

A SHORT DESCRIPTION
OF
THE GEOLOGICAL FEATURES
OF THE
COUNTY OF LIMERICK.

J. FITZGERALD WINDLE, Assoc. M. Inst. C.E.

In treating of the Geological features of so large an area as a whole county in a short paper, one can but touch lightly on the general classes of rocks met with, and the fossils and minerals which they contain, comparing them, where necessary for pointing out their peculiarities, with those occurring in other districts or counties.

It is with the *Primary* period and its subdivisions that we shall have mainly to deal in this paper, the rocks in the county for the greater part belonging to that period.

The rocks met with, beginning with the more recent formations, are:—Peat bog, shell marl, alluvium, and drift, which belong to the *Quaternary* or *Post Tertiary* period. The rocks of the two periods intermediate between this and the *Primary* are absent in County Limerick. We have next to mention the Coal measures, Flagstone series, Shale series, Upper, Middle, and Lower Limestone, and Lower Limestone shale, all of which belong to the Carboniferous *System*. We have next the Upper Old Red Sandstone and the Old Red Sandstone, which belong to the Sandstone *Series*. Under these we have grey hard shales and slates, belonging to the Lower Silurian *System*, which are the oldest rocks we meet with in the county. All the above systems belong to the *Primary* or *Palæozoic Period*.

The igneous rocks occurring are—Trappean Ash or Breccia, Greenstone, Basalt, Porphyry, Amygdaloid, Greenstone Ash, Dolerite, Felstone, and Volcanic Augitic Ash.

With regard to the term "Greenstone" used above, it is, unfortunately, and of necessity, vague, as it includes such rocks as Diorite, Hyperite, Gabbro, and Diabase, and it is often found so blended together with Basalt that it is impossible to draw a line of demarcation between them. With reference to rocks of this class, the late Professor J. Beete Jukes, then director of the Geological Survey of Ireland, says (1):—"A detailed chemical investigation into the composition of these varying trap rocks would be very interesting and instructive. Without it, it is impossible to guess the proportions in which the felspathic are mingled with augitic or hornblendic minerals, or even to decide on the nature of the feldspars themselves." Perhaps I might suggest this subject to the consideration of such of our members as have the requisite chemical knowledge and appliances. I would go further, and suggest the microscopical examination of the structure of these rocks to any of our members who have microscopes. Such combined investigations, if properly conducted and tabulated, could not fail to be of very great use, and would be a work worthy of our Club.

Speaking generally of the igneous rocks of this county, the eminent authority quoted above says (2):—

"The igneous rocks interstratified with the carboniferous limestones of the County Limerick are a very remarkable series of varieties. Some of the hard purple porphyritic traps seem as if almost entirely composed of felspar, and the embedded crystals are certainly all felspathic. I am, however, unable to say to what species of felspar they belong.

It seems difficult to suppose that the rocks can be composed of a trisilicated felspar, such as *orthoclase*, (3) when they have come through and have been poured out upon such a basic substance as the thick carboniferous limestone, still less likely does it seem that they should contain any free silica mingled with the felspar in a state of paste. We are therefore precluded from applying the term "felstone" to them since that is already applied to a rock consisting of a pasty mixture of a trisilicated felspar and uncombined silica; yet the felspathic crystals do not appear to be *Labradorite*. (4).

(1) Foot note, p. 9, Explanations to Sheet 144, Geological Survey of Ireland.

(2) Foot note, p. 9, Explanations to Sheet 143, Geological Survey of Ireland.

(3) $Al_2O_3 \cdot 3SiO_2 + K_2O \cdot 3SiO_2$ or $AlO_3 \cdot 3SiO_2 + KO \cdot 3SiO_2$

(4) $Al_2O_3 \cdot 2SiO_2 + RO \cdot SiO_2$

Other varieties of these traps of dark green, sometimes almost black colour, might easily be supposed to be varieties of basaltic or doleritic and dioritic rocks, yet they seem to pass by insensible gradations into the red porphyries (which would be commonly called felspar porphyry), and scarcely to differ from them in colour.

The vesicular or scoriaceous structure of some parts of these traps is very remarkable, and appears in some cases to form irregular bands alternating with compact rock, as if marking successive flows of molten matter.

The ash beds (or Tuffs) are also very remarkable ; some are coarsely conglomeritic or brecciated, and there is every gradation from these through finer and finer grained materials to a perfectly compact rock of which the particles are indistinguishable even to the lens. Different beds in the same quarry, and sometimes different laminæ in the same block, show alternating layers of coarse and fine grain arranged with the utmost evenness and regularity, the coarse made up of rounded grains of finely vesicular trap, varying from the size of a pea to that of a pin's head, while the finer are made of smaller and smaller particles till we get the materials of impalpable powder. Among the coarse conglomerates large blocks of trap and limestone occur, and little rounded fragments of limestone may be seen now and then in the finer layers.

The compact greenstone which seems to have been made of consolidated trapean powder, often blends insensibly with layers of gray limestone so that hand specimens may be got containing alternations of the two substances. The evenness of the layers of the rather coarser sorts is so remarkable, that they have been likened in the quarry to a pile of boards in a timber yard."

Thus we have distinct evidence of active volcanic action in our county at one time, and I shall at a later stage of this paper be able to locate the site of the cone of at least one extinct volcano.

I shall now proceed to a more detailed account of the features and rocks to be met ; beginning at the Western border of the county and proceeding towards the Eastern.

Along the western boundary of the county, comprising parts of the Baronies of Shanid and Glenquin, and for a distance varying from about ten to fourteen miles in an easterly direction, the rocks met with are the flagstone and shale series which lie immediately over the limestone, and are at the bottom of the coal measures,—when I say the Coal Measures

I mean the *Lower Coal Measures*, for the true Coal Measures which exist to such a great extent in England are entirely absent in Ireland with the exception of two very small patches, one near Dungannon, in the County Tyrone, and another near Lough Allen, in County Sligo, known as the Arigna coal fields. This absence, if they ever existed, is to be accounted for by extensive denudation having taken place after their formation, and probably during the epoch in which the rocks belonging to the Secondary and Tertiary periods were being deposited in England. I shall refer to this later.

The lowest part of the shales is usually cherty and destitute of fossils; over these cherty beds the shales are flaggy and in them *Posidonomya* often abounds with a few *Goniatites*. The shales which I have examined are of an argillaceous nature, and in one quarry with which I am acquainted they assume a spheroidal structure, the shales consisting for a great part of balls of varying sizes with concentric coats, through which the original lines of lamination are visible; some of these shales are strongly stained with iron.

The next rocks which we meet with in this district are the *Lower Coal Measures*. They are found in four patches, the largest of which extends into the Counties of Cork and Kerry. Quite a number of collieries were at work in this county some sixty or seventy years ago, and near the little town of Glin, where one of them was situate, there was also an iron smelting furnace, but I have been unable to ascertain from where the ore came. The coals, however, were not found in sufficiently thick seams, or of good enough quality, to repay continued working, when the introduction of steam navigation enabled English colliery owners to import superior coals into Ireland at such a low rate; hence it was that after working out the coal seams at their outcrop and near the surface, where it cost so little to raise it, the pits were abandoned. There is little doubt, however, that at some future date all these coal seams will be worked out.

The greatest depth to which any of the pits were sunk, so far as I have been able to ascertain, was about 100 feet; the method of working was very crude, and little attempt seems to have been made to keep the pits pumped dry, they being generally abandoned when any great rush of water was met with.

The kinds of coal worked were *Anthracite*, *Culm*, and *Pindy*. The Anthracite is of a brownish black colour, or dark brown, has a highly

metallic lustre, and usually a cubical fracture; when burning it gives out intense heat, but, as it is generally impregnated more or less with iron pyrites, it gives off offensive sulphurous gases when ignited.

The Culm is a soft black laminated coal, which crumbles when exposed to the atmosphere.

The Pindy, locally known as "slaty culm" and corresponding to the "kelve" of the Queen's County and Kilkenny colleries, is a carbonaceous shale or a highly argillaceous culm sometimes containing so much carbon in it that it is suitable for use as a fuel.

Coal has been worked in the district which I am describing in no less than thirteen places, and some very interesting fossils, which I shall presently enumerate, have been found in the workings.

The sites of these workings are as follows:—At the extreme south of the district, just on the borders of the County Cork, in the townland of Knocktoosh, and about five and a half miles to the south-west of the village of Dromcolliher, culm was raised. About three miles due east of the town of Abbeyfeale, half a mile west of Goulbourne bridge, and about a quarter of a mile due south of the mail road from Tralee to Newcastle, in the townland of Dromtrasna, a coal was worked, probably culm; these pits are all now closed. To the north-east of Abbeyfeale, in the townland of Ballaghbehy, a very good hard coal was worked, it was accidentally discovered by a man who was sinking the foundations for a house; in this place, as most others where coal was found, it seems to have been worked only along the outcrop; a local farmer who sank a trial-pit, as long ago as the year 1832, to the west of the first working, found a seam of coal two feet thick, which, so far as known, is the greatest thickness in which coal has been found in any of the workings in the county, but it has been met with of the same thickness in some of the other workings. On the extreme eastern boundary of the townland of Tulligoline North, a slaty culm was worked which was found from two and a half feet to three feet thick, but as this is only suitable for fuel under the conditions before mentioned, I do not think one could regard it as a coal seam of that thickness in the true sense of the word. We have next Crataloe colliery, which lies about three and a half miles to the northeast of Abbeyfeale, and about 400 yards east of the road from Abbeyfeale to Athea. The coal or culm, probably culm, seems to have been pretty extensively worked here along the outcrop, as when last I was in the locality you could still see the remains of the

heaps of rubbish around the pit mouths, which appear to have been seven in number, and none of them, according to the Geological Survey, were more than forty feet deep.

We now move further North, and at a spot about five miles east of Athea, close by the road from Athea to Ardagh in the townland of Carrigkerry, coal was raised about the year 1833, but all the pits are now closed, and no information about the coal was obtainable at the time of the Geological Survey, as the colliers who had worked it came from the County Cork. This coal was first discovered in sinking a pit in the shale for road metal.

Going still further North as we approach the Shannon we come on quite a number of old collieries, namely, Glin colliery, Fleanmore colliery, Carrowbane colliery, Knocknabooly colliery, Rocklodge colliery, and Coal Hill colliery. Some of these collieries are the most interesting we meet with as being the ones about whose working, etc., we can obtain the most information. The first of them, the Glin colliery, is situated about three-fourths of a mile nearly due south-east of the village of Glin; when I visited the place some months ago, the remains of the old pits with their heaps of rubbish were still there, some of them had been filled up to the surface level but others were open; of those still open which I measured the greatest depth was eighteen feet, but it appears to have been deeper formerly. This colliery is very interesting, owing to the fact that the shale over the coals is very rich in fossils. Mr. G. H. Kinahan, of the Geological Survey, found a very interesting fossil fern of a new genus in these shales, which was named the *Corynepteris Stella*; although I searched the shale heaps around the pits, I was unable to get a specimen, but found some specimens of the bark of *Calamites*, and some bits of shale with impressions of ferns on them. I regret that space will not permit me to give a detailed account of *Corynepteris Stella*. The following other fossil plants were collected by members of the Geological Survey from the above shales:—*Sphenopteris Latifolia*; *Alethopteris heterophylla*; *Sphenophyllum Saxifrageifolium*; *Lepidadendron*, stem, leaves, and fruit; *Sigillaria oculata*; *S. organum*; *S. Tessalata*; and *Stigmaria Ficoides*. Some of the shales found in this place are strongly stained with iron.

In the Townland of Fleanmore, due south of Prospect Hill, the remains of an old colliery worked along the outcrop of the coal were found. About one mile due south of the village of Loughill, in the

townland of Carrowbane, a culm one foot two inches thick was worked along its outcrop.

About one and a quarter miles due East of Loughill, coal and culm were worked at Knocknabooly colliery, but never apparently to a greater depth than about forty-seven feet. At this colliery Mr. Kinahan found in the shales a number of exceedingly minute univalves, *Loxonema minutissima*, which he describes as a new species.

A mile to the West of the village of Loughill was situated Rock Lodge colliery, whose culm appears to have been pretty extensively worked. At this place also the shale overlying the coal was found to contain nodules and thin seams of clay-ironstone, for which it was formerly worked. Quantities of bivalve shells were found in these shales. The colliers were paid at the rate of 10d. per bucket for all the coal they sent to grass.

Less than half a mile to the North-east of the village of Loughill, near Ouvane House, is the site of Coal Hill colliery; coal was worked here by Captain Hewson, between the years 1840 and 1850; the coal seam does not appear to have been more than six inches thick.

Mr. James D. Leahy, C.E., of Newcastle West, informs me that when boring for water in the village of Dromcolliher he came upon a coal seam fifteen inches thick at a depth of seventy feet, this I suspect was culm, but in the absence of a specimen cannot say definitely; he also informs me that a farmer at Tullygoline raised a slaty culm about two years ago and used it for burning lime on his farm, he found it at a depth of about five feet.

In working for coal in most of the localities mentioned, ores of iron, namely, *siliceous haematite*, *clay ironstone*, *iron pyrites*, and *bog iron ore* were found, but do not appear to have been worked to any very great extent, in fact they are of too poor a quality to make their working remunerative. The only record I could find of a mine being worked exclusively for iron is a mention by Mr. G. H. Kinahan on page 27 of the Explanations to Sheet 152 of the Geological Survey of Ireland, where he says:—"To the south of Kilcoleman, which lies about four miles to the north of the village of Ardagh, there is an old iron mine from which a siliceous haematite was extracted. Specimens of this ore were examined by Mons. Alphonse Gages, Curator of the Museum of Irish Industry, and pronounced to be of little value, as the ore contained a very large quantity of silica."

Beds of fire-clay were also found in some places as thick as two feet. Brick clay is found in various places in the district.

Scattered all over this portion of the county are huge tracts of bog, lying in some places immediately on the coal measures.

[I would wish particularly to draw the attention of our members to the district which I have just described, as being likely to furnish interesting botanical specimens, as mentioned by our President in his interesting lecture on "The Flora of County Limerick."]

Proceeding eastward, we leave the coal measures, and come on the upper, middle, and lower limestone; but before leaving the coal measures I would like to mention a narrow band which runs from Foynes right down to the south of the county, and forms the passage or boundary beds between the coal measures and the limestone formation. This band consists of the flagstone series and the shale series, and I might say a good deal about them, but it would be of a purely technical nature, which would be uninteresting to the majority of you; my principal reason for mentioning it is because at Foynes we meet with a very interesting lot of fossils in these beds, four of which are described by Mr. W. H. Bailey, F.G.S., who acted as Palæontologist to the Geological Survey, as new specimens, namely:—*Orthoceros minimum*, a cephalopod; *Myalina Foynesiana*, a lamellibranch; *Loxonema Galvani*, a gastropod; and *Machrocheilus Inflatus*, also a gastropod. No less than fifteen species of fossils were found at Foynes Island, and, in fact in four other places in the beds referred to interesting fossils have been found.

Less than a mile to the east of the village at Foynes, and running south along the band of shale, we have the upper limestone, which varies in width in an easterly direction from about one and a quarter to five miles, and occurs again in the eastern side of the county. This limestone varies from one inch to four feet in thickness. Several useful quarries have been worked in the locality, the stone from those at Foynes having been used for the Foynes Railway Station, Kilrush Pier, and works in England. Fossils are found in it in various places, but are not, I believe, abundant.

It is at a point on the boundary between this Upper Limestone and the Coal Measures near Ashford, in the parish of Kileedy, about six miles to the south of Newcastle-west, that we meet with a quarry which shows the junction between the limestone and the Coal Measures, and possesses the additional interest of showing a fine specimen of *bent strata*.

You will observe that I use the term *bent* strata, not *contorted* strata ; the latter term I would consider to apply more to strata which were originally deposited horizontally, and afterwards bent or contorted by some upheaval or depression ; whereas, in the case I am speaking of they appear to have been deposited in and followed the contours of the hollows then existing in the limestone, probably worn in it by the action of running water.

At a point about one mile to the south-east of the village of Shanagolden, in the parish of Kilmoylan, we come upon Trappean Ash, protruding through the limestone for about half a square mile in area.

Proceeding to the east, we meet the Lower Limestone, which occupies a large extent of the county and is usually highly fossiliferous. In the lower beds bivalves predominate, while in those near the Upper Limestone large and beautiful univalves are found in great profusion, such as the *Nautilus*, *Orthoceras*, etc. It is magnesian in places, and in the parish of Robertstown, near Barrigone, a limestone is found which burns into a good hydraulic lime which, I am informed by Mr. Horan, the County Surveyor, was used to some extent in the building of the fine sea wall on the road from Foynes to Tarbert ; it was also used in building the head race at Askeaton Mills.

The limestone about Askeaton, and, I might say, in the whole of the Baronies of Kenry, Lower and Upper Connelloe, is highly fossiliferous. Some of the specimens which I have from that in the neighbourhood of Askeaton are very perfect. (5)

Three miles nearly due north of Askeaton, close to the Ballysteen cross roads, ores of copper, lead, and zinc were worked.

About three miles nearly due south of Askeaton, in cutting for the Foynes Railway, *Argentiferous Galena* (an ore of lead containing silver) was found, and a specimen of it on analysis gave 90 % of pure lead, and contained silver in the proportion of 40 ozs. to the ton of lead. Zinc and lead ores were also found to the north of this, near Graigue's Lough.

Copper and lead ores were found about one and a half miles to the north-east of Pallaskenry, in the townland of Ballydoole. These ores were found in the Old Red Sandstone, which appears in a considerable patch along the borders of the Shannon here, the Lower Limestone Shale showing as a narrow band between it and the Lower Limestone.

(5) Specimens were shown.

Dolomite, which is a magnesian limestone, was found in small patches near Nantinan, and again about three-quarters of a mile to the west of Cappagh.

The Upper and Middle Limestone are described by the Geological Survey as undistinguishable from one another in the County Limerick.

Argentiferous Galena, Blend (an ore of zinc), *Copper Pyrites*, and *Iron Pyrites* were found in two places near Rathkeale,—one in the townland of Cloghatrida, which lies a little to the west of Stoneville; another about 500 yards south-east of Ballingrane Railway Station. The ores were worked at both these places.

Lead ore (*Galena*) was also found near Kilmeeady, about six miles to the south-east of Newcastle-west, but I have been unable to ascertain the exact locality—although I have some specimens of the ore—it is so long ago since it was found, and it is not referred to by the Geological Survey. It looks a rich, heavy ore, and is probably argentiferous. Copper and iron ores were found in the same locality.

A little more than half-a-mile to the south-east of Ballingrane railway station is situate Dohile Lough, which you can see when passing in the train; and near it, I am informed by Mr. Brian Sheehy, C.E., of Newcastle West, when some drainage works were being carried out, was found the horn of a red deer; he also informs me that a boat made out of a log of oak was found, but this was promptly smashed up, and, I presume, burned by the natives.

I mentioned in the early part of this paper that I should be able to locate for you the site of the cone of an extinct volcano in this county, and as it occurs in the district which I am at present describing, I shall now do so. About two-and-a-half miles due east of the village of Ballingarry is situate Knockfierna mountain, which attains an altitude of 949 feet above sea level, and forms a very prominent object in the landscape, rising as it does rather abruptly out of the plain which stretches south from the Shannon. The mountain is of a more or less conical form, and on the top exhibits every evidence of having been an active volcano, such as the remains of what appears to have been the neck of an old crater, surrounded by the igneous rocks which were ejected from it, and which burst up through the sandstone, lower limestone shale and limestone, all of which surround it. The sandstone is well seen in several places to the west, south, and east of Knockfierna, and the trap rocks which occur on the top of the mountain assume a columnar structure.

The main features of the country as we proceed south and east from Foynes towards Limerick are huge tracts of limestone, with here and there patches of alluvium, such as that along the river Maigue from Adare to Askeaton, in which horns of the Irish Elk, *Megaceros Hibernicus* were found; that along the river Deel for about four-and-a-half miles to the south-west of Rathkeale, etc., etc.; and here and there districts of varying extent showing igneous rocks, such as at Carrigogunnel, Kilpeacon Glebe, Roxboro', and immediately to the east of the city. At Carrigogunnel, a true metamorphic dolomite also occurs; this dolomite is found to a great extent in the County Cork, and is, I believe, largely used for obtaining magnesia.

Before dismissing the subject of the limestone, which occupies more than half the County Limerick, I think it may probably interest you if I give you a little information about the *marbles* occurring. Three different kinds of marble are found in this county, namely, the *Red*, *Black*, and *Grey*.

In general, the red marbles are clear-coloured, varying from shady or coloured red to variegated, with grey, green, yellow, and other tinges. This, however, is not the case with the Pallaskenry marble, which corresponds more to the Cork red. It was used extensively in building Elm Park, Lord Clarina's residence, and also at Adare Manor. Another red marble found near Clorane, which is situated about two and a half miles north of Adare, was used at Adare Manor.

The beautiful pillars of the cloisters of Askeaton Abbey were built from a greyish red marble found in the neighbourhood, but the exact locality from which it came has not been ascertained.

Good black marble has been worked at different places in the county. At Thomondgate a quarry was formerly worked, the famous "Treaty Stone" being a rough block from it. Under the site of the present Railway Station a large quarry, affording an excellent black stone, was worked up to about the year 1830.

Stones of excellent quality, varying from seven inches to six feet in thickness of bed, were worked at Ballysimon. The best of this stone was exported to London.

Black marble was also procured at Banks quarry and Carey's Road; also about half-way between Patrickswell and Adare, and again between Adare and Rathkeale.

Associated with the red marbles already mentioned, there are grey

marbles, except at Pallaskenry. A good deal of this grey was used in Askeaton Abbey.

In the alluvial flat to the west of the city, in the Barony of North Liberties, skeletons of the Irish elk have been found; at a point near Coonagh the skeletons of both male and female were found at a depth of about ten feet. A skeleton was also found near Lansdowne bridge, on the Ennis road, when raising brick clay. Mr. McNamara, of Shelbourne Cottage, the proprietor of the brickworks at Lansdowne Bridge, informs me that his men found a human skull on one occasion when raising brick clay, but it was unfortunately destroyed by them. It is a matter for regret that persons who find these interesting remains seldom think of preserving them. Large trunks of trees are frequently met with imbedded in the clay at this place.

In a large limestone quarry which I visited some time ago on the Circular Road, near Mr. Russell's, I noticed, where the top of the quarry had been stripped, distinct glacial striatum and polishing.

This is all I propose saying about the part of the county lying to the west of the city, and the next and smaller portion which I shall describe is that to the north-east, east, and south-east of the city, which furnishes us with a very varied selection of geological features.

Immediately to the east of the city we have Volcanic Augitic Ash, locally known as "greenstone"; then we have an alluvial flat running along by the banks of the Groody river from Ballysimon down to the Shannon; beyond that we again meet with augitic or trappean ash, Newcastle hill being composed of it, and to the south, north-east, east, and south-east of this the rock showing is principally limestone, with the exception of that in the localities which I now propose to describe, beginning at the northern extremity of the county and proceeding in a southerly direction.

To the north-east of Castleconnell we have a very well-defined *Esker* forming the hill of Gooig, through which the road from Limerick to Nenagh runs; another occurs about one mile due south of this near Bunkey bridge, which is on the road from Limerick to Newport; another one smaller than either of the above but which reaches a height of nearly two hundred feet in places occurs about three-quarters of a mile south-east of Killonan Station. These *eskers* assume the form of mounds and ridges of varying extent; in some parts of Ireland they attain a height of one hundred feet, and sometimes run in sinuous lines

for twenty or thirty miles looking like irregular railway embankments. They consist sometimes of coarse gravel or earthy detritus, but more usually of clean well-stratified sand,—locally known as “Rabbit Sand,”—and gravel, and appear to be due in some way to the melting of the great snow fields and glaciers of the glacial period and the consequent discharge of large quantities of water over the country; but no very satisfactory explanation of their mode of formation has yet been given.

In the bog lying to the east of Castleconnell horns of the Irish elk have been found.

To the east of Lisnagry Railway Station we have Volcanic Augitic Ash occurring for about half a square mile in area.

Porphyry, Basalt, Amygdaloid, and Augitic Ash also occur about Cahernarry and Carrigparson.

At Maddaboy, situate about one mile and a quarter, nearly due east of Barrington's Bridge, occurs a large mass of igneous rock; it is a compact trap, of rather uncertain composition.

The next districts in which igneous rocks are met with are those of Inch St. Lawrence, Caherconlish, Dromkeen, Pallasgrean, Killeely, Rathjordan, Herbertstown, and Sixmilebridge. These form a kind of belt surrounding the basin in which lie the carboniferous flagstone and shale series of Ballybrood. These igneous rocks are of the same varieties which I have described before, but they possess the additional interest of assuming a columnar structure in several places, such as at Boughilbrega in the townland of Luddenmore, to the east of Stonepark; at Inch St. Lawrence in the townland of Knockroe Mason; at the old castle of Caherconlish, where, I believe, the columnar structure is the most regular we meet with in the county; at a place about three-quarters of a mile to the north-west of Nicker near Linfield House; at the village of Killeely, and at Rathjordan.

A small band of *Serpentine* (6) was found about three-quarters of a mile to the south-east of Herbertstown.

Along the extreme north-eastern portion of the district, in the Barony of Ownybeg, we have the old red sandstone appearing over a large extent of country, and to the east of the sandstone, in the Slieve Phelim Mountains, we meet the oldest rocks which occur in the county, namely, those belonging to the Lower Silurian System. They chiefly consist of a variety of grey hard shales and slates, among and associated

(6) Hydrous silicate of magnesia.

with which are found numerous beds of massive quartzose greyish grit, which generally weather of a brownish colour.

In the portion of the county lying to the east of a line drawn north and south through the city of Limerick, the following minerals have been met with:—Copper, Lead, Iron, Barytes, and a trace of Zinc.

Copper has been found in the vicinity of Oola, and “Lewis’s Topographical Dictionary” mentions it as having been found at Abington.

A copper mine was worked at Lackamore, which is about four miles in a south easterly direction from Newport, and, although not strictly in this county, I think it well to mention it, as it lies only just over the county boundary in County Tipperary. The ore generally occurred as a sulphide (Pyrites) or a carbonate (Malachite), and was shipped to Swansea to the extent of 150 tons per annum, at an average value of £10 per ton.

Lead was found near Coonagh Castle, which is situate about one and a half miles to the south-west of the village of Doon, at Stonepark, and at Oola. It is found as a sulphide (Galena), and often contains silver; that at Oola yielded about 29 ozs. of silver to the ton of ore.

Iron pyrites was found in the vicinity of Oola, as were also Barytes (sulphate of Baryta) and traces of zinc.

In an old map of the county which I came across recently—made in the year 1814—I find mention that the following collieries and mines were then at work, namely:—Crataloe col.; Carrigkerry col.; Coal Hill col.; Stoneville copper mines; Ballysteen lead mines; and Lackamore copper mines.

This I think concludes what I had intended to be a *short* description of the Geological features of the county, but which I fear has strayed far beyond the limits to which I had intended originally to confine it. I must not, however, be taken as having attempted to give more than a very superficial description of those features, as anything like a detailed account of them such as their relative ages, compositions, dips of strata, localities of faults, etc., etc., would be too severe a trial on my most patient listener and would tend more to the nature of a volume than than of a short descriptive paper.