
Chapter 28 Economic products of the Silurian Rocks of the south of Scotland

In this chapter attention is directed to the economic products of the Silurian strata of the Southern Uplands and the associated igneous rocks, which are presumably older than Upper Old Red Sandstone time.

Building materials

Throughout the uplands, the Silurian rocks furnish several varieties of building stone. In particular, the massive greywackes and grits of the Central Belt (Llandoverly and Tarannon) are locally used for this purpose on account of their durability and regular system of jointing, the corner stones and facings for windows and doorways being usually composed of sandstone of Triassic, Permian, or Carboniferous age. Indeed all the towns and villages within this geographical belt, from Peebles, Galashiels, and Hawick in the east, to Wigtown and Glenluce in the west, are mainly constructed of these materials. In the Northern Belt, also the greywackes and grits (Caradoc and Llandeilo) have been serviceable for building, as, for instance, in the districts of Broughton Leadhills, Wanlockhead, Carsphairn, and Portpatrick. Most of the houses of the latter seaside resort and the greater part of the pier and dock have been built of stone from the large quarry at Portpatrick. Within recent years, however, since the development of the railway system, the much younger sandstones of Annan, Dumfries, and other localities have been exclusively used for the larger buildings within the Silurian region.

By far the most important building stones are obtained from the granite masses that traverse the Silurian rocks in the southwest of the tableland. The largest quarries have been opened at Dalbeattie [NX 83384 61307] and to the south of Creetown [NX 48084 56503]. The stone from these places has been extensively used for ornamental purposes, for street pavement, and for docks. The new docks at Liverpool have been entirely constructed of stone obtained from the Creetown granite quarry. Recently the Dalbeattie granite has been used for the manufacture of granolithic pavement.

In the Ballantrae region some of the red, green, and mottled varieties of serpentine, and the beautiful diabase-porphyrity (Arenig lava) of Currarie [NX 16217 90921], Knockgown, Pinbain [NX 14685 91991], and other localities are worthy of attention for ornamental purposes, but they have not yet come into use.

Throughout the Silurian Tableland the greywackes, grits, and flagstones, together with the dykes of acid intrusive rocks, have been locally available for field "fences" or "dry-stone dykes". The grey and blue flaggy shales have been worked at various localities for roofing purposes, as, for example, at Stobo [NT 18338 37627], Wrae [NY 36699 87900], and Grieston [NT 30863 35516] in Peeblesshire, near Elvanfoot [NS 95297 17534] in the Abington district, at Benbuie [NX 71034 96106] near Moniaive in Dumfriesshire, at Barlae and Marnhoul [NX 71799 78034] in the district of the Ken, at Loch Lure [NX 42019 97029] and Loch Bradan north of the Loch Doon granite mass, at Cairnryan [NX 06626 68445] in Wigtownshire, and other places. They are not genuine slates, as they split along the bedding planes, and on account of their weight are not well adapted for roofing. For many years they have been superseded by the lighter Welsh slates.

Limestones

These occur chiefly in the Girvan and Ballantrae region, where they are still in much request for agricultural purposes. The limestone occurs in thick beds of excellent quality, and might be extensively employed for more than local use. The largest quarries still in operation are those of Tramitchell [NX 23232 94420] and Craighead [NS 49265 32159]; within the last few years another opening has been made at the latter locality close to the quarries formerly worked. Other exposures of the Stinchar Limestone at Aldons [NX 19657 89628], Bougang [NX 11415 85502], Colmonell [NX 14697 85379], etc., which were formerly quarried, have now been abandoned. In Peeblesshire thin lenticular patches of limestone occur at Wrae [NY 36692 87925], Glencotho, Drummelzier [NT 13586 34213], and Winkston [NT 24506 43094], the working of which has long been discontinued.

Road-metal

The harder greywackes of the Silurian system are extensively used for macadamised roads, but the material is frequently not very durable. The massive greywackes and grits (Llandoverly and Tarannon) are best adapted for the purpose. More compact road-metal is obtained from the dykes of micro-granite and porphyrite where these are readily accessible, as, for instance, in the neighbourhood of Castle-Douglas, Innerleithen, and the Moorfoot Hills, the exposures of which are indicated on the several sheets of the Survey Map.

Hone-stones

In the Mippal Burn in Ayrshire, and at Hareshaw in the Pentland Hills, the green fine-grained shales in the fish-bearing zone of the Downtonian series have been quarried for hones. Some of the softer flags and shales in the Lowther Shales of the Leadhills region might be used for water-hones.

Ores

Lead

Galena has been worked at various localities throughout the uplands, especially in the districts of Leadhills [NS 88636 15174], Wanlockhead [NS 87169 13054], Blackcraig [NX 44435 64027], near Newton-Stewart, and at Carsphairn. Of these mineral fields the most important is that of Wanlockhead and Leadhills, where mining operations are still in progress. An interesting feature connected with the occurrence of galena in this region is the gradual disappearance of metalliferous conditions as the black shales are approached horizontally and vertically. The ore seems to be restricted there to veins in the arenaceous sediments (Caradoc) overlying the radiolarian cherts and Glenkiln–Hartfell black shales. This peculiarity in the distribution of the galena has been noted at the surface, and has been proved by the mining operations underneath.

The direction of the veins is indicated on the Geological Map of that region (Sheet 15), and their general character may be gathered from the following description of a part of the New Glencrieff vein, given in the Explanation accompanying that sheet. The vein hades to the east at 70°–75°. Beginning at the east or "hanger" side, the order of metals is as under (Explanation of Sheet 15, p. 42):

- a. Greywacke: part of the general Silurian rock or "country"
- b. "Black Jack" (zinc-blende) decomposing into clay ½
- c. "Vein-stuff": greywacke ground up and mixed with quartz 1½
- d. Calc-spar (½ inch to 1 inch) 1
- e. Galena ½
- f. "Vein-stuff", similar to C: quartzose and graduating into
pure quartz near the floor of the level (2 to 3 inches) 3
- g. Blue greywacke: joints veined with calcareous matter 3½
- h. Hard, fine, compact quartz, with iron-pyrites in flowers;
that is, the crystals are scattered through the mass and are
not connected 7
- k. Alternating irregular layers of barytes and galena 8
- l. "Vein-stuff", similar to c.
- m. Greywacke (the "ledger" side of the vein) marked with
vertical slicken-sides

The section is about six feet high. A string of "Black Jack" commences at the roof of the level in g, and cuts through all the layers to in, which it enters near the floor; a, g, and in are "country". The other layers and the string are properly the vein. The veins vary at every step, and are sometimes remarkably rich in lead ores; while, on the other hand, the levels are sometimes driven for many fathoms without meeting with any.

At Dalleagles [NS 57320 10591], south of New Cumnock, a vein of galena occurs close to to the great boundary fault, in strata consisting of blue shaly greywackes similar to those at Leadhills.

At Blackcraig [NX 43739 64914], near Newton-Stewart, large mines have been opened in the Llandoverly and Tarannon flags and shales and in the underlying black shales, where the veins of galena have a general trend from E.S.E. to W.N.W. A few transverse veins run generally N.N.E. As in the Leadhills region, the galena is here associated with zinc-blende, quartz, and calcite. The same ore of lead has been worked in the Wood of Cree, opposite Penninghame House[NX 38623 69927]; at the Cairnsmore Mines [NX 46347 63512], near Cairnsmore House; and at the Pibble Hill Mines [NX 52759 60476], east of Creetown. Further west, thin veins of galena have been found on Knockibae Hill [NX 17800 65952], to the north of New Luce.

Galena was at one time extensively worked at the lead mines at Garryhorn [NX 54705 93467], west of Carsphairn, where the main vein, which traverses greywackes and shales, runs in a north and south direction. This ore of lead likewise occurs there in the greywacke as well as in the main vein.

In the Balloch Burn, below the Nick of the Balloch [NX 34612 92634] near the headwaters of the river Stinchar, a trial mine in search of galena was opened in the greywackes and shales.

Among the Upper Silurian rocks of the Lesmahagow inlier, galena occurs in several veins in association with barytes, as, for instance, near the head of the river Nethan [NS 74875 33008] and its tributary, the Pockmuir Burn. One lode, on the north slope of Nutberry Hill [NS 74889 32982], about two feet wide, consists of barytes with a string of galena from two to four inches across. Another lead-bearing vein occurs near the head of the Ponesk Water in the same area (Sheet 23).

Iron

Thin veins of hematite occur in association with the red radiolarian cherts (Arenig) at various localities near the northern margin of the Silurian Tableland, as, for example, not far to the south of Lamancha [NT 19920 52244] in Peeblesshire; near Tewsgill [NS 96110 23782] in the Abington district, Lanarkshire; below the Nick of the Balloch [NX 34624 92645] near the head-waters of the Stinchar in Ayrshire; and on the Salachan Hill [NX 12920 84586] in the estate of Knockdolian in the same county. At none of these localities does this ore occur in workable quantity. A specimen of red haematitic shale, procured by the Geological Survey from this horizon at Noblehouse [NT 18412 50075] in Peeblesshire, was analysed by the late Professor George Wilson, with the following result (Explanation of Sheet 24, p. 23):

Peroxide of iron	38.42
Alumina	12.19
Clay	44.62
Alkaline salts with traces of lime and magnesia,	4.77
	100.00

Iron, per cent., 27.0

A prominent vein of haematite occurs on the Coran of Portmark [NX 50267 93851], near the eastern margin of the Loch Doon granite mass, the trend of which is about N.N.W. and S.S.E. The direction of this vein has been proved by various trial pits, which show that it traverses the slightly altered greywackes and shales. Thin veins of haematite have been noted also (1) on the north shore of Dally Bay [NW 96478 68960], south of Corsewall Lighthouse; (2) in the neighbourhood of Mabie [NX 94767 70661], south-west of Dumfries, near the margin of the Criffel granite mass; (3) in the Glenjaan Burn[NX 70992 94857], north of Moniaive, Dumfriesshire; (4) in association with the lead veins of Wanlockhead and Leadhills; (5) in association with barytes near the head of Pockmuir Burn [NS 75270 32346] in the Lesmahagow inlier. Traces of chalybite occur in a vein at Tonderghie [NX 44344 35681]; near Whithorn, Wigtownshire, in association with copper pyrites.

Copper

Veins of carbonate of copper occur in the grits and shales near the village of Elba, below the junction of the Whiteadder with the Dye Water [NT 71769 59673] in the Lammermuir Hills. Again, in the Priestlaw granite mass in the same region, copper ore ("green carbonate and prismatic copper glance") is met with in veins of barytes, where they have been worked to a small-extent. In the course of the Geological Survey of the Lammermuir Hills various lodes containing copper ore were observed, which are indicated on the map, but there does not seem much hope of working them to profit.

In the mineral veins of Leadhills and Wanlockhead, copper pyrites is occasionally found. Trial mines for copper ore have been opened in the Auchencat Burn [NT 08998 11029], near Hartfell, north of Moffat, and in the island of Hestan [NX 83867 50306] on the shores of the Solway, at which latter locality the vein occurs in strata altered by the Criffel granite mass. A thin vein of copper-pyrites was mined at Wauk Mill [NX 33244 60242], near Kirkcowan, in Wigtownshire, where this ore appears in the Llandovery Grits near the northern margin of the Central Belt. Copper-pyrites is likewise found in the vein already referred to at Tonderghie [NX 44735 36143] near Whithorn.

Antimony

On part of the Knipes granite, at a place called Hare Hill [NS 65723 10380], to the south-west of New Cumnock, a vein of antimonite or sulphuret of antimony was formerly worked. Though the mining operations have been discontinued, much of the ore is still to be found at the old workings. Another "antimony mine" occurs in the valley of the Glenshama Burn [Glenshanna] [NY 31269 96612], which joins the Megget Water — a tributary of the river Esk in Dumfriesshire. Here, on the south slope of the Grey Hill and about a mile E.S.E. of Glendinning Farmhouse, a vein yielding this ore appears in the Hawick Rocks. Its trend is approximately E.N.E. and W.S.W. The "vein stuff" consists of brecciated greywackes and shales, cemented with calcareous matter. In the mineral veins of Leadhills and Wanlockhead small quantities of antimony are also met with.

Manganese

On the old Sanquhar road, about a mile northeast from Wardlaw Hill [NS 70218 23601], small quantities of finely mammillated pyrolusite occur in a vein of barytes. The same ore appears in the mineral veins of Leadhills.

Zinc

Sulphuret of zinc ("Black Jack") is of frequent occurrence in the galena veins of Leadhills, Wanlockhead, and Blackcraig near Newton-Stewart.

Mispickel

Arsenical pyrites is worked in a vein along the junction of the Cairnsmore of Fleet granite mass with the altered Silurian rocks, in the valley of Palnure ca. [NX 47884 70160], north-east of Newton-Stewart.

Silver

From the galena veins of Leadhills and Wanlockhead silver has been extracted with profit, and small quantities have also been obtained from the lead ore at Blackcraig [NX 44321 64259], near Newton-Stewart.

Gold

From the alluvial deposits of the streams in the district of Leadhills and Wanlockhead gold has been collected in small quantities for more than three centuries.

Barytes

In the Upper Silurian (Wenlock) rocks, veins of barytes occur at Barlocco [NX 58962 48861], on the Rerwick shore, Kirkcudbrightshire. Again, in the Upper Silurian rocks of the Lesmahagow district veins of barytes appear, near the head

of the river Nethan and its tributary, the Pockmuir Burn [NS 77375 34400], and also in the northern slope of Nutberry Hill [NS 74265 33798].

Mineral wells

At various localities in the Southern Uplands mineral wells occur on the lines of outcrop of the black shale series, of which the best known are those in the Moffat district [NT 08602 05322] and at Lawrieston [NX 68233 64860] near Castle-Douglas. Indeed, much of the prosperity of Moffat is due to the efficiency of its mineral waters, which still continue to attract a large number of visitors. Here there are two springs, the most powerful one being situated about a mile north-east of the town, the other in Hartfell "score". The following analysis of the water from the Moffat well, made by Mr. Johnstone, Edinburgh, was published in the "Chemical News", 1875, and inserW in Forrest's "Guide to Moffat":

Specific gravity at 60° F., 1001.068.

Temperature. 49–5° F.

Temperature of air. 64.0° F.

Sodium chloride	0.8524
Sodium sulph-hydrate	0.0078
Calcium chloride	0.1243
Calcium sulphate	0.0125
Calcium carbonate	0.0940
Magnesian chloride	0.0581
Magnesian carbonate	0.0402
Potassic chloride	0.0616
Ferrous carbonate	0.0247
Silica	0.0180
total	1.2936
Total residue in one litre dried at 356° F.,	1.3874
Volatile and organic matter	0.1150
Total solid residue in one litre	1.5024
Iodine, manganese, and lithia in minute traces	
Gases dissolved in one litre,	34.508 c.c.
Hydrogen sulphide	5.325
Nitrogen	25.644
Carbonic dioxide	2.539
Oxygen	0.999
	34.507

A sulphureous spring issues from the Silurian rocks at Kirkurd, Peeblesshire, similar to the springs at Moffat.

Chalybeate springs are found in many places throughout the Southern Uplands, more especially along or near the outcrops of the pyritous shales.<ref>In the preparation of this chapter the descriptive notes of the economic products, already published in the Explanations of the Geological Maps, have been used.</ref>