshion to the Blackwater. On the other side of this the Kilworth and Knockmealdown Mountains (2,600 feet in extreme height) rise only less abruptly. (See map, p. 47.)

Returning to the Suir, we find that it pursues its southerly course as far as the eastern foot of the Knockmealdown Mountains. There is a slight depression between these and the Monavullagh Range (2,500 feet) to the east, which suggests a more natural direction for the Suir, to a mouth in Dungarvan Bay, than that which it actually follows. For instead, it bends abruptly northward, and then sweeps to the east, round the foot of the Comeragh Mountains (2,480 feet), and flows in a fine valley between these hills on the south and Slievenaman (2,360 feet) on the north. Through this valley its course is rather rapid, and it affords power to work mills at Clonmel and elsewhere; but it is not too swift to be navigable by barges, and at Carrick-on-Suir it becomes tidal. Caher, Clonmel, Carrick-on-Suir, and Waterford are the chief towns in the lower part of the valley. Waterford is a large port, and until the opening of Rosslare Harbour near Wexford it offered the best route across St. George's Channel to South Wales, and it still has regular communication with Fishguard, &c. It is also one of the principal railway centres in the south of Ireland, having lines of the Great Southern and Western system converging upon it from east, north, north-west, and west, and being also a

terminus of the Dublin and South-eastern railway. Its early importance was that of a gateway to the south-west of Ireland by way of the Suir, rather than one to the north by way of the Barrow, as may be inferred from its foundation (by the Danes in the ninth century) on that branch of the estuary which belongs to the Suir.

CHAPTER XX

THE SOUTH-WEST AND COUNTY CLARE

The South-western Highlands, as defined in Chapter V, are covered by the Counties Limerick, Cork, and Kerry. In that chapter, by way of illustrating the structure of the highlands in parallel folds, it was necessary to give a list of the principal inlets of the coast, with the headlands dividing them, and also to trace the lines of the principal mountain-ranges by name, and the valleys separating them, with their rivers. This chapter should now be consulted again, while we fill in here the topographical details omitted there.

The County Limerick, sloping north from the Mullaghereirk and Ballyhoura hills to the Shannon, is fertile country, though its appearance is generally bare, owing to lack of trees and hedges. It is drained to the Shannon by the Mulkear, Maigue, Deel, and other streams. The County Cork is the largest in Ireland. Here, again, is very fertile country in the picturesque valley of the Blackwater, in which the chief towns are Mallow, Fermoy, and Lismore. This valley is bounded on the south by the central ridge of the South-western Highlands, but the county does not include its highest summits. In the Derrynasaggart Range, Mullaghanish, on the Kerry border, reaches 2,130 feet; Musheramore of the Boggeragh Range 2,120, and the highest point of the Nagles 1,400. The valleys and low dividing ranges south of this line make up a generally fertile and pleasant tract, and a

number of small towns are found both inland and on the coast—Midleton, Macroom, Bandon, Dunmanway, and others, together with Youghal, Kinsale, Clonakilty, and Bantry, each on its harbour or bay. But the principal town is Cork, an important city and seaport at the head of the great inlet of Cork Harbour, where the River Lee enters it. Cork itself shares with Waterford the position of the two largest towns in the south of Ireland, and it is instructive to notice that the geographical position of

Fig. 33. Cork Harbour.

each is very similar, on the inner shores of estuarine harbours. Cork has an outport, nearer the mouth of the harbour and therefore more accessible to the largest vessels, in Queenstown, a port of call for the great mail steamers crossing the Atlantic. The harbour is completely landlocked, the entrance being narrow; several islands afford shelter within, and on the shores are a number of pleasant villages, besides the two large seaports. All the harbours of this coast have a certain amount of shipping trade, and Berehaven or Bearhaven,

a strait of Bantry Bay sheltered by Bere Island, is used as a naval port of call. An arm of Bantry Bay, at its head, is called Glengarriff Harbour from the village on its shore, which is peculiarly famous for its surrounding scenery, even in this district which is all full of natural beauties.

It is in the County Kerry, however, that the chief of these beauties are found. Kerry is one of the most mountainous, wildest, and least fertile counties in Ireland, but the attraction of its scenery to visitors has made up in some degree for its lack of natural wealth. Its chief mountains and celebrated lakes are described in connexion with the physical geography in Chapter V.

The islands off this coast are fewer and smaller than those of Galway, Mayo, and Donegal, being mostly mere rocks. But Valencia is to be noted as the starting-point of telegraphic cables across the Atlantic to America, and also as a station from which the state of the weather over the Atlantic is reported to the Meteorological Office in London (see Chapter VIII).

In order to complete the circuit of the highland districts surrounding the Central Lowland, the County Clare must now be described. It coincides with the promontory between the Shannon estuary on the south and Galway Bay on the north, and is connected physically with the district south of the estuary (County Limerick), the rocks being the same. Though hilly, it nowhere rises to a great height. The county as a whole is barren and wild, and in the west bogs are extensive. There are, however, rich lowlands called corcasses along the Shannon and the chief river belonging entirely to the county, namely the Fergus, which enters the Shannon through a wide branch estuary. The west coast is generally rocky, and sometimes rises in great cliffs, such

as those of Moher, which have an extreme sheer height of 580 feet. Liscannor and Ballyvaghan Bays and Malbay are the chief indentations, but the first is the only safe harbour, the rest of the coast being very dangerous to shipping—indeed, Malbay ('evil bay') is so named from this fact. Mineral springs, at Lisdoonvarna and elsewhere, are numerous. The county town is Ennis on the Fergus. There are no towns of large size. Connected with northern Clare and the Central Lowland by geological formation, and included in the County Galway, are the Aran Islands, or South Aran, in distinction from the Aran Island of County Donegal. These three islands, Inishmore, Inishmann, and Inisheer, lie across the mouth of Galway Bay. They are lofty and, on the ocean side, precipitous. The limestone of which they are composed is in some places laid down in great flat slabs like a huge pavement, with fissures between full of rare plants and ferns. The islands, like others of the west, have many remains of antiquity. The scanty produce of the land, where with heavy labour it is made fit for agriculture, and the fisheries, support the inhabitants.

PART III

HUMAN GEOGRAPHY

CHAPTER XXI

HISTORICAL GEOGRAPHY

Early Physical and Social Conditions—Remains of Ancient Buildings—Place-Names

Early Physical Conditions. We know something of the story of Ireland in very early ages—long before the beginning of the Christian era—and from what we are told in legend before the historical period it is possible to infer some truths. In the earliest times, and indeed for long afterwards, the appearance of Ireland was by no means the same as we have described it. Mountains rivers, lakes, and plains were there, of course, as we see them now—only the lakes of the plains, perhaps, were sometimes more extensive than now, and had wider areas of marsh-land fringing their shores. Besides these lake-marshes there were other great tracts of marsh and bog, as now. The main physical difference between Ireland of those days and the present day is the former great extent of forests; Ireland, now remarkable as a woodless country, was formerly full of fine timber. The oak, yew, pine, elm, ash, birch, willow, hazel, and many others flourished. Only after centuries of felling for building-material, for house-fuel, and for feeding the smelting-fires for iron were the forests destroyed. Moreover, in some cases, as woodlands naturally decayed,

bogs encroached upon them, and wherever the stumps of old trees are found buried in the bogs of the present day (as they often are), there, it may be supposed, a forest formerly grew. Among and apart from the forests and marshes there were open tracts or clearings of firm, cultivated, and populated land. The deer, wolf, boar, and smaller animals inhabited the woods; great flocks of various birds inhabited the marshes, and fish the rivers and lakes, and the people were keen hunters and fishermen.

It is not difficult then, to picture Ireland as its early inhabitants knew it, and it is not difficult to picture their dwelling-places, places of burial, and places of worship, from the remains which are fortunately preserved all over the country, and need to be carefully studied in connexion with its historical geography.

Early Dwellings. The most common remnant of an ancient Irish house is a circular earthwork. Such works appear now as a sloping wall of earth with a trench outside it, the trench having been dug in circular form and the earth so raised having been piled up around its inner edge. Within the circle thus marked out and defended, circular huts or houses were erected, but as these were almost invariably made of timber or wattles and clay, they have vanished long ago. The finest and largest houses were generally enclosed within rings of three or even more earth-walls and ditches, and sometimes a flat-topped mound of earth was thrown up within the ring, and the houses erected thereon. Sometimes, again, chambers walled and roofed with stones were either dug out beneath the surface of the earth or constructed within the mound; they probably served as store-houses and as places of refuge from enemies for women and children.

These erections were therefore at once dwelling-places and fortresses. The earthworks, as has been said, are to be seen to-day in many parts of the country, and are known under the names of dun, rath, fort, caher, cashel, and others. A few of the most noted may be named here.

Tara, near Navan in the County Meath, was long the most famous residence of the Irish kings. It stood in a naturally strong position on a low hill, which is still covered by its remains. One great oval earthwork encircles its summit, and encloses three mounds or forts; on one of them rises a pillar-stone, believed to have served as the coronation-stone of the kings. The long mounds marking the side-walls of the banqueting-hall, unique as being not round or oval, but an oblong building, are also to be seen. Another royal residence was at Tailtenn, which name survives in the modern form of *Teltown,* between Navan and Kells; another was at Tlachtga, now *Hill of Ward,* near Athboy; yet others are Emania, now *Navan Fort,* near Armagh, and at *Tullaghoge* in eastern Tyrone. At all these spots and at many others wonderful remains of the kind described are to be seen. In some parts of the country where stone was plentiful and easily worked, it was used both for fortifications and for huts. At the old royal palace of Greenan-Ely, situated on a high hill near Londonderry, the wall is of stones, and on Inishmore, the largest of the Aran Islands, off the mouth of Galway Bay, a great stone fortress is built on a rock rising from the sea, and is known as Dun Angus. In the same islands, in the County Kerry, and elsewhere are circular huts with domed roofs, built of stones piled together (as the fortifications also are) without mortar.

Another method of ensuring the safety of their houses,

commonly practised by the ancient Irish (as by other early peoples), was to build up artificial islands in lakes, and thereon to erect their dwellings. On a foundation of piles driven into the soft lake-bottom at a shallow spot, and supporting flat cross-timbers, a platform of branches, stones, and earth was laid. Remains of these lake-dwellings (called crannogs) have often been discovered, in lakes and also in marshes which, it may be assumed, were formerly lakes.

Burial-places. Places of burial also form an important feature in the study of Irish historical geography. Great men were commonly buried in a tomb over which a mound of earth was piled up, and such mounds are common all over the country, both on hills (very frequently) and on the plains. Sometimes they occur in groups; they then mark either early fields of battle (as we shall see later), or ordinary cemeteries, or those in which the victims of a plague were buried together. A famous cemetery of the great dead lies on the north bank of the Boyne, not far from Drogheda; in it one mound, that of Newgrange, is especially noteworthy. It is 70 feet high and has a passage leading to a chamber within. It was also surrounded by a circle of huge stones standing erect. Tombs of upright stones supporting a flat roof are also found in Ireland as in England and elsewhere; they are known as cromlechs, and have often been believed to be heathen altars.

Religious Establishments. The introduction of Christianity meant the introduction of church buildings and other religious buildings. From the fifth century onwards, though many churches must at first have been built of timber, and have vanished, some were built of stone, and in the earliest times were simply of oblong form. They are found in every part of Ireland, but it

is most interesting to note how they were commonly erected on islands off the coast, to which the holy men resorted as quiet retreats. Some of these ruined early island-foundations are places of pilgrimage and burial to this day. Examples of these early oratories are found on the Skelligs, Scattery Island, Bishops Island near Kilkee, High Island off the coast of Galway, Inishmurray (Sligo), and other islands. They also occur on lough-islands, as in Loughs Erne, Currane, Ree, and others, and sometimes on high mountains, such as Slieve Donard, Slieve Gullion, and Brandon. Sometimes the oratory of the holy man was also his dwelling-place, as in the case of St. Kevin's House at Glendalough, and St. Columba's House at Kells.

The round towers which were erected by the occupants of religious establishments in later times are still an architectural feature very nearly peculiar to Ireland. These tall, thin towers, with a pointed cap in the case of those which still stand perfect (Fig. 20), have been ascribed to various periods and builders, and their use has been disputed, but they are now held to have served both as belfries and as retreats from enemies, and to have been built between the ninth and twelfth centuries. As retreats, they usually have their doors high above the ground, so as to be accessible only by a movable ladder. These belfry-strongholds occur in every part of Ireland—there is even one on the remote Tory Island.

The larger religious foundations of the early centuries of Christianity have always something remarkable in their geographical situation, and the idea of retreat or remoteness is generally to be found in their chosen places. Thus, to take a few examples of famous foundations, the Seven Churches of Glendalough stand high up in a valley of the Wicklow Mountains, on a little plain where the

river Glendalough leaves the lower of its two lakes, and just above the point where it enters its wooded glen. The site is surrounded by high hills, and must have been as quiet and safe a spot as could be found in that district. For different reasons the foundation of Clonmacnoise must have been no less secure; it lay among marshes on the east bank of the Shannon, not far below Lough Ree. In the holy site of the Rock of Cashel we find advantage taken of a great flat-topped limestone rock rising alone to a height of 300 feet from the surrounding plain, on which, at later dates, a cathedral and castle, besides other buildings, were erected. Finally in Devenish, in the lower Lough Erne, we find one of the best examples in Ireland of an island site for a religous foundation. There are beautiful examples of the round tower at all these places; at Clonmacnoise there are two.

The same care and similarity of idea in the choice of geographical position is to be noticed in the case of the great abbeys of which so many were founded in the twelfth century and later, after the Anglo-Normans had established themselves in Ireland (see Chapter XXIII). By this time simple seclusion was neither so necessary nor so greatly desired. The rich abbeys had large landed properties; and they were very commonly founded in fertile country on the banks of the larger rivers, which could supply the inmates with fish. But the possibility of having to defend their abbeys against enemies was also not forgotten by the founders; thus the buildings of Bective Abbey, on the Boyne, founded in 1146, are clearly designed to serve both religious and military purposes. Other examples of riverside sites are provided by Holy Cross and Athassel abbeys, both founded at the end of the twelfth century on the Suir in the County Tipperary, and Jerpoint (about 1180) on the Nore in

County Kilkenny—to mention a few notable instances among many.

Place-names. A few examples will help us to understand how closely the place-names of Ireland reflect its historical geography. Their most notable feature is that they are Irish almost entirely; there are few names of English origin and hardly any given by the Danish invaders. The Danes did not make any extensive permanent settlements in Ireland, as they did in England, where their place-names are common. As for the English, their invasion was a slow process and did not result in the creation of many new towns and villages. Of course most Irish names have been anglicized in spelling and pronunciation, but they remain Irish nevertheless. In the process of being anglicized, mistakes have sometimes been made. Phoenix Park at Dublin, for instance, comes from *feenisk*, clear water, from a spring there, and not from the pillar with a phoenix upon it. The English sometimes translated names from the Irish (e.g. Clover-hill) but there are not many purely English names like Kingstown, though such as there are generally belong to important places. Danish names are almost solely east-coast settlements like Wexford and Carlingford. But the word *gal*, foreigner, as in Donegal, Galbally, often shows where the Irish named places after the English or Danish invaders. The common Irish word *Bally*, town, sometimes appears in combination with comparatively modern forms, as in Ballyjamesduff.

If the old purely Irish names are grouped according to their meaning, they are found to reflect the people, their history and their country, very clearly. A great number are seen to be derived from physical features, when we consider how common are such syllables as *ath*, ford; *ard*, height; *knock* and *ban*, hill; *drum*,

ridge; *carrick*, rock; *moy* or *magh*, plain; *clare*, level tract; *glen* or *glan*, glen; *-isk*, water; *owen* or *avon*, river; *bel*, mouth; *innis* or *inish*, island. These features were often defined by their colours. The bog-stained water of rivers and loughs gives the common forms *dub* or *duff*, black, as in Dublin.

A great number of names remind us of the constant warfare between the various tribes and kingdoms, such as *dun*, *rath*, and *caher*, all signifying fort; *fert*, grave; *carn*, heap of stones or cairn. Many of the ancient tribe-names, family-names, and names of local chiefs have survived, illustrating the continual division of Ireland into a number of almost independent territories, as described in the next chapter. *Ry*, the king (as in Athenry), and *saggart*, the priest, frequently occur. The number of names preserving legends, as of fairies (*Shee*), is large. Christianity, once established, gave rise to many place-names, as we find from the frequent occurrence of the syllables *kill* or *donagh*, meaning church, and the common inclusion of the names of Patrick and other saints. The form *-affrin*, Mass, often refers to the old practice of celebrating mass in the open air. Agriculture, no less important in early times than it is now, accounts for such common forms as *clon* or *cloon*, meadow; *cappagh*, plot of land; *garry*, garden. The former great extent of forests is illustrated by the frequency of such syllables as *dare*, oak, *fee* and *coill*, or *kil*, wood, and others.

CHAPTER XXII

HISTORICAL GEOGRAPHY (*continued*)

Early Peopling and Territorial Division—Irish Invasions of Britain—Christianity—The Danish Invasions

Legendary peopling of Ireland. There is a full measure of legends to account for the peopling of Ireland by immigrant tribes in prehistoric times. These legends as such, are not, of course, to be taken as true, but no doubt they are originally based on truth, a little of which can still be gathered from them. According to them there came five great invading tribes into Ireland, at times varying from 1,500 to 500 years before Christ (but these dates, which in the original legends run from the creation of the world, are quite untrustworthy). Their names, in order of arrival, were the Parthalonians, the Nemedians, the Firbolgs, the Dedannans, and the Milesians. Greece and Scythia are the two far distant countries asserted to have been the original home of these tribes. There also appears in the legends a race of pirates—the Fomorians. We hear of various landing-places for the invaders—the Parthalonians appear to have arrived at some point on the west coast, perhaps Kenmare River, perhaps the mouth of the Erne. The Firbolgs are said to have reached the country in different bands at different points on the north-east, south-east, and west coasts. The Milesians, the most powerful

invading tribe, landed at the mouth of the Slaney. The Fomorians, the sea-pirates, had their stronghold on the remote island of Tory.

Two instances may serve to show what has been said, that these legends have no doubt a foundation of truth. The legends constantly refer, not (as might have been expected) to the deeds of one great chief, who subdued the whole country, but to the settlements of each of the various tribes being confined to certain parts of the country, or to their breaking up into different parties, each under its own chief. Now, when true history gradually takes the place of legend, it is found that Ireland was practically always a divided country. The Firbolgs are said to have arrived under the leadership of five brothers, who divided the country into five provinces, one for each of them—Ulster, Leinster, Connaught, and two Munsters, east and west. We know that these provinces (the two Munsters being afterwards joined as one) survive to the present day, and though their boundaries were often changed we may say that they are actually of prehistoric creation, and are one of the most remarkable survivals in the historical geography of the world. We shall come back to this subject presently.

The other instance of the probability of truth in the ancient legends is the reference to two great battles fought by the Dedannan invaders—one with the already settled Firbolgs, and one with the Fomorian raiders. The first was fought on the plain of South Moytura near Cong, and the second at North Moytura near Sligo. The interesting point in regard to these legends is that on these two fields there are still numerous mounds, standing stones, and other remains of the kind already described as marking early burial-places, giving visible proof that they were actually the scenes of early battles,

and showing the importance of studying such ancient remains in connexion with historical geography.

But the main truth which underlies the legends is that Ireland was peopled by a number of different tribes who invaded the country at different times. If some of them arrived by sea direct from southern Europe (and it is said that the Milesians abode long in Spain before they came to Ireland) it is possible that they were turned from landing in England by the rocky and cliff-bound coast characteristic of the south-west (Cornwall, &c.). But numbers must have come by way of Britain, and crossed the narrow sea to the eastern shore of the Central Lowland, a shore easy to land upon, and backed by a fertile, inviting country. That there should be so many invasions of Ireland is not surprising when we remember that Ireland is the westernmost European island. It is known that such movements as the incursions of unsettled races from the far east into Europe, and the extension of the Roman Empire outside the geographical limits of Italy, drove races previously settled in the track of the invaders to move before them. Pressed thus from east or south, they would reach the European coastlands, be driven to cross the sea to England, and thence to the last retreat westward—Ireland.

The Provinces. Such movements went on perhaps as late as the first century A.D. Ireland, then, was divided under a number of chieftains, as we have said. When legends gradually give place to history we find that even very small divisions of territory, some of which correspond roughly to baronies of the present day, had kings. Over these were the kings of the provinces, which, as we have seen, existed from prehistoric times. At the earliest time of which we have certain knowledge, the boundaries of these provinces were not unlike those

of the present. Leinster extended from the Suir to the Boyne, Ulster from the Boyne to the Drowes River, south of the Erne, Connaught thence to the Shannon estuary, while Munster covered the remaining south-westerly district. The two divisions of Munster were very early joined into one, but King Tuathal, at the close of the first century A. D., formed a new province no longer existing—that of Meath. Tuathal was ard-ri or over-king of all Ireland, and created Meath to be always the territory belonging specially to the over-king. This was a large extension of a small territory which previously served the same purpose, surrounding Tara, the king's chief stronghold.

There was generally an over-king of Ireland, but it was seldom that he had complete control over all the under-kings. It might at first sight seem that Ireland, with a central power established in the Central Lowland, from which we have seen that access is easy to every other point, ought (on geographical reasons) to have been readily kept under the control of a single king. But we know also that the Central Lowland, in those early times, was broken up by more numerous lakes and more extensive bogs and marshes than at present, and that there were great tracts of forest in every part of the country. The open habitable tracts were therefore (generally speaking) clearly marked off, one from another, and there was a tendency for the people to settle in them in more or less detached communities, more easily governed by local chieftains than by a distant king who found it difficult to keep in touch with all of them at once. Such may be a geographical explanation of the division of Ireland. A curious instance of a temporary division of the island is that between King Conn of the Hundred Battles (123–157 A. D.) and King Owen More (also called

Mogh Nuadhat) of Munster. These two, after long strife, divided Ireland into halves, taking as their frontier the esker ridge (see Chapter II) which extends east and west across the Central Lowland.

Irish invasions of Britain. But however frequently the Irish kings were at strife together in their own country, some of them became strong enough to make invasions across the seas eastward to Scotland, Wales, and England, and even into Europe. We therefore find the tide of invasion, which originally flowed from east to west, ebbing from west to east again after many years, and in one instance at least, that of Scotland, resulting in a great permanent settlement. It is certain that from very early times the Irish of Ulster kept up intercourse with that part of Scotland which lies nearest to their coast; but the first invasion of historical importance was that which took place about the close of the second century A. D., when Carbery Riada, son of Conary who succeeded Conn of the Hundred Battles, led a colony from Ireland to the south-west of Scotland, subdued the people already settled there, and established a territory which bore the same name as his lands in Ireland—Dalriada, or Riada's Portion. The Irish now became firmly established in Scotland, and early in the sixth century another important colony passed from Antrim into Argyle, and afterwards so greatly increased that it brought the whole of Scotland under control and founded the Scottish kingdom. The very name of Scotland is derived from the Irish invaders, for 'Scots' was a name given to those invading tribes which are grouped by the legends under the name of Milesians.

Other branches of the Scots, in very early times, occupied the Isle of Man, Anglesea, and the northern

half of Wales. We know that Niall of the Nine Hostages, one of the most powerful of the Irish over-kings, who was of Milesian descent and reigned in the second half of the fourth century, made a great invasion of Wales, where he came into conflict with the Romans, whose general Stilicho finally drove him out. This same Niall even made raids into France, and is said to have been killed on the River Loire in 405. South Wales and Cornwall were colonized by Irish from Munster, a movement which appears to have begun about the middle of the third century.

For all its internal divisions, therefore, we find that Ireland in those early times, before Christianity had reached it, was a powerful and an important country. It was capable of sending out colonies, and its products were well known in European trade, for the Roman historian Tacitus, as early as the first century A. D., suggests that the trade of Irish harbours was more important than that of English ones.

Christianity established. Christianity must have been introduced into Ireland as early as the fourth century, but for a long time it made no headway, and as late as 431 we hear of a Christian bishop from Rome landing on the Wicklow coast and being at once expelled. But before this date St. Patrick, the great missionary of Ireland, had been brought captive to Ireland as a boy (probably by one of Niall's raiders into Wales), had conceived the idea of converting Ireland to Christianity, had escaped, and studied to prepare himself for the task. In 432 he returned prepared, and landed first in Wicklow, but was turned back, and proceeded to the coast of Down. Before his death about 465 vast numbers of the Irish had been converted; St. Patrick and his few original followers had been joined by large numbers of priests, and churches

and monasteries were growing up everywhere. By the sixth century the Irish church was sending missionaries eastward to Britain, and in the seventh and eighth centuries these workers extended their journeys to France, Germany, Italy, and even Iceland. In a geographical sense, the story of Christianity in Ireland is not unlike that of the settlement of the country. Christianity came from the east as the early invaders did; it established itself firmly there as they did, and it then began to extend eastward again, as we have seen the Irish invaders of Scotland, England, and France did. But the establishment of Christianity in Ireland was a far shorter process than its settlement by the early tribes; when established the Church was united, not divided as they were, and the after extension was over a far wider area than the Irish invaders ever covered. The Irish church became so famous both for religion and for general learning that priests and scholars flocked to Ireland as disciples from every part of western and southern Europe, and even from Egypt. Even those holy Irishmen who had established themselves in remote homes such as we have described, on distant islands and hardly accessible mountains, found themselves followed by disciples anxious to share their life of quiet study and sanctity. Ireland might have continued to be a safe retreat and centre of religion if it had been equally strong as a kingdom. But from the eighth century a new tide of invasion set against the country.

The Danish invasions. The new invaders are generally called Danes, though there were actually two separate peoples, the Fingals or white strangers (so known from their light hair), who were from Norway and Sweden, and arrived before the Duvgals or dark strangers, who were Danes. The Fingals appeared first in 795, when

they plundered Lambay Island near Dublin and the monastic house on it. From the first they attacked the monasteries, for by this time these had gathered together riches, and could not offer much resistance to the invaders. It was as a protection against them that the monks built so many of the round towers which still remain. But the Irish, for many years, never combined against the invaders—one kingdom or another occasionally defeated parties of them, but nothing more. And the country was easy of access to the Danes, who were practical seamen as well as warriors. In 832 we find their boats sailing up the Bann to Lough Neagh and up the Shannon to Lough Ree. They thus penetrated the very heart of the country, though their permanent settlements were naturally on the coast, as they were constantly reinforced from oversea—by 850 they had settlements at Dublin, Waterford, and Limerick. How terribly the holy places suffered can be gathered from the fact that Armagh was sacked at least nineteen times between 832 and 1021, Glendalough eight times, and other places similarly all over the country. Neither the island monasteries nor those inland were safe from the Danes. It was not until 1014 that the famous over-king Brian Boru united the country against the Danes and broke their power in the battle of Clontarf near Dublin, where burial-mounds still mark the battle-field.

CHAPTER XXIII

HISTORICAL GEOGRAPHY (*continued*)

The English Invasions—The Pale—Creation of Counties—Plantations

Anglo-Norman Invasion. The union of Ireland effected by Brian Boru against the Danes did not continue after his death. The same division into provincial kingdoms continued, and now for a century and a half there is no notable feature in the historical geography of the island. There is not even an over-king during this period who was accepted by all the under-kings. Ireland therefore lay just as open as before to invaders, who came for the first time in 1169 in the persons of the Anglo-Normans.

These were the descendants of the conquerors of England under William I (1066), but they made no such rapid conquest of Ireland as their predecessors had of England. A show of real strength of arms, followed by a strong government, might have established peace and union in Ireland once for all, whereas instead there followed centuries of warfare. For the purpose of historical geography, however, we have rather to trace the very slow territorial settlement of Ireland by the English, and the gradual creation of the present division into counties.

At the moment of this invasion the provincial divisions of Ireland stood as follows. Ulster existed as it does now, save that it included the district covered by the modern County Louth, and did not include Cavan, which

was included in Connaught. Munster extended further than at present, including a portion of King's County.

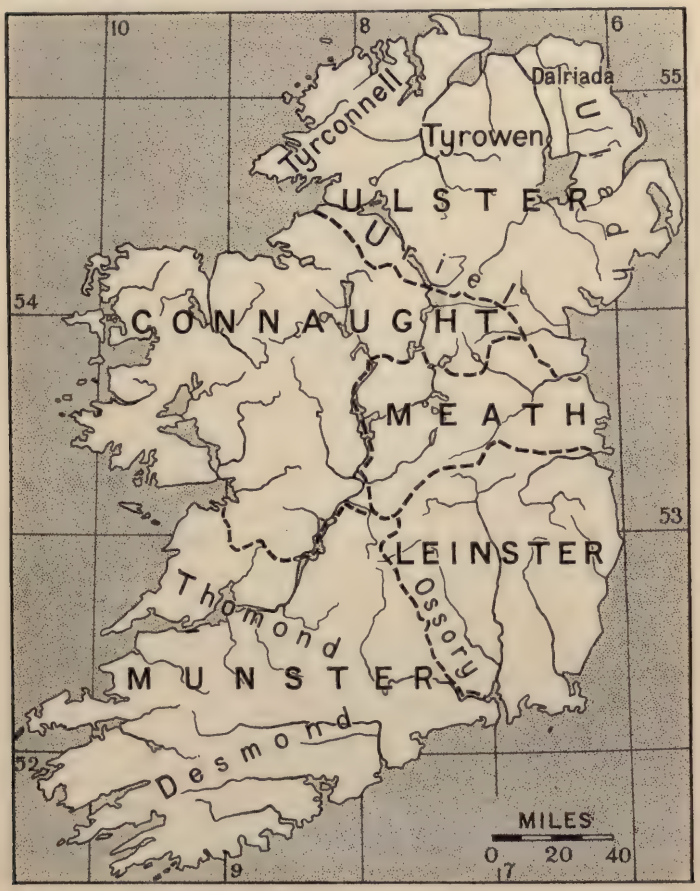


Fig. 34. Provinces of Ireland before the Anglo-Norman Invasion, with some of the lesser Territorial Divisions. Boundaries of provinces shown by broken lines.

Leinster did not include that part of King's County, nor Louth, nor the territory then covered by the province of

Meath. This province extended from the Boyne nearly to the Liffey in the east, including the strip of coast between the Boyne mouth and Dublin Bay. Inland it broadened so that its western boundary extended from the modern Birr or Parsonstown to near Lough Bofin, and was formed for the most part by the Shannon. The provinces were divided and subdivided into a large number of territories, belonging to the various septs or divisions of tribes, and we shall mention some of the more important of these territorial divisions, because their names survived and are met with in later history (see Fig. 34). In Ulster the name Uladh, which was the original name of the province, was also applied to a division lying mostly east of the Bann and the Lough Neagh. The north of this division, that part which lies nearest to Scotland, was the Irish Dalriada, of which we have already heard (see p. 154). Across the southern part of the province extended the territory of Uriel, while the north-west was divided between Tyrowen (whence the modern Tyrone) and Tyrconnell (roughly representing Donegal). These four divisions were in general practically independent principalities, but the ruling families of Tyrowen and Tyrconnell claimed descent from the great Niall of the Nine Hostages, were known together as the Hi-Neill of the north, and numbered many over-kings of Ireland among them. In Munster there was, as we have seen, a broad division into North Munster (Tuath Mumha, Thomond), and South Munster (Deas Mumha, Desmond). In Leinster there was a great western territory called Ossory; this name survives in the title of a modern bishopric.

The Anglo-Norman invaders, coming from the east, naturally established themselves, as earlier invaders had, on the plain coast between Wicklow and Down—the

coast of Meath. As they pushed inland they were able to spread southward and westward, into the valleys of the Slaney, the Barrow and the Suir, and across the plain of Tipperary, as well as over the Central Lowland to the Shannon and even beyond. But the South-eastern Highlands formed an Irish stronghold on their flank, and the mountainous regions of the south-west, west, and north of Ireland stopped them.

First creation of Counties. We find this movement reflected in the first group of twelve counties created in Ireland by the English. These are commonly dated from the reign of King John (1199–1216). They show an extension from the Meath coast south-westward, being Louth, Meath, Dublin, Kildare, Carlow, Wexford, Kilkenny, Tipperary, Waterford, Cork, Limerick, Kerry. Though this division shows the whole of Munster, including the mountainous south-west, to have been divided into counties, there is no doubt that this was done, at least in the more remote parts, only in virtue of a few English settlements, and that the English rule was far from being generally accepted. Moreover, it was a common practice, when the king realized that he was not likely to be able to enforce his rule through ordinary officers of the Crown, to create 'counties palatine', in which very extensive powers were given by the Crown to great lords to exercise government. This was frequently done in Ireland, and often, after a while, the palatine lords became too powerful, threw off their allegiance to the Crown, and were as little subject to it as the Irish themselves. The power of the Crown was therefore absolute only in that part of Ireland where, on geographical grounds, we should expect it to be, namely, in the eastern territories of the Central Lowland.

The Pale. From this we are led to consider another

division of Ireland—not one, however, that was ever marked out with formal boundaries. This was the

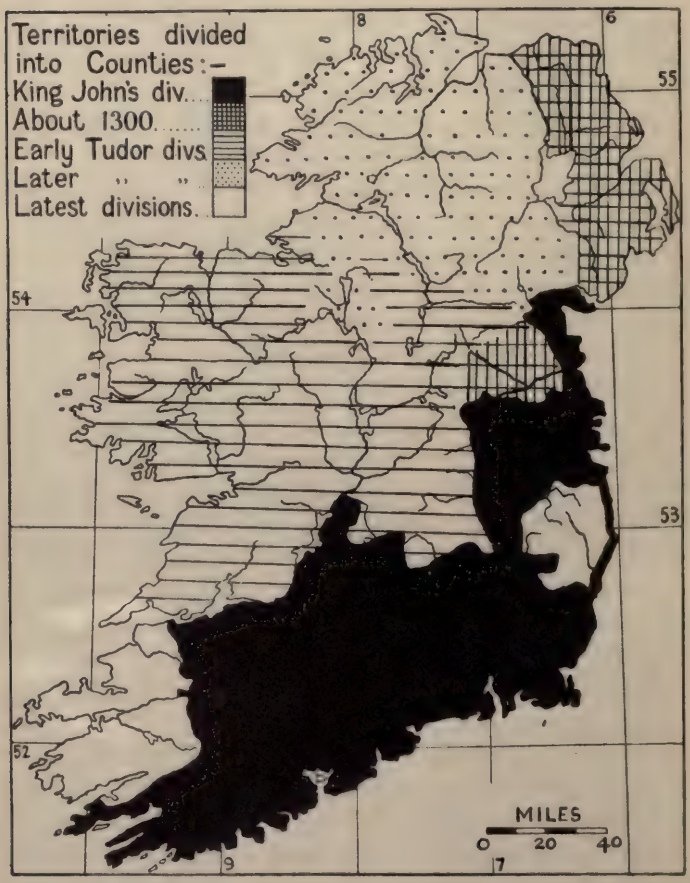


Fig. 35. Map showing Periods at which various Districts were divided into Counties. Note.—It must not be supposed that the division attributed to King John remained unchanged ever afterwards. At any rate in the more westerly district, it can have had none of the importance or permanence of later divisions.

English 'Pale'. The Pale was a term applied to the territory where English rule was paramount. Its extent varied. Down to the beginning of the fourteenth century it was gradually enlarged, and the authority of the king's officers, or of those of his palatine counts, was to a greater or less extent effective in the territories covered by King John's counties. Moreover at some time between John's reign and 1296 Connaught was divided into two districts—Connaught and Roscommon, and in 1296 Meath was created a county by itself. Finally, at some unknown date, but certainly as early as the beginning of the fourteenth century, the counties of Down and Antrim were created, or at least those names were given to districts approximately the same as the modern counties.

But in 1315–18 the whole country was convulsed by the invasion of Edward Bruce, whose attempt to establish a Scottish kingdom in Ireland, though a failure, left the English rule very weak, so that the Irish managed to win back much of the territory previously in English occupation. In 1494, by an Act of Parliament, the English who dwelt along the 'marches' or border-lands of the English territory were ordered to make and maintain a line of dykes as a protection against the Irish. These dykes may therefore be taken to define the Pale at that time; in fact the term 'Pale' probably came into use then, and was derived from the Latin *palus*, a paling or fence, thence applied to the land enclosed by the fence. The boundary of the Pale thus defined ran from Dalkey along the north flank of the Wicklow Mountains, into the great bend of the Liffey, thence northward by Naas, Kilcock, and Trim to Kells, and north-east by Ardee to Dundalk. Thus it only included parts of four counties—Dublin, Kildare, Meath, and

Louth. Beyond the Pale lay forest and bog—natural defences which the Irish strengthened by twining together branches and bushes in the woods, and by deepening the river-fords so as to render them impassable. The Irish system of disunited tribal government continued as in earlier days. Communications between the Pale and other parts of Ireland, at any rate by land, were practically impossible.

Later creation of Counties. This state of affairs continued until the reign of Henry VIII. It is well illustrated by the proverb of the time—'Whoso lives by west of the Barrow, lives west of the law.' From the year 1541, however, Henry and his successors made strong, and at last successful, attempts to exert their authority over all Ireland. Henry at first tried the plan of inducing the Irish chiefs to accept his authority by making them his direct feudatories, that is to say that they should acknowledge themselves his subjects, while continuing to hold the territory they possessed, not as independent chiefs, but 'from the Crown'. At first, therefore, hardly anything was done in the way of creating new counties; only that of Westmeath was established out of part of Meath in 1543. But the territory under English rule was steadily extended. In 1556 the Queen's and King's Counties were created, and named after Queen Mary and her husband Philip. Under Queen Elizabeth, Sir Henry Sydney became viceroy of Ireland three times. In 1566 he caused a bridge to be constructed over the Shannon at Athlone, and soon afterwards another over the Suck at Ballinasloe. These were (and still are) on the direct route from Dublin to Galway. Having thus made communication more easy between the capital and the west, so that he could more easily enforce the queen's authority, Sydney, in 1579, divided

Connaught into the four counties of Galway, Mayo, Sligo, and Roscommon. Next, for the first time, we find some extension taking place northward from the Central Lowland, when the Counties Longford and Cavan were created. We have seen that Thomond was the northern part of Munster, but Sydney, realizing that the Shannon estuary offered a natural frontier, transferred the territory of Munster which lay north of it to Connaught, and made of it the County Clare, so that the name of Thomond disappeared. From about 1600, however, this territory was governed by the Earls of Thomond, as distinct from either Connaught or Munster, until 1639, when, as the County Clare, it was reunited, not to Connaught, but to Munster.

Desmond appears to have formed an English county for a while; it was natural that it should, for it was an especially turbulent country in Elizabethan times, when Gerald the rebel Earl of Desmond and others of his kind kept the whole of south-western Ireland in ferment. It may be added that in 1565 Munster and Connaught were each put under the government of a president and council, with very large powers to enforce English law. Desmond was reckoned as a county from about 1571 to 1606, when it was united with Kerry.

A successor of Sydney in the viceroyalty, who had much to do with the formation of counties as we now know them, was Sir John Perrot (1584). He, early in his period of office, created the county of Leitrim, and followed this with a larger scheme—the long-deferred division of Ulster. Geographically it is not unnatural that the north should have been divided later than the west and south. The district north of the Central Lowland was less accessible, on the whole, than the districts west or south of it. But Perrot now created the counties of

Armagh, Monaghan, Coleraine (which afterwards became Londonderry), Donegal, and Fermanagh. Louth had always been within the Pale; Down, Antrim, and Cavan already existed as divisions.

But though the south was as a whole divided before the north, there was one southern district on which no attempt had been successful. In the earliest times of English settlement we have found that the South-eastern Highlands formed an Irish stronghold on the flank of the Pale, and it still was so. Here the Irish kept themselves free of English rule among the mountains, and though in 1578 a county of Wicklow was created the step was of no effect, and it was not till 1606 that the county, though so near to Dublin, the capital city, was properly established. Even then, and for long after, there was a little island, so to say, of land unsettled by the English about the headwaters of the Liffey, the Slaney, and the Ovoca.

To complete our study of the counties, we have to mention that of Tipperary. It was created a county palatine in 1328, held by the Earls of Ormond (Ormond, as a territory, being the western part of the present county). But in lands belonging to the Church within a palatinate, officers were appointed by the Crown, not by the palatine count, and thus there were in many cases two divisions of a county palatine, one representing the Church lands, and being known in consequence as the County of the Cross. In earlier times there were several Counties of the Cross in Ireland, but Tipperary had survived much later than the other palatinates. It only reverted to the Crown in 1621, and even then the County of the Cross of Tipperary, or Cross Tipperary, continued to exist at least as late as 1634. Moreover, the palatinate was revived in 1664, and continued to

exist till 1715, when the modern county, including both the old palatinate and the Cross lands, was formed.

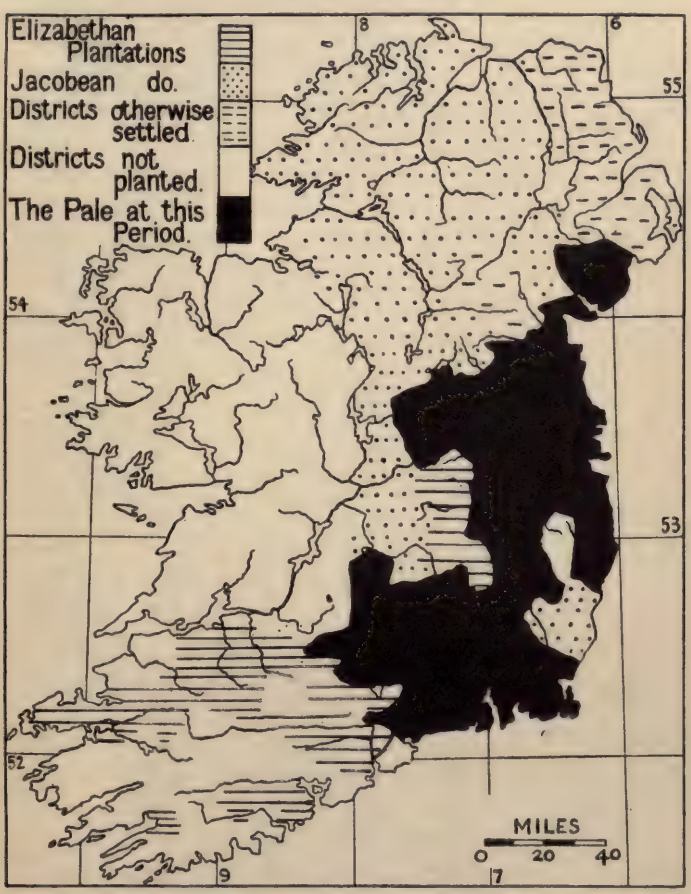


Fig. 36. Map showing the extent of Plantations, the Districts unplanted, and the extent of the Pale in Elizabethan and Jacobean times.

Plantation. Side by side with the creation of the counties, from the time of Queen Mary, the system of

'plantation' was going on. This system consisted of the confiscation of all the lands under the rule of any chief who rebelled, which lands were then given to 'undertakers' from England, so called because they undertook to settle English and Scots on the lands. We need not here follow out the constant struggles between the English and the deposed Irish landowners, to which this system naturally gave rise. But the progress of the system may be traced on a map. In Elizabethan times lands had been 'planted' in the eastern parts of King's or Queen's Counties, in Western Tipperary and Waterford, the east and south of County Cork, and in Limerick and Kerry. In the reign of James I the chief plantation was that of Ulster, including the central, north, and west parts of that province. In the east (Antrim and Northern Down) there had been settlements of emigrants from Scotland, driven into Ireland by enemies in their own country, in the time of Henry VIII. At first the English government tried to drive them back to Scotland, but in 1586 they were recognized as lawful settlers, and thereafter their numbers increased. By the middle of the seventeenth century, then, we find that the only parts of Ireland not 'planted' covered, roughly speaking, Connaught, together with large tracts in Munster interspersed with planted districts. There also remained the small unplanted tract in the higher parts of the Wicklow Mountains (South-eastern Highlands).

Oliver Cromwell restricted the purely Irish districts still more. After his successful campaign in 1649–50 he took the River Shannon as a boundary, beyond (that is, west of) which he transferred such Irish landowners as could prove that they had shed no blood in the strife and had been loyal to the English parliament. The boundary, from the foot of Lough Allen, followed the

southern boundary of County Sligo, and so ran to Lough Conn and thence northward to the coast. In the heart of this territory, about the town of Galway, a small tract was reserved by the government. The lands elsewhere in Ireland thus deprived of their Irish owners, were granted to Cromwell's soldiers for good service, to those who had supplied money, and other such. This was the last great settlement of territory which we have to notice in the historical geography of Ireland.

CHAPTER XXIV

THE POPULATION OF IRELAND

The population of Ireland is under four and a half millions.[1]

Towns. The first diagram in this chapter (Fig. 37) marks the distribution of towns in Ireland. The first lesson to be learned from this map is that the population in towns, or urban population, is small. The round black dots, which represent small towns, with populations of 2,000 to 5,000, are by far the most numerous, but even of these there are not very many. Ireland has no district of dense urban population such, for example, as the south of Lancashire and south-west of Yorkshire in England. There is a well-marked group of considerable towns in the north-east, in the Counties Antrim, Down, and Armagh. These include the great port of Belfast, the largest town in Ireland (349,000). Others in the group are Lurgan (11,800), Lisburn (11,500), Portadown (10,000), Newtownards (9,100), Armagh (7,600), Bangor (5,900), Banbridge (5,000), Carrickfergus (4,200), Holywood (3,840). This group is not merely to be regarded as one of those which naturally grow up round a very large town like Belfast. In the preceding description of the north-east of Ireland it has been noticed that this district is the only one where there is a characteristic manufacturing industry. This is the linen industry, and this group of towns is its centre.

[1] At the census of 1901 it was 4,458,775.

Round Dublin, on the other hand, there is certainly a group of towns, but they are less scattered, and are more

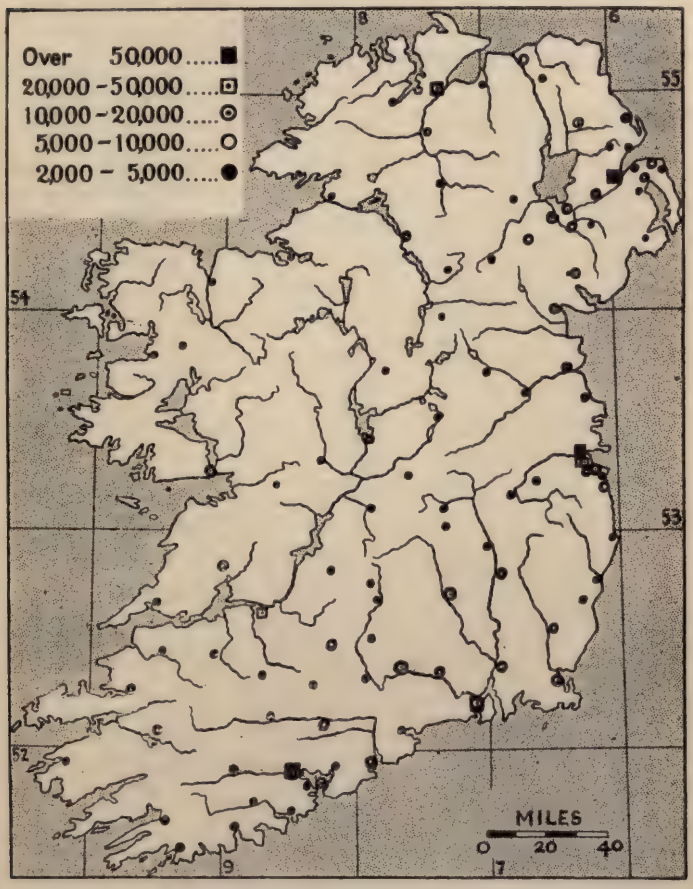


Fig. 37. Distribution of Towns, distinguished according to Population.

like suburbs of the capital. Dublin itself has a population of 290,000 ; and the chief places close to it are Rathmines

and Rathgar (32,600), Pembroke (25,800), Kingstown (17,400), Blackrock (8,700), Bray (7,400), Dalkey (3,400), Killiney and Ballybrack (2,750).

There is a small group of towns around Cork Harbour, consisting of the city of Cork (76,100), Queenstown (7,900), Passage West (2,000), and Midleton (3,400). But otherwise towns do not fall into groups in Ireland; they are scattered pretty evenly over the country, with this exception—clearly seen on the map—that there are far fewer west of the Shannon, Erne, and Foyle than east of those rivers. We may note here the populations of the chief towns not already mentioned :—

In *Ulster* (apart from the Belfast group), Londonderry (39,900), Newry (12,400), Ballymena (10,900), Coleraine (7,000), Larne (6,700), Enniskillen (5,400), Strabane (5,000), Omagh (4,800), Dungannon (3,700), Cookstown (3,500), Downpatrick (3,000), Bessbrook (3,000), Ballymoney (2,950), Monaghan (2,930), Cavan (2,800), Limavady (2,700), Letterkenny (2,400), Ballyshannon (2,360).

In *Leinster* (apart from the Dublin group), Dundalk (13,100), Drogheda (12,800), Wexford (11,200), Kilkenny (10,600), Athlone (6,600), Carlow (6,500), New Ross (5,840), Enniscorthy (5,460), Arklow (5,000), Birr (4,400), Athy (3,600), Kells (2,400), Balbriggan (2,200).

In *Munster* (apart from the Cork group), Limerick (38,000), Waterford (26,800), Clonmel (10,000), Tralee (9,900), Tipperary (6,300), Fermoy (6,100), Killarney (5,600), Carrick-on-Suir (5,400), Youghal (5,400), Ennis (5,100), Dungarvan (4,850), Nenagh (4,700), Mallow (4,500), Thurles (4,400), Kinsale (4,250), Kilrush (4,200), Listowel (3,600), Skibbereen (3,200), Bantry (3,100), Clonakilty (3,100), Macroom (3,000), Cashel (2,900), Bandon (2,800), Templemore (2,800), Newcastle (2,600), Roscrea (2,300).

In *Connaught*, Galway (13,400), Sligo (10,900), Ballinasloe (4,900), Ballina (4,500), Westport (3,900), Castle-

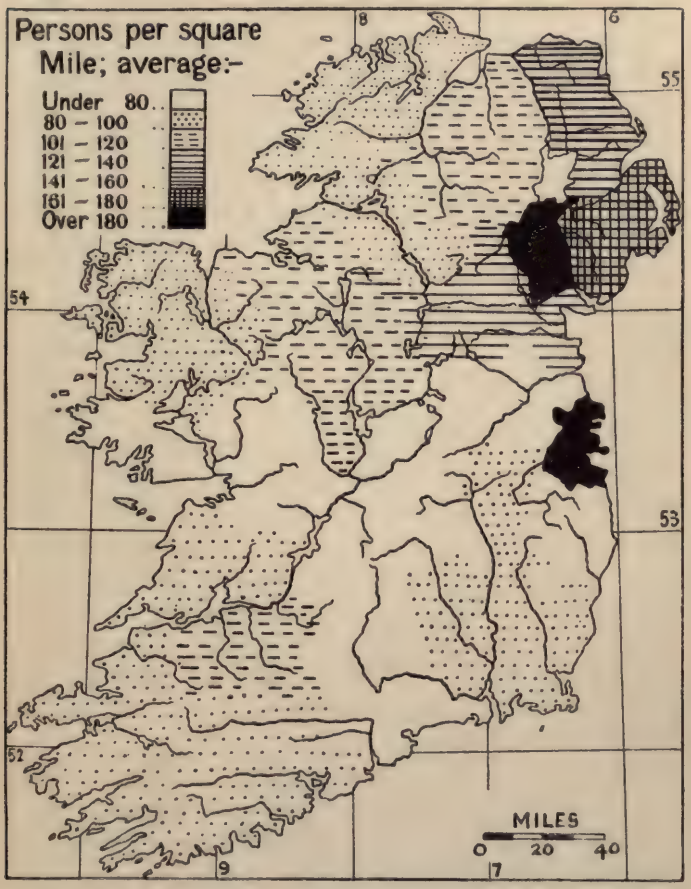


Fig. 38. Average Density of Rural Population per square mile (by counties).

bar (3,600), Tuam (2,900), Loughrea (2,550), Boyle (2,500).

The comparatively small number of towns west of the

Shannon (in the province of Connaught) is thus clearly seen. In the census report the term 'civic area' is used to cover all towns with a population of 2,000 and upwards; on this area the population is not quite 1,400,000.

Density of Population. The 'rural' population, which is the population outside the civic area, is about 3,000,000. In Fig. 38 the approximate density of the rural population in each county is seen. This map requires careful explanation and study. The average number of persons to a square mile in the rural districts has been ascertained for each county; thus the County Wicklow, with an area of 776 square miles, has a rural population of 45,000 persons, so that, dividing the latter figure by the former, we find that to each square mile there are 58 persons; this, then, is the 'density of population' in the rural districts of the County Wicklow. This county, and all others which have a density of less than 80, are left white on the map; those with a density of 80 to 100 are covered with dots; for those where the density is greater the shading becomes heavier, until a density over 180, found in the Counties Dublin and Armagh, is represented in solid black. The names of the counties are not written on this map, but their position, if not perfectly known, can be followed by reference to a map which shows them (as Fig. 29).

Speaking generally, then, we find the heaviest rural population in the County Dublin and in the north-east of the island, especially in the Counties Armagh, Down, and Antrim. This corresponds exactly, it will be remembered, with the two chief groups of towns seen on Fig. 37, and the inference is that the total population is by far the most dense in these two districts. In the north-east the prosperous linen industry accounts to a great extent for the comparatively dense rural population as it did for the

urban, for it is not one of those industries which can only be carried on in towns. As regards the neighbourhood

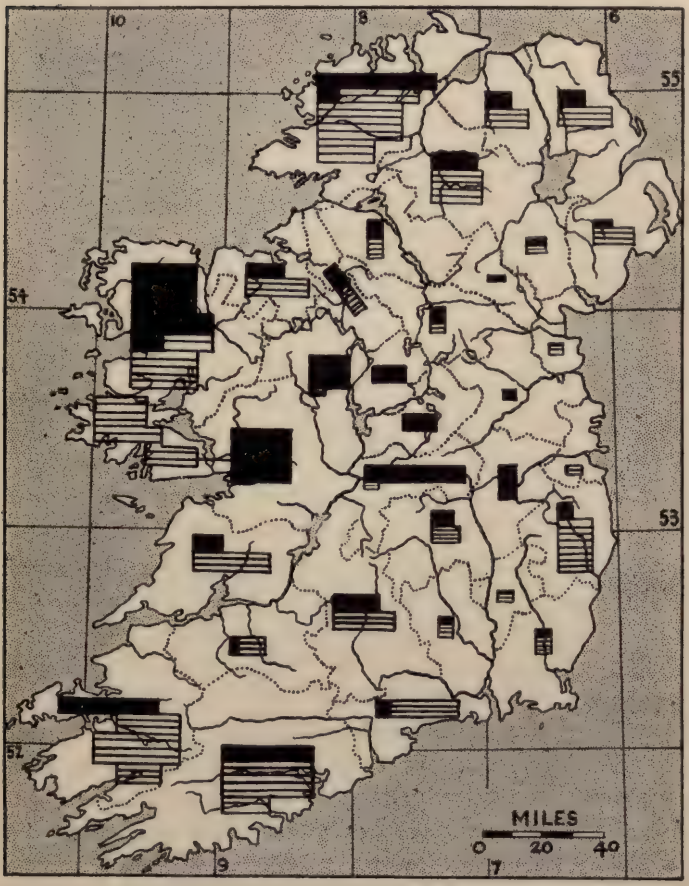


FIG. 39. Bogs and Mountainous Waste Lands. In this map, within each county, the black figure is drawn proportionately to show the extent of bog in that county, and the shaded figure shows the extent of mountainous waste land in the same way.

of Dublin, the conditions are different. By the shading on the map it can be seen that the population gets gradually denser as one proceeds from the centre or north-west of Ireland towards the north-east, whereas immediately bordering on the densely populated county Dublin there are some of the least densely inhabited counties in Ireland, notably Meath and Wicklow. Dublin is not, like Belfast, the centre of a manufacturing district, but on the other hand there is always a movement of population from rural districts to a large town or its neighbourhood, and this may account in some degree for the scanty rural population of the counties round Dublin.

But in the case of County Wicklow, the least densely populated of all the Irish counties, there is another reason —the physical character of the country. Fig. 39 is a map on which the county boundaries are shown, and within each county are drawn squares or oblong figures, partly black, partly shaded with lines. The black squares are drawn to a scale to show the total area of bog and marsh within any county proportionally to the total area of that county. The shaded figures represent the proportional area of mountainous waste land in a similar way, and in this aspect the map may be compared with Fig. 2, showing the mountainous land and hill country over 500 feet in elevation, or with the maps of the various physical divisions of Ireland already described. From these we have already a fairly clear idea in what counties the greatest area of mountainous waste land is found—they are the counties bordering the coast on the one hand and the Central Lowland on the other, and especially Wicklow, Waterford, Cork and Kerry, Galway and Mayo, Donegal and Tyrone. As for bog and marsh, we can now see, from this map, that the greatest areas of these are

found in the counties of the Central Lowland, especially those of its southern part, where the Bog of Allen and its offshoots extend, and also in the extreme western counties of Cork, Kerry, Galway (more than half of which, of course, belongs to the Central Lowland), Mayo, and Donegal. Now, where the surface of Ireland consists neither of mountainous waste land nor of bog and marsh (leaving lakes, rivers, and towns out of account) it consists generally of cultivable land. And as men do not build their houses in bogs or on mountainous wastes, it follows that the map we are now studying shows pretty nearly the amount of habitable land in each county as opposed to uninhabitable land.

Turning back now to the previous figure (38), we find that the least dense rural population is found in Wicklow and Meath, in the counties of the southern part of the Central Lowland (as shown by the untinted area extending across the middle of Ireland from Meath to Galway), and in an area extending south from these, and represented by the Counties Tipperary and Waterford. We find a still scanty population (80 to 100 per square mile) in the south-eastern counties, the mountainous south-west, the mountainous and very boggy west (County Mayo), and the north-west with its similar character. In the north-east, where the land is proportionately drier and less desolate, we find the heaviest rural population. We may find an additional reason why the population should be more dense here and round Dublin than elsewhere in Ireland in the comparative ease of communication with Great Britain, and the consequently greater opportunities for trade.

But now let us leave out of account entirely the uninhabitable bogs and wastes, and regard the density of the rural population on the habitable lands alone. This

is done in the next figure (40). The same forms of shading are used to represent similar degrees of density as on Fig. 38. We find that some of our conclusions hold good

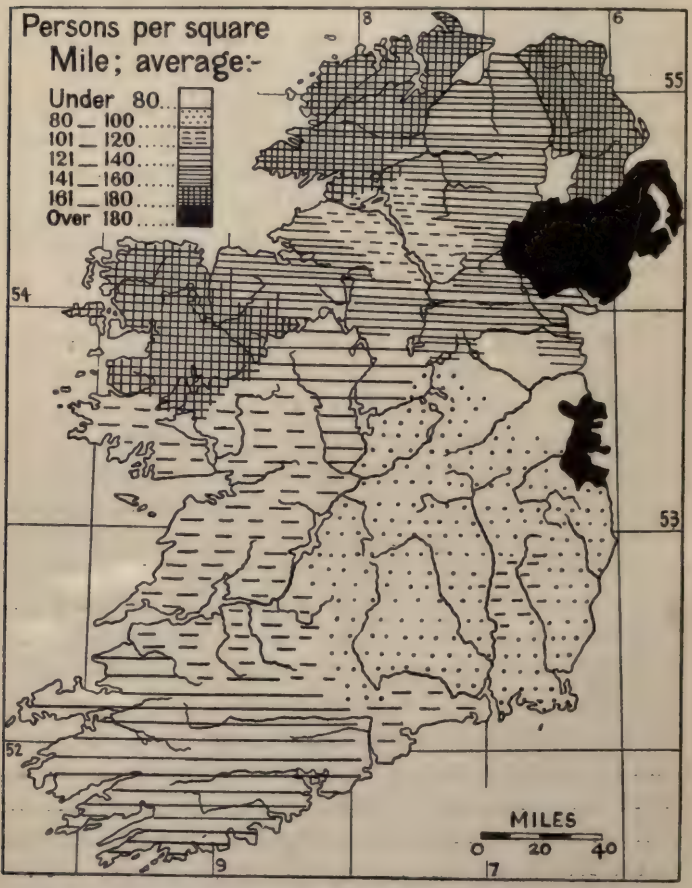


Fig. 40. Average Density of Population per square mile on habitable lands (i.e. total area minus bogs, mountainous waste lands, &c.) (By counties.)

under these new conditions, while others do not. The County Meath, lying next to the densely inhabited metro-

politan county of Dublin, still appears very sparsely populated—now, in fact, the most sparsely of all the counties. The north-east maintains its character as the largest area of dense population. The counties of the south-eastern quarter of Ireland, both plain and highland, form a group apart, nearly all having the uniform density of 80 to 100 persons per square mile. But the habitable lands of the Counties Cork and Kerry in the south-west are seen to be more densely populated than those of Limerick and Clare to the north of them; and finally, a remarkable result is seen in the west and north-west, the habitable lands of Mayo and Donegal having a rural population as dense as that of Antrim, and only exceeded by Dublin, Armagh, and Down.

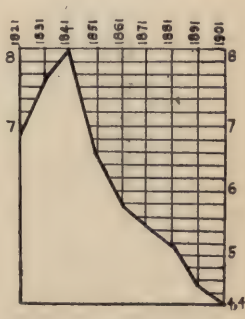


FIG. 41. Diagram showing Rise and Fall of the Population of Ireland from 1821 to 1901.

Decrease of Population. The population of Ireland has decreased enormously since 1841. There are various reasons for this, some of which cannot be considered in a book of geography, as they are in no way geographical; others will be better considered in connexion with the economic conditions of the island, i. e. its industries and trade. For the present we may simply accept the fact and look at the accompanying figure (41) which shows that when the first census was taken, in 1821, the population was nearly seven millions (6,801,827). No proper census had ever been taken before, but estimates had been made which went to show that the population had been long increasing steadily, just as in other countries of Europe. For instance, in 1672 it was believed to be

little over a million; about 1725 it was computed to have exceeded 2,300,000; about 1791 estimates brought

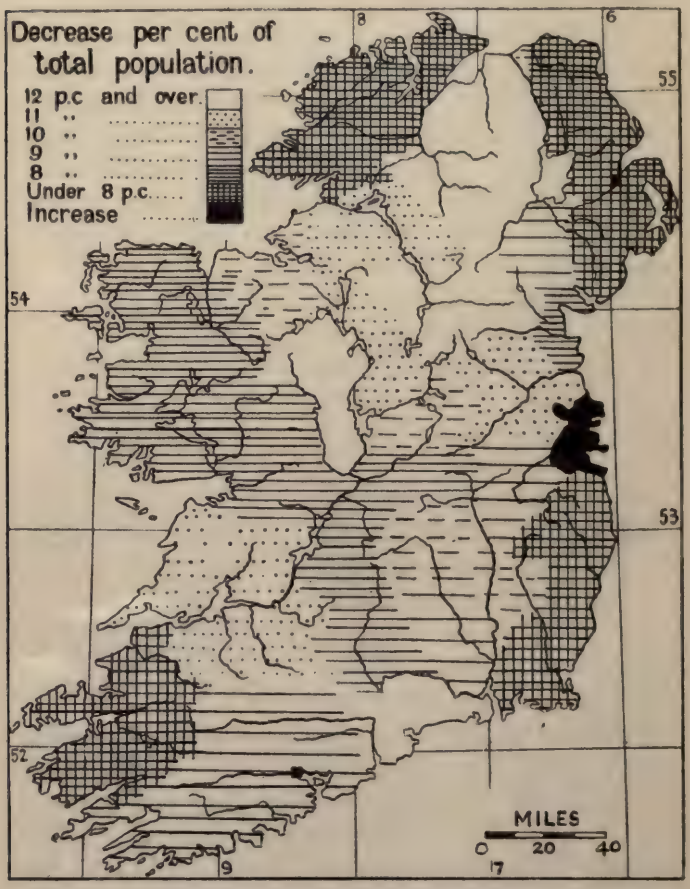


Fig. 42. Map showing (by counties) the Decrease per cent. of the Total Population between 1891 and 1901.

it over four millions, and in 1805 to nearly five and a half, millions. The census of 1841 gave it as over 8,000,000,

but then the fall set in—to 6,500,000 in 1851; to 5,800,000 in 1861, and so on, as shown by the falling curve in the diagram, to less than 4,500,000 in 1901. A decrease was shown in the populations of all the counties except Dublin between 1891 and 1901; but the three cities of Belfast, Dublin, and Cork (which rank as counties for certain purposes) all showed increase, thus further illustrating the movement of population from country to town.

In Fig. 42 the increase and various degrees of decrease are shown by tints. The County Dublin and the cities of Belfast and Cork are shown in black, as their population increased; the heavy crossed shading over Antrim and Down, Wicklow and Wexford, Kerry and Donegal, shows that the population decreased comparatively slightly—under 8 per cent. The tints decrease in intensity, as in previous maps, till the areas left white (Londonderry, Tyrone, Monaghan, Roscommon, Waterford) represent the areas where decrease of population was greatest—12 per cent. or more. In Donegal and the north-eastern counties may be seen a certain relationship between a dense rural population on the habitable lands and a comparatively slight decrease in population, and to some degree the student may trace similar relationship elsewhere, but not markedly. It is of greater interest to study the relation between this map and the two following, which illustrate two leading causes of local decrease in population, namely emigration, and the movement towards the towns. Fig. 43 and Fig. 44 furnish a striking contrast. Fig. 43 shows by various tints the amount of emigration to foreign countries from the different counties. The solid black shows the counties from which over 20 per thousand of the population left the country each year from 1881 to 1901 on an average, and the tints run in

gradation down to the counties left white, from which less than 9 per thousand emigrated. This map gives a

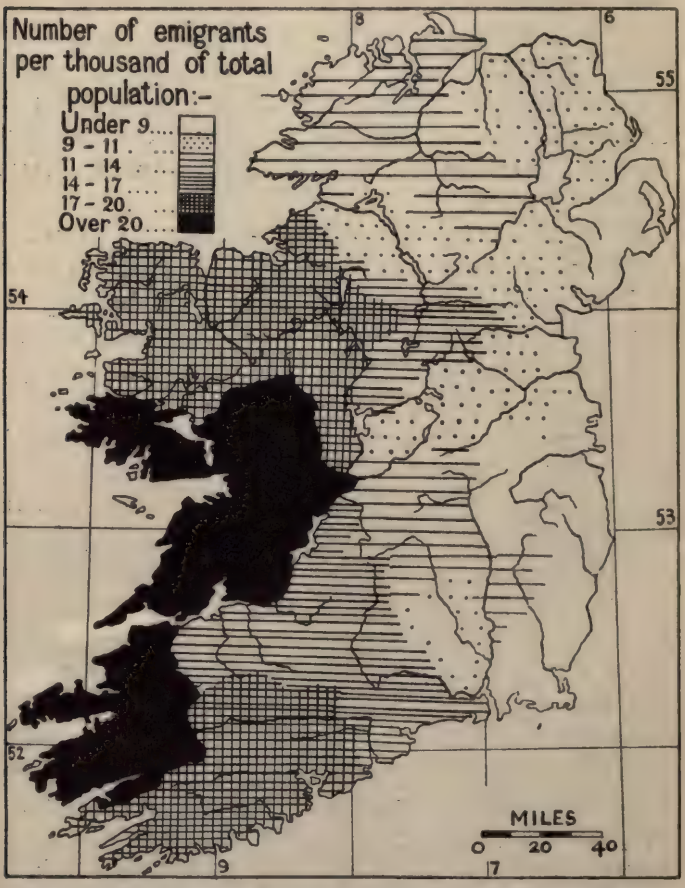


Fig. 43. Map showing (by counties) the Annual Average Number of Emigrants per thousand of the Population during the Period 1881–1901.

remarkably perfect gradation from west to east, showing clearly that the western counties have their population

most heavily reduced by emigration, and the eastern counties least. Fig. 44 shows by the same tints the per-

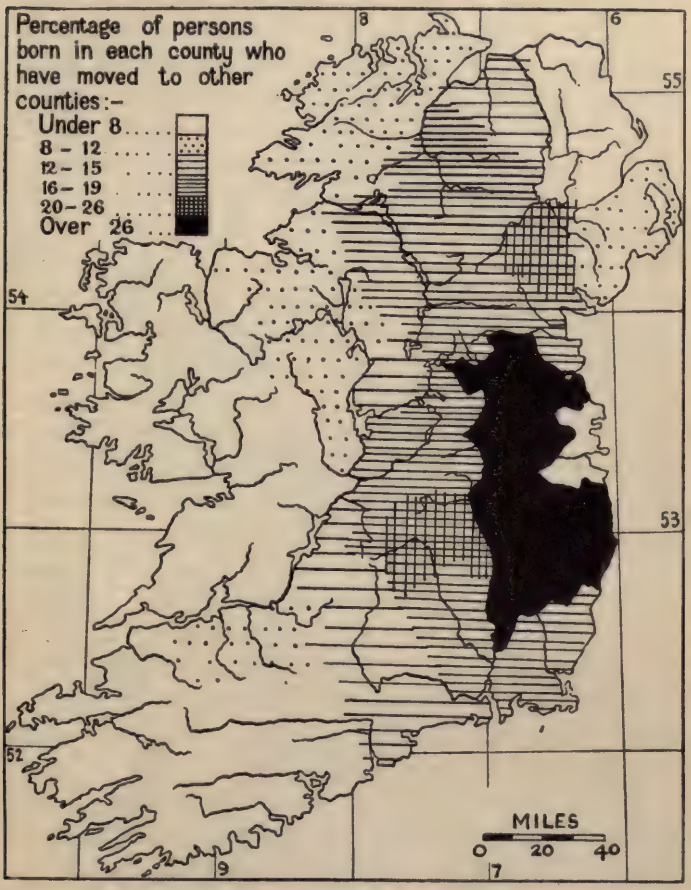


FIG. 44. Map showing Movement of the Population within Ireland (percentage of persons who have moved from the county in which they were born to another),

centage of persons born in each county who were found in 1901 to have left that county and gone to live in

another. A gradation is seen from east to west—the opposite to the map of emigration. But as we have seen, this movement is generally a movement from rural districts to towns, and thus we find that the Counties Antrim and Down (in which we include Belfast), and the County Dublin, have a very small movement outward. On the other hand, the counties immediately surrounding Dublin have the largest movement outward; those near Belfast have also a large movement, while the western counties have very little. In the report for 1901 it is seen that the Irish inhabitants of Dublin city and county who were not born there come chiefly from the Counties Wicklow, Kildare, Meath, Wexford, and Tipperary, in this order, and a considerable number also from Carlow, Queen's County, Westmeath, Cavan, Louth, King's County, Kilkenny, and Limerick. To Belfast the movement is chiefly from Armagh, Tyrone, Londonderry, Monaghan, Cavan, and Fermanagh. Movement towards those counties in which other large towns are situated is also clearly seen, though to a less degree; thus there are noticeable movements from Kerry, Limerick, Tipperary, and Waterford to Cork; from Tipperary and Kilkenny to Waterford; from Clare, Cork, and Tipperary to Limerick; from Mayo and Roscommon to Galway; from Mayo and Leitrim to Sligo; and from Donegal, Antrim, and Tyrone to Londonderry.

Of the emigrants, about 90 per cent. go to the United States of America, about 7 per cent. to Great Britain, and the small remaining fraction to Australia, Canada, and elsewhere.

The Irish Language. Fig. 45 illustrates the interesting geographical distribution of the Irish language. It shows very clearly how the language has survived most strongly in those parts of Ireland which are most remote

from Great Britain and have always been least open to English influence. One large area left white on the

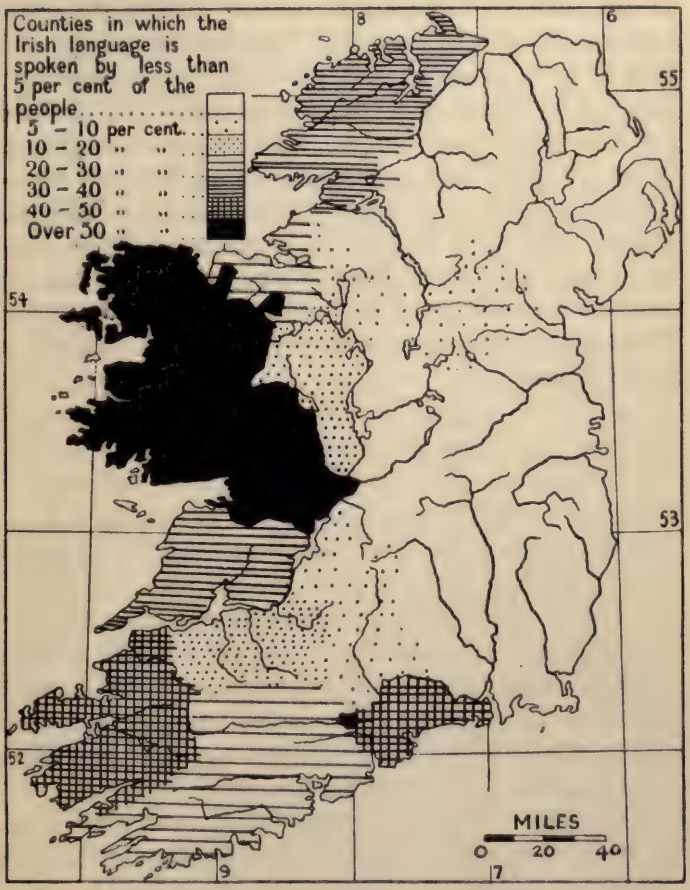


FIG. 45. Distribution of the Irish Language.

map, showing that less than 5 per cent. of the inhabitants speak Irish, corresponds exactly to the province of

Leinster. Another such area includes the whole of Ulster except Donegal and the two counties bordering the Central Lowland on the north—Cavan and Leitrim. In these and in Tipperary we have a slightly larger percentage; in Roscommon and Limerick, as we proceed west, it is larger still, and finally it increases still further in Sligo and Cork, in Donegal and Clare, in Waterford and Kerry, and in Mayo and Galway. In the two last, at the census of 1901 (on which the map is based), somewhat over 50 per cent. and 56 per cent. of the inhabitants respectively spoke Irish. The great majority of those who speak Irish speak English also, but in some of the western counties there are a good number who speak Irish only. The census showed these to number (in round figures):

In Galway	9,500
In Donegal	4,500
In Mayo	2,500
In Kerry	2,500
In Cork	1,100

Conditions of physical geography thus appear to have some influence on the preservation of the Irish language —it is most strongly maintained in the mountainous districts of the west; which have always been the least accessible to influence from outside. We have here another illustration of the importance of the western highlands as a retreat; the native language has been driven westward, so to say, but it has never been driven out altogether by the English invasion.

Religion. The Irish people are divided almost entirely between three great religious bodies—the Roman Catholics, Protestant Episcopalians, and Presbyterians. These bodies respectively account for about 74, 13, and 10 per cent. of the population. Broadly speaking, the Roman Catholics predominate most strongly in the west and least strongly in the north-east (Ulster). In Connaught

there is no county in which they number less than 90 per cent. of the population, and in Galway, Mayo, and Roscommon they number more than 97. In Munster they nowhere number less than 91 per cent. in the County Cork, and they reach 98 in Clare. The few Episcopalians and Presbyterians are mostly concentrated in the large towns—Cork, Limerick, and Waterford. In Leinster the Protestant sects are somewhat stronger, but the Roman Catholics still number over 90 per cent. in Kilkenny, Longford, Louth, Meath, Westmeath, and Wexford. Only in Wicklow the percentage falls to 79, while that of the Episcopalians is over 18, and in Dublin to 70, while that of the Episcopalians is 24.

In Ulster, however, the conditions are quite different. The geographical distribution of the sects in this province is peculiar. The Roman Catholics number as high as 81 per cent. in Cavan, but they fall as low as 20 per cent. in Antrim. The Episcopalians are most numerous in Fermanagh and Armagh (35 and 33 per cent.), the Presbyterians in Antrim, Down, and Londonderry (51, 39, and 31 per cent.). In the whole province Roman Catholics number 44 per cent., Presbyterians 27, and Episcopalians 23.

CHAPTER XXV

ECONOMIC PRODUCTS—MINERALS

The mineral resources of Ireland are not large. They resemble those of Great Britain on a small scale. Thus, while there is some abundance of coal and (to a less degree) of iron, the precious metals and precious stones are practically entirely wanting, though, as will be seen, Ireland had once a store of gold which far exceeded that of Britain. The whole of the Irish mining and quarrying industry suffers in modern times from a want of opportunity and money to develop it; it is generally considered that the coal mines and quarries (particularly for granite and marble) might be made a source of wealth to the country under better economic conditions.

Coal. The coal mines, as at present worked, are not of much value. They would in no case rival the great mines of England and South Wales, but expert investigation has shown that they might produce considerable quantities of coal if they were worked more deeply than they have been hitherto, and if better means of communication were provided to transport the coal from the mines to the places where it would be consumed in largest quantities.

The 'coalfields' (that is, the districts where coal occurs in a position accessible by mining) are scattered. They are found (1) in the County Kilkenny and neighbourhood, this field, which extends over nearly 100 square miles, being named from Castlecomer, the small town

which is the centre of the coal-bearing area; (2) in the County Tyrone, about Coalisland and Dungannon; (3) in the north of the County Antrim, near Ballycastle; (4) about Lough Allen, in the neighbourhood of Arigna; (5) in the south-west—the north of Counties Cork and Kerry and County Clare.

There is a clear physical reason for this scattered position of the coalfields. The 'coal-measures', as geologists call the coal-bearing rocks, always overlie the limestone which, as has been seen, still covers such a large area in Ireland. But we have also seen how the surface of the land, in the course of ages, is worn away by denudation, and thus the coal-measures have all been gradually removed, and their mineral riches with them, except in a few districts here and there, where they have escaped destruction, just as in a ruined building a single pillar or two may remain standing.

The coals principally worked are those of Castlecomer and the Tyrone field. Iron ore is found in the County Antrim over an area of about 170 square miles, and is mined to a small extent near Glenarm; it also occurs near Arigna. In the same district is found bauxite, a mineral used in the preparation of alum and aluminium. It is exported to Scotland. It is well known that the burning of wood to smelt iron in former times led to the cutting down of great tracts of forest, and is therefore one cause of the lack of woodlands in Ireland to-day.

Gold and Silver. The occurrence and working of gold and silver in Ireland is of historical rather than of modern interest. It is true that gold has been in recent times found in small quantities in the Croghan Kinshela and Avoca districts of County Wicklow, where there is a stream still known as the Gold Mines River, and silver in the same county and elsewhere. But in both

metals, and especially in gold, Ireland was formerly far more rich than at present. In the National Museum at Dublin there are a number of magnificent gold ornaments of great antiquity, which have been accidentally dug up in various localities. In number and quality they far exceed those found in Great Britain, and thus show the vastly superior wealth of Ireland in gold. Tradition records that the first Irish king who worked Irish gold lived about 939 B.C.—nearly 3,000 years ago. The Wicklow goldfield was particularly famous, but the metal was also found near Killaloe, near the River Moyola in the County Londonderry, in Antrim and Tyrone, in Dublin, Kildare, and Wexford. As late as the fifteenth century both gold and silver ores were exported from Ireland, but in earlier times, when great use was made of the precious metals for ornaments, the supply did not equal the demand, and gold was imported from Spain. Great necklets, bracelets, plates, rings, and beads have been found, and there are examples of all in the National Museum; they have been discovered in all parts of the country, which shows their wide distribution and use. Silver was obtained in County Kilkenny on the Nore at Rathbeagh (called Argetros or Silverwood in early times), at Silvermines in the north of the County Tipperary, at Glendasan in the County Wicklow, and elsewhere, and at the two places last named it has been worked in modern times.

Copper has been found and worked at various times in various parts of Ireland. At Bonmahon and Knockmahon in County Waterford, and at Allihies near Berehaven in County Cork, it was formerly raised in considerable quantities. It is found, too, in the Avoca district of County Wicklow, which on all considerations may be considered the richest field for metals in Ireland.

Among other minerals only the rock-salt of the Carrickfergus district in County Antrim needs mention. The salt-beds were discovered by accident in 1850, when a bore was made in the hope of finding coal. A large quantity of salt is produced annually.

Quarries. Ireland is rich in a variety of stones suitable for building, decorative, or other purposes. In this as in other directions, difficulties of transporting the stone (the best of which is often found in remote parts of the country) from the quarries to the places where it is to be used or the ports whence it may be exported, have been against the proper development of the trade. Some of the Irish granites are particularly valuable for important buildings, being of beautiful colour and wearing well. In Wicklow, in the neighbourhood of Newry, in Donegal, and in Galway, granite is or has been worked. In a country like Ireland, which is composed in so great part of limestone, it would be expected to find marble, which is 'metamorphic' limestone. In Ireland it is found in large quantities and variety of colour. Black marbles are found near Galway and Kilkenny, red at Little Island and near Middleton and Fermoy in the County Cork, greys in Donegal and Roscommon. Most notable of all is the green marble of Connemara (County Galway) obtained near Ballynahinch and elsewhere in the district. It is very beautiful when polished, and is suitable for the finest decorative work in stone.

The slate of Valencia Island is well known; slate is also obtained near Killaloe and Carrick, and Suir and elsewhere. The so-called 'Carlow flags', of a hard sandstone raised in the County Kilkenny, are valuable as paving-stones.

Industrial uses of Peat. Peat has been put to various uses, and although many of these have only been dis-

covered by experiment, and have not been developed as industries, it is proper to mention them, since in view of the vast amount of peat provided by the bogs of Ireland it is possible that one or another of these uses may prove to be a source of industrial wealth to the country.

The use of peat as fuel, of course, is general, the country people cutting it for their own use (see Fig. 28). A common and simple method of preparing it is as follows. The mud peat is dug out and broken, trampled, and turned over and over in order to mix it. It is then spread out to dry, to a thickness of about a foot or less, and is at the same time shaped into blocks of convenient size. But a more elaborate preparation is necessary if the peat fuel is to be of commercial value. One such method is that which has been employed at Kilberry, near Athy, in the County Kildare. This is an electrical process for the production of what is known as electro-peat-coal. The peat is pressed to remove the bulk of the water from it, and is further dried by passing an electric current through it. It is then broken and kneaded into a soft mass like putty, moulded into briquettes or small blocks, and completely dried. It is more compact than ordinary coal, and by tests has been found to give greater heat, and to raise steam in a boiler more quickly, than ordinary steam coal. It may be added that other forms of peat fuel have been shown to possess greater heating power than coal.

Gas for lighting purposes has been produced from peat, experiments with this object having been made in Ireland. In Ireland also, as early as 1835, paper has been made from peat. Moss litter for cattle is made from peat by drying it, tearing it into fragments, and separating the dust. This dust, called peat-mull, is a deodoriser and preventive of bad odours; it is also a good preservative,

meat which is packed in it keeping good for a long time. Peat is of considerable value in agriculture; it serves as a manure for grass, potatoes, and grain, and is also more generally useful as a manure when mixed with other substances. With the addition of a binding material, peat has been compressed into a hard and serviceable wood. By a process of distillation, tar, creosote, paraffin, ammonia, and other substances have been extracted from it; even molasses or sugar can be produced from it. Among other curious uses to which it has been put is that of road-paving—it is said to make a good springy and silent pavement. From all this it would seem possible that Ireland may possess great undeveloped wealth in peat.

CHAPTER XXVI

AGRICULTURE AND FISHERIES

In the cultivable tracts of Ireland, the proportion of pastoral land to arable is very high. The area of pastoral land is considerably more than twice that of arable, whereas in England pastoral only slightly exceeds arable land in area. The proportion of arable to pastoral land is largest in Ulster among the provinces—about one-third to two-thirds of the total cultivable area; it is least in Connaught—about one-eighth to seven-eighths. Among the counties the proportion is largest in two northern groups of counties—Louth, Down and Armagh, Tyrone, Londonderry and Donegal. It is least in the west, in the centre of the Central Lowland, in the south-west, and in County Wicklow.

In round figures about 24,000 square miles of land in Ireland are under cultivation, of which 16,500 are under grass and 7,000 under crops, while 500 are under woods. This shows clearly the comparatively small cropped area, and also illustrates the fact already brought out, that Ireland is now very poorly wooded, whereas it was in former times the reverse. About 7,500 square miles are uncultivated, of which barren mountain-land covers 3,500 square miles, and bogs and marshes 2,500, while the remainder is waste land.

The grain-crops principally grown are oats, barley, and wheat. Oats occupy the greatest area, and are the most widely distributed crop. Barley is grown principally

in a group of counties in the south-east—Wexford, Kilkenny, Carlow, Kildare, King's and Queen's Counties, and Tipperary; also in Cork and Kerry, Galway, Louth, and Down. Wheat is grown principally in some of the eastern counties—Down, Dublin, and Wexford; in a southern group—Cork, Limerick, Tipperary and Kilkenny, and in Galway. The decrease in grain crops has been exceedingly heavy; the production of wheat at the end of the nineteenth century was only a tenth of the amount about the middle of the century, and the oats crop decreased by half in the same period. Flax is a crop of some importance in Ulster, where the linen industry is established.

The principal and characteristic Irish root-crop is the potato. This is the most important item in the food supply of many Irish country people, especially in the west and south. The appalling results of the potato famine in Ireland, consequent upon the appearance of blight or disease in 1845, and the resulting failure of the crop, are a matter of history. Since that period the potato has lost the supreme importance it then possessed, but still about 1,000 square miles, or one-seventh of the total area under crops, are devoted to potatoes every year.

The dairying industry has long been of great importance in Ireland. The Butter Exchange at Cork, which was established about 1770, became an exceedingly important institution for the proper control and maintenance of the industry and trade in butter. Some idea of the geographical distribution of dairying may be obtained by observing that the greatest number of agricultural societies, which also attend to the interests of dairying, are found in two groups of counties—Sligo, Leitrim, Fermanagh, Tyrone, Cavan, Monaghan, Eastern London-

derry and Western Antrim; and Cork, Limerick, Tipperary, and Kilkenny.

From the utility of the waste products of the dairies as food for pigs, these animals became an important and indeed typical feature of Irish farming, and the bacon-curing industry has developed in consequence. Limerick is the principal centre for this industry, followed by Cork, Waterford, Belfast, Londonderry, and Dublin, and, among smaller towns, Tralee, Enniscorthy, Dundalk, Ballymena, and New Ross. It is thus obvious that the industry is pretty generally distributed over Ireland, but it appears that the greatest number of pigs are found in Counties Wexford and Carlow, and in a north-eastern group of counties—Longford, Cavan, Monaghan, Louth, Armagh, and Antrim, with Cork and Waterford in the south, following. Their numbers are least in an eastern group—Counties Dublin, Westmeath, Wicklow, Kildare and Meath—and in Donegal.

Horse-breeding is a typical Irish industry; Irish horses for all kinds of uses have a high reputation, and the annual horse-show in Dublin, for the exhibition and sale of horses, is one of the most important functions of its kind. The geographical divisions of the industry according to the special purposes for which horses are bred are not clearly marked, but roughly it may be said that the counties of the eastern and northern coasts, from Dublin to Londonderry, are most noted for heavy cart-horses; the midland and southern counties, especially Cork, Limerick, Tipperary and Waterford, Wexford, Carlow, Kildare, Meath and Westmeath, for hunters; and Galway (Connemara) and Mayo, with Northern Antrim, for ponies; while horses for general purposes are bred all over the country, but especially in Ulster.

Of cattle Ireland possesses two famous breeds in those

known as Kerry and Dexter. The first, a small and hardy breed, took its name from the county which was its original home, where the thin pastures had accustomed it to scanty fare. The second takes name from the agriculturist whe first reared it. Sheep are kept principally in Galway (by far the most important county for them) and Mayo, Cork and Tipperary, Meath and Wicklow and Wexford. They are least numerous in a north-central group of counties—Fermanagh, Leitrim, Monaghan, Armagh—and Carlow. Great sheep-fairs are held at Ballinasloe, Banagher, Tuam, and Dublin.

Fisheries. The Irish sea-fisheries are rich and important, and might be more so but for certain obvious natural difficulties. Thus the western shore, which has deep water close to it, offers in consequence only a narrow belt of fishing-grounds along it, and the open Atlantic Ocean is liable to storms highly dangerous to fishing-boats. On this coast the mackerel fisheries are of great value; they extend from Broadhaven in County Mayo to the Old Head of Kinsale in County Cork, and are divided between the seasons of spring and autumn. In the earlier season the fish lie in deep water and are taken from large boats; in the later season they come close in shore, and small craft must be employed. The fish are salted and exported mainly to America. Cod and ling are taken in considerable numbers in spring and winter all round the coast. The herring fisheries are sometimes valuable, but these fish do not appear regularly, either in place or in time. Generally speaking, the grounds where they are taken are found in all the great bays of the west coast from County Donegal to Tralee, off Cork, Dungannon and Waterford Harbours, and near Rosslare, Arklow, Dublin Bay, Dundalk Bay, Dundrum Bay, and off the coast of

Down on the east coast. Trawling is carried on pretty generally all round the island; practically the whole of the Irish Sea is trawling-ground; there are extensive grounds off the north and south coasts, and other grounds off the west, rich in fish but of small extent owing to the rapid deepening of the water over the edge of the Continental Shelf. Some of the shell-fisheries are important; oysters and lobsters are found locally, and there is a considerable trade in periwinkles.

The salmon fishery is carried on to a greater or less extent on all parts of the coast at the mouths of rivers, of which the most notable in connexion with this industry are the Shannon, Corrib, and Erne on the west coast, the Foyle and Bann on the north, the Boyne on the east, and the Suir, Barrow, and Blackwater on the south. Sea trout or white trout and other varieties are also netted, especially in the west coast estuaries. The eel fisheries, notably in the Shannon, Bann, Erne, and Corrib, are of no little value. Salmon, trout, and, among coarse fish, pike are the fish which principally attract sportsmen to Irish waters. The rod fisheries for salmon are widely distributed through the country and still more so those for trout. The Shannon (notably about Castleconnell), the Erne from the lower Lough Erne to Ballyshannon, the Moy in County Mayo, and in County Cork, the Blackwater, Lee, and Bandon, may be specially mentioned as noted for rod salmon-fishing; and for trout the lakes of Westmeath (particularly at the season of the May-fly, a favourite food of the fish) and Ballynahinch in Connemara are famous.

CHAPTER XXVII

MANUFACTURING INDUSTRIES

Linen. It has already been seen that the principal industrial district of Ireland is that in Ulster, which extends inland from Belfast over the country south of Lough Neagh, and that this district is devoted to the manufacture of linen. The industry was firmly established by the introduction of Dutch Huguenot workers at the end of the seventeenth and beginning of the eighteenth century. One of these, Louis Crommelin, established factories at Lisburn and Hilden, where the industry still flourishes. A Linen Board was created at Dublin, to regulate the industry, and a large export trade grew up about the year 1800. The manufacture of cotton cloth was introduced to compete with that of linen, of which for a time it partly took the place, but it did not last long, whereas the linen manufacture survived and flourished as it does still. The conditions of climate in Ulster are said to give the linen a peculiarly pure whiteness in the process of bleaching. In this manufacture a large number of women are employed, and it is therefore of great advantage that Belfast, the chief centre of the industry, has other large industries as well, in which men may be employed while their women-folk work at the linen factories.

A certain amount of the flax used in this manufacture is grown locally, but it has never been cultivated to a very great extent, and the acreage under the crop has generally declined in modern times.

Shirts. The manufacture of shirts, for which Londonderry is the chief centre, is kindred to that of linen, and in fact developed out of it. The linen manufacture was carried on formerly in this part of Ulster also, but decayed, and about 1840 the shirt manufacture was introduced in its place. It extends over the counties of Londonderry, Donegal, and Tyrone. At first it was carried on almost entirely in the cottages of the peasants, who brought their products to be sold to dealers in Londonderry, but although this arrangement is still maintained, and the wholesale firms have agents to collect the goods from the rural districts, the industry, since about 1850, has been for the most part carried on in large factories in the city of Londonderry. The part of the work which is now chiefly carried on in the rural districts is the sewing of the shirts after the cloth has been cut out. The industry, as in the case of the linen manufacture, employs a large number of women, whose labour the manufacturers sometimes find it hard to get, for there are not in this district any very large industries in which men can be employed, as there are at Belfast.

Woollens. Woollen cloth is woven chiefly in the Counties Donegal, Mayo, and Kerry, and in the Connemara district of Galway. It is therefore a western industry. This 'homespun' which is largely used at home, but is also exported, and is much appreciated in London and elsewhere, is made almost entirely on looms in peasants' cottages. Fairs are held for the sale of the cloth to dealers, as at Ardara and Carrick. Each district produces its own types of cloth; thus in North Donegal, in the Gweedore district, a heavy dark cloth is the kind chiefly produced; about Castlebar a heavy cloth is also made, but of lighter colour; in Connemara and the neighbourhood of Gort the favourite cloth is the so-

called 'flannel' both white and dyed. Some of the wild plants which grow locally, and other products of the soil, are used to give the various dyes; thus we find used for this purpose a lichen called 'crotal', heather, the roots of blackberry and iris, peat-soot and bog-ore, and in Kerry spurge, hemlock, and fuchsia, each of these plants or materials providing a different dye. 'Balbriggan hose' is well known.

Lace. Ireland has long been famous for the production of lace. This is made almost entirely by women, and its manufacture is carried on principally in convents, where it is both practised and taught, so that the country-folk may practise it at home. At Limerick, Carrickmacross, Kenmare, Youghal, New Ross, and many other places are convents where lace of various sorts and beautiful patterns is produced.

Poplin. Poplin is a rich material made of wool and silk in combination. Its manufacture needs great skill, and it is not a material which is very widely used. On both accounts its manufacture is not large, but it is important, for Irish poplin is reputed to be the best made. The industry has its centre in Dublin.

Ship-building. The ship-building industry in Ireland is associated chiefly with the city of Belfast. It is carried on at other places, but to a much smaller extent. At Belfast the firm of Messrs. Harland and Wolff is one of the most celebrated in the world, and has built some of the largest ships existing. So far as is known ship-building began at Belfast in 1636. The great firm was founded in 1858 when the industry was already flourishing, and there are now several other large companies engaged in all the branches of ship-building—the erection of the hull, the construction of the engines,

and other parts of vessels. The rope-manufacture is an important kindred industry. Ship-building is also carried on at Londonderry (though the extent of the industry and the size of the vessels built are here much smaller than at Belfast), and to some extent at Dublin and at Haulbowline on Cork Harbour.

Brewing. The brewing industry in Ireland, where the bulk of the liquor brewed is porter, has attained large dimensions. It is in connexion with this industry that barley is so important a crop in Ireland, for the brewers use large quantities of the home-grown grain, though some of them are compelled also to import it. The largest brewery is that of Messrs. Guinness in Dublin, which is the principal centre of the industry, as several other great firms are also established there. There are others in Cork, Clonakilty and Bandon, in Castlebellingham, Drogheda and Dundalk, in Kilkenny, which is the centre of one of the chief barley-growing districts, in Waterford, Dungannon, Clonmel, and several towns in the south-east, whereas in the north of Ireland the industry is much less developed.

Distilling. The distillation of whisky is an industry which has been established in Ireland for centuries—it was so long before its introduction into Great Britain. The word whisky is a corruption of the Irish 'usque-baugh'. It is known to have been made in the twelfth century; by the seventeenth the industry had grown very important, and towards the close of the eighteenth some of the well-known modern distilleries were established. The earliest was probably that at Bush-mills. The chief centres of the industry are Dublin, Belfast, and Cork, but in the north-east there are also distilleries at Bushmills, Comber, Londonderry, Coleraine, and Dundalk, in the south at Wexford and elsewhere,

and in the midlands at Birr, Galway, Kilbeggan, Monasterevan, Tullamore, &c. Distilling, like brewing, aids agriculture by stimulating the cultivation of barley, of which a larger quantity is required than the country supplies. The high duty levied on whisky produced at licensed distilleries gave rise to the establishment of a vast number of unlicensed or illicit stills in the eighteenth century, which were carried on in defiance of the law with the object of avoiding the payment of duty. In a sparsely inhabited country like Ireland, where hiding-places are numerous and it was difficult to enforce the law, especially in the remote west, these illicit stills were not easy to discover and suppress, and they are still found.

Tanning. The tanning of leather is an industry which in Ireland has to some extent decayed in modern times. The principal centre of the industry is Limerick, but there are also tanneries of importance at Cork, New Ross, Dunmanway, Bantry, Ballytore, and Clonmel in the south, with Dublin, Drogheda, Newry, Belfast, Coleraine, and Londonderry in the east and north. A certain amount of export trade is carried on, but down to about 1870 the industry was more fully developed and widely distributed. Boots and shoes were manufactured not only in town-factories, but also in country cottages, but after the year mentioned this manufacture began to extend largely in England, and cheap boots and shoes were imported, so that the Irish industry declined. The boot leather now produced is mainly for soles; harness leather is also produced in large quantities.

CHAPTER XXVIII

COMMUNICATIONS

Roads. At the earliest period of Irish history Ireland was well provided with roads. It is still possible to trace some of these ancient lines of communication, which are followed by modern highways. They were sometimes paved with wood and stone where the nature of the country required this, and were carried over bogs and marshes on causeways which were usually composed of trees, brushwood, stones and earth, and may also be still traced in some parts. From the royal town of Tara five great roads radiated, westward, west-south-westward, south-westward, south-eastward, and northward. Of these the west-south-westward road reached, in the Central Lowland, the great esker or gravel ridge which crosses the country on a line between Dublin and Galway. The road made use of this feature as a natural causeway, running along its crest; the modern main road to the west does the same. The northern road, which followed the pass of Moyry north of Dundalk, also coincided in part with the course of the modern main road to the north. There were numerous minor roads.

Communication between different parts of Ireland is easier than might be supposed from the knowledge that large areas in the north and south are mountainous or at least hilly. It has been learnt already, however, that the

Central Lowland not only covers a large area in the midlands, but also sends out branches, as it were, between the surrounding groups of mountains towards the coasts. When this is remembered it becomes less surprising to find that the road (for example) from Dublin to Belfast, which has to pass through hilly or even mountainous country north of Dundalk, rises to levels only a little higher than that from Dublin to Galway which passes wholly through the Central Lowland. This most important feature of Irish communications may be more fully illustrated by considering a few of the main roads between Dublin and the chief towns to the west, north, and south.

(1) The Dublin and Galway road, running by Maynooth, Enfield, Kinnagad near Mullingar, and Athlone, runs at a general level of 250 feet, and rises occasionally to 400 feet, as at Kilconnell between Ballinasloe and Athenry. The branch from Mullingar to Sligo is of the same character by Longford and as far as Boyle, after which it leads over a pass of the Curlew Mountains, but hardly reaches 600 feet. Finally it follows the important low pass which leads to Sligo from the south, from Collooney, a pass also followed, as we shall see, by a joint railway carrying the trains of three railway companies, the only line entering Sligo.

(2) The north-western road from Dublin by Navan, Kells, and Cavan to Enniskillen, is a plain road as far as Cavan, which it may be mentioned, passes the ancient road-centre of Tara. After Cavan it follows the valley of the Erne, and hardly ever exceeds 250 feet in level.

(3) The northern road to Drogheda and Dundalk is carried nearly to 500 feet in leaving the Boyne Valley north of Drogheda. Between Dundalk and Londonderry it has to rise nearly to 1,000 feet between Dundalk and

Armagh, and between Armagh and Omagh. The Dundalk-Newry-Belfast road, however, following, like the Great Northern Railway, the important pass at Newry between Slieve Gullion and the Mourne Mountains, at the head of Carlingford Lough, need not be carried above 500 feet there or elsewhere.

(4) The Dublin, Bray, and Wicklow road keeps near the coast, but not so near as the Dublin and South-Eastern Railway, which often almost overhangs the sea. The road, traversing the foothills of the Wicklow Mountains, is hilly, but only exceeds 350 feet in height at the Glen of the Downs.

(5) The road from Dublin by Naas to Carlow and Waterford has to skirt the north-western slopes of the Wicklow Mountains, and reaches 500 feet 13 miles out of Dublin. From Carlow it follows the Barrow Valley (an important north-and-south line of communication) beyond Bagenalstown, and then takes a pass (500 feet) somewhat to the west, also followed by the Kilkenny-Waterford Railway.

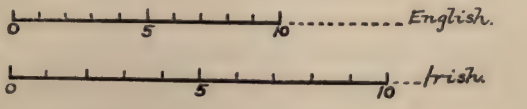
(6) The road from Dublin by Naas to Maryborough is a plain road after Naas. Maryborough is an important communication point in the branch of the Central Lowland between Slieve Bloom and the Kilkenny hills. The road thence to Cashel and Caher follows this branch, the lowland of Tipperary, undulating between 350 and 450 feet. After Caher the pass to Mitchelstown, between the Knockmealdown and Galty Mountains, hardly takes the road above 400 feet. Striking over the Kilworth Mountains to Fermoy, it reaches 650 feet, and thereafter, through the hilly country to Cork, it only once again reaches 600 feet, at Watergrasshill.

(7) The Maryborough, Roscrea, Nenagh, and Limerick road, the last to be noticed, is one of the best illustrations

of the value of the branches of the Central Lowland in providing easy roads. The pass near Roscrea, south of the Slieve Bloom Mountains, hardly carries it above 400 feet, and that between the Arra and Silvermine Mountains, after Nenagh, hardly above 300 feet.

Cars. The Irish car is peculiar to Irish roads. There are long cars, running on four wheels, and small cars which, like English dog-carts, run on two only. The peculiarity of Irish cars is that the passengers' seats face to either side of the road, and between them there is a 'well' for luggage. Before the railway system became widespread there were public services of long cars on the roads in every part of Ireland, and these still serve as 'feeders' to the railways in some districts, and distribute the mails. The cars and the first public service were introduced by Charles Bianconi, an Italian who settled in Ireland early in the nineteenth century, and began to work the first public car between Caher and Clonmel in 1815. The system was successful. The roads to Limerick and Thurles were the next to be served, and gradually cars were introduced in other districts, until, for a period during the first half of the century, they formed the chief mode of communication in the country.

Irish Miles. It may be mentioned here that the Irish mile, by which distances are frequently reckoned in preference to the English mile of 1,760 yards, measures 2,240 yards. The following scale shows the difference between the two measurements :—



Railways. The first railway in Ireland was opened between Dublin and Kingstown in 1834, but no more lines were built for some length of time, during which the conclusion since justified was arrived at that the standard gauge of 4 feet 8½ inches, used in England, Scotland, and elsewhere, was not wide enough. A gauge of 5 feet 3 inches was therefore employed, and Ireland is alone in using this. As the country is an island, and no connexion has ever been made between its railways and those of Great Britain, this difference of gauge causes no particular inconvenience. It has been proposed to lay a railway tunnel under the narrowest part of the Irish Sea, but the project has never been seriously taken up.

Ireland is so sparsely populated that none of the railways, except a few lines in the immediate neighbourhood of the largest towns, has to carry a large traffic, either in passengers or in merchandise. A railway like the Great Western of England, serving populous districts and industrial centres, carries an average of more than 30,000 passengers per mile of railway in a year, and earns over £5,000,000 from that traffic and still more from the carriage of merchandise. All the Irish lines, however, carry, on an average, hardly 9,000 passengers per mile per year, earn a little over £2,000,000 from that traffic, and still less from the carriage of merchandise.

On the other hand, there are clear geographical reasons why the cost of construction of railways in Ireland is on the whole small. In considering the main lines of roadway it has been seen how the Central Lowland sends out branches between the surrounding groups of mountains towards the coasts. It is not often, therefore, that Irish railways have had to be carried through difficult country; tunnels, very deep cuttings, and very high embankments, which add so greatly to the cost

of railway-building, have not frequently been found necessary in Ireland. Moreover, the small traffic on

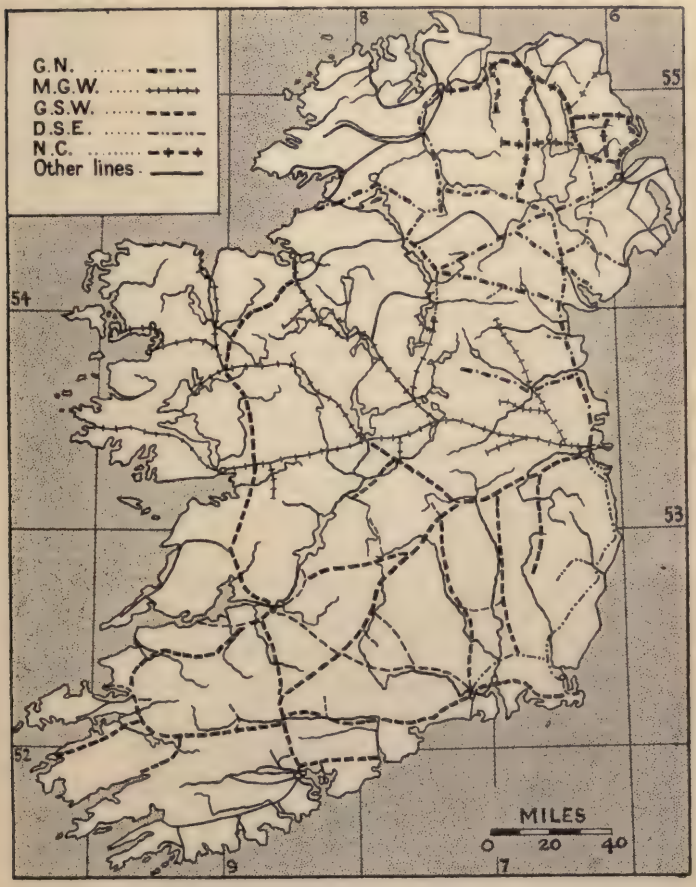


Fig. 46. The Railways of Ireland. The five principal systems (Great Northern, Midland Great Western, Great Southern and Western, Dublin and South-Eastern, and Northern Counties) are distinguished by different signs, so that the district served by each may be seen.

Irish railways can for the most part, except in the case of great main lines, be carried on over a single pair of rails or 'single line', instead of there being a pair for traffic in either direction. Out of a total length of lines amounting to about 3,200 in all Ireland, over 2,500 miles are single lines.

The Irish railways have almost wholly been built and are entirely worked by companies, not by the state, though in the earliest days it was resolved in Parliament that they should be under state control. As in England they were built by a large number of small companies, and again as in England many of these small companies have been absorbed into larger systems. There are now five principal systems in the country—the Great Southern and Western, the Midland Great Western, the Great Northern, the Dublin and South-Eastern, and the Midland (Northern Counties of Ireland). Of these the first three possess by far the greatest length of lines. The main routes of these five will now be considered, and afterwards some of the principal smaller companies, of which there are still a considerable number, whose lines generally serve as 'feeders' to the larger systems, will be named.

(1) *Great Southern and Western.* This system serves practically the whole of the southern half of the island. Its main line runs from Dublin up the valley of the Liffey, leaves it at Newbridge for Kildare, and then traverses the wide vale or arm of the Central Lowland which separates the Kilkenny hills from the Slieve Bloom, Devil's Bit, and other mountains. Passing Thurles, the line throws off a branch from Limerick Junction to Limerick, and then runs along the northern foot of the Galty Mountains to Charleville, where it turns sharply south through the pass leading to Mallow,

across the Blackwater River, and so to Cork and Queenstown. Mallow is the junction for an important line running along the Blackwater valley, westward to Killarney and Tralee, eastward to Fermoy, Waterford, and Rosslare. In the west of the country the Great Southern and Western system has a long northward extension from Limerick to Athenry, Tuam, Claremorris, and Sligo.

(2) *Midland Great Western.* This line runs through the midst of the Central Lowland from east to west. From Dublin it serves Mullingar, Athlone, Athenry, and Galway, whence it continues into Connemara, running along the southern foot of the Twelve Bens, on the north side of the low lake-district, and terminating at Clifden. From Mullingar an important branch runs north-west to Longford, Carrick, and Sligo, and from Athlone another to Roscommon, Claremorris, and Manulla, where it forks northward to Ballina and Killala, and westward to Westport and Achill Sound. Except in the extreme west and north-west, therefore, this railway belongs entirely to the Central Lowland.

(3) *Great Northern.* This system includes the important main line between Dublin and Belfast, which runs at first close to the east coast by Drogheda and Dundalk, and thence follows the important pass between Slieve Gullion and the Mourne Mountains, by Bessbrook, and so enters the Lough Neagh plain, serving Portadown, Lurgan, and Lisburn. From Dundalk a north-western branch runs to Clones, Enniskillen, Omagh, Strabane, and Londonderry. Portadown is an important junction on the system, for besides the Dublin-Belfast line there are branches westward to Armagh, Monaghan, and Clones, and north-westward to Dungannon and Omagh, while

from Dungannon there is a northward branch which serves the Tyrone coalfield.

(4) *Midland* (*Northern Counties*). This system was formerly known as the Belfast and Northern Counties Railway, but it has been acquired by, and become a section of, the Midland Railway of England. With the Great Northern it completes the railway service of the north of Ireland. Its territory is the north-east. From Belfast the main line runs north, at first along the shore of Belfast Lough, thence across to Antrim on Lough Neagh, thence along the valley of the Main to Ballymoney and Coleraine, and thence westward by the coast and the shore of Lough Foyle to Londonderry. Another line, running along the shore of Belfast Lough to Carrickfergus, is continued to Larne, one of the ports for a cross-channel steamer service to Scotland (Stranraer).

(5) *Dublin and South-Eastern.* This railway, formerly called the Dublin, Wicklow, and Wexford, runs south from Dublin by Kingstown and Bray, and close along the coast to Wicklow. Thence it turns inland through the hilly country, traverses the Vale of Avoca, touches the coast again at Arklow, and then runs inland to Enniscorthy, after which branches run south-westward to New Ross and Waterford, and south-eastward to Wexford.

Of the numerous short railways which are worked by separate companies the following may be mentioned. Running south from Belfast there is the Belfast and County Down line, which serves Donaghadee, Downpatrick, and Newcastle. The County Donegal is served by two lines—the Londonderry and Lough Swilly, running from Londonderry into the Inishowen peninsula (Buncrana and Cardonagh), and also to Letterkenny, and thence by a devious route among the mountains to

Burtonport on the west coast, and the County Donegal line, which follows the valley of the Foyle and Finn to Stranorlar, and thence serves the towns of Donegal, Killybegs, &c. The Sligo, Leitrim, and Northern Counties Railway is a line, shorter than its name suggests, from Sligo to Enniskillen. The railway approach to Sligo is a geographical curiosity. There is only one line of rails leading to it, from Collooney, through the pass from the south, and this is used by all three railway companies which serve the town—the Sligo and Leitrim, the Midland Great Western, and the Great Southern and Western. The Cavan and Leitrim is a line between Belturbet, Arigna, and Dromod.

The West Clare line serves the country indicated by its name, with the towns of Ennis, Miltown Malbay, Kilkee, and Kilrush. The city of Cork is a centre of short railways—the Cork, Bandon, and South Coast running to Bandon, Bantry, Skibbereen, and Baltimore; the Cork, Blackrock, and Passage, skirting the west shore of Cork Harbour; and the Cork and Muskerry, to Donoughmore and Coachford. Among other short lines we may notice the Listowel and Ballybunion, peculiar as being worked on a single rail, supported on trestles above the ground. The Giant's Causeway and Portrush Electric Railway was the first of its kind built in the United Kingdom.

Steamship Connexions. The passenger steamship lines between Ireland and Great Britain may be considered in conjunction with the railways. The east coast ports from which the most important lines of steamers sail are, from north to south, Larne, Belfast, Dublin, and Rosslare. The chief ports in Great Britain for Irish passenger traffic, from north to south, are Glasgow, Stranraer, Heysham, Fleetwood, Liverpool,

Holyhead, and Fishguard. Three of the Irish ports face three of the British across the three narrowest parts of the Irish Sea, namely Larne and Stranraer across the North Channel, Dublin and Holyhead, and Rosslare and Fishguard across the St. George's Channel. It is re-

Fig. 47. Principal Steamer Connexions between Ireland and Great Britain.

markable that natural harbours, at Larne, Dublin Bay, and Wexford, should coincide so nearly with the three points of the east coast of Ireland, north, central, and south, nearest to the British coast. Wexford Harbour, it is true, is unsuitable for large steamers, and a harbour has been built outside its mouth, at Rosslare.

The most important passenger services are as follows:—

(1) *Larne* to *Stranraer*, distinguished as the shortest sea-passage between the two islands.

(2) *Belfast* to *Fleetwood*, to *Heysham*, and to *Liverpool*.

(3) *Dublin* to *Holyhead*. Steamers of the London and North-Western Railway Company sail from the quay on the Liffey in the City of Dublin itself. Other steamers of the same company, and the mail-steamers of the City of Dublin Steam Packet Company, save a short distance by water by sailing from the outport of Kingstown in Dublin Bay, running in connexion with special trains from Dublin on the Dublin and South-Eastern Railway.

(4) *Rosslare*, a new port (opened in 1906), has a service of steamers to Fishguard on the Great Western Railway of England. The opening of this route provides a short sea-passage principally for passengers to and from the south of Ireland.

Besides these most important routes, there are numerous other connexions for passenger traffic. Belfast has steamship lines to the Scottish ports of Glasgow, Ardrossan, and Ayr, to Barrow (Lancashire), to Douglas (Isle of Man), to the South Welsh ports (Cardiff and Swansea), and to Southampton and London. From Greenore, at the mouth of Carlingford Lough, there is a service of steamers to Holyhead. From Dublin there are connexions with Glasgow, Silloth, Douglas, Heysham, Liverpool, the South Welsh ports, Bristol, the southern English ports and London. Of other Irish ports, Londonderry has regular passenger connexions with Glasgow, Heysham, Fleetwood, and Liverpool; Sligo with Glasgow and Liverpool; Cork with Glasgow, Liverpool, Fishguard, Bristol, and the southern English ports and Bristol; and Waterford with Fishguard.

Canals. The navigable river and canal system of Ireland has never been developed as either nature or man intended. The Central Lowland with its ramifying branches gives ample opportunity for building canals to connect rivers which owing to their usually gentle course through level country needed only a little work to make them easily navigable. Early in the eighteenth century this opportunity for a complete system of waterways, natural and artificial, was fully understood; and not only so, but it was also seen that the digging of canals would also help in the drainage of bogs and the conversion of many useless and unhealthy wastes into fertile, habitable lands. Those who planned this scheme had before them, as a model, the drainage of the Fen country in eastern England, where vast tracts of marsh had been 'reclaimed', or converted into dry lands, by the cutting of canals which at once drained them and served as waterways on which to carry their produce to market in boats. From 1730 to 1787 a body incorporated by Act of Parliament and known as the Commissioners of Inland Navigation made a beginning with the principal canal and river-improvement works now existing in Ireland. The canals, which came later into the hands of private companies, prospered until the railways were built. The improvement in speed and carrying capacity offered by the railways caused men to forget that railways are much more expensive to work than canals, and that on them, therefore, much higher rates must be charged for the carriage of goods. Goods which are bulky and not of great value in proportion to their bulk, and need not be carried and delivered quickly, may be conveyed more cheaply by water than by rail. But even so, some of the Irish inland navigations could not be kept up with profit against the competition of the railways, and fell more or less into

disuse. However, the waterways which are in use carry chiefly the class of goods indicated—grain, and other agricultural produce, malt, manures, turf, coal, bricks, timber, sand, porter, &c.

In considering the main lines of inland navigation in Ireland we may begin with the chief natural waterway, the River Shannon. By means of a few stretches of canal avoiding the rapids in the lower part of its course (above Limerick) this river is made navigable for 140 miles, from Limerick to the upper end of Lough Allen. It carries a fair traffic, and as we shall now see, it has or had connexions with the other principal lines of waterway in Ireland.

From Carrick-on-Shannon the Ballinamore Canal, a line of short canals connecting one of the chains of lakes characteristic of this region, runs north-east to Upper Lough Erne. This canal for navigation and drainage was begun as a famine relief work. It was never satisfactory for navigation, and has become entirely disused. As a drainage channel for a marshy district it is of value.

The upper and lower Loughs Erne, the river connecting them, offer a line of navigation of which some use is made, with Enniskillen, between the loughs, as a centre, but the river from the lower lough is too rapid for navigation to Ballyshannon.

From the upper lough the Ulster Canal runs north-east to connect with the River Blackwater and so with Lough Neagh, but the part west of Clones is not used. There is a branch, the Tyrone Navigation, from the Blackwater to Coalisland. The River Bann is navigable below Lough Neagh to its mouth, and above, for a short distance, it serves as the line of the Newry Navigation, which, following the important pass from the

north-east to the east midland of Ireland becomes a ship canal (i.e. one navigable for small sea-vessels) from Newry to Carlingford Lough. Finally, from Lough Neagh eastward a canal connects with the River Lagan and so with Belfast and the sea. The manufacturing district of Ulster is therefore pretty well provided with waterways.

Two canals, the largest in Ireland, run westward through the Central Lowland from Dublin to the Shannon. The more northerly is the Royal Canal, which runs by Mullingar to Tarmonbarry on the Shannon, traversing the Counties Dublin, Kildare, Meath, Westmeath, and Longford. It is now owned by the Midland Great Western Railway Company, whose main line runs close to it for a considerable distance. It is comparatively little used. On the other hand the Grand Canal, which runs to the Shannon further to the south, and is connected with the Barrow, is the most extensive and prosperous navigation-system in Ireland. The Grand Canal runs from Dublin by Edenderry and Tullamore to Shannon Harbour, where it joins and crosses the Shannon, being carried on to Ballinasloe. It has several branches, one of which runs to Portarlington and Mountmellick and connects with the River Barrow at Athy. The Barrow Navigation, which is now included in the Grand Canal system, extends from Athy to the tidal estuary; it thus gives access to Carlow, Bagenalstown, New Ross, and Waterford. From Waterford the Suir is navigable upward, past the towns of Carrick-on-Suir to Clonmel; the lower Blackwater is also navigable.

With the estuary of the Shannon (below Limerick) there connects the short navigation of the River Maigue, up to the town of Adare. The River Boyne is navigable from Drogheda up to Navan, but has no inland connexion with other navigations. Finally there is a navigation on

Lough Corrib, but an attempt to connect it with Lough Mask by a short canal failed because the subterranean channels in the limestone carried off the water. It will be remembered that the stream connecting the two lakes runs underground. A short canal connects Strabane with the tidal Foyle.

INDEX

(*Co.*, *County* ; *L.*, *Lough* ; *R.*, *River.*)

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