
Chapter 37 Other metalliferous deposits

Considering the great size of the accumulations of metallic sulphides concentrated in Parys Mountain, it is really surprising that there should not have been more elsewhere. Veins and pockets have indeed been found in a good many places, especially in the north, and have been mined for a while, but nothing on a comparable scale. Nor is this for lack of exploration. Hopes naturally rose high, after so striking a success, shafts and levels were driven all over the district, and even now the sight of a little pyrite or of a few stains of malachite are enough to cause an outlay of capital. Not much can generally be gathered of the history of these undertakings, but those of which anything has been ascertained are placed on record here.

Sulphides and their associates

Rhosmynach-fawr — About 30 years ago, shafts and levels were driven into the rocks of the small Silurian infold (pp. 482, 495, 535, 571), and chalcopyrite was obtained, but the mine was eventually deserted. It has lately been reopened, and the usual pyrite and chalcopyrite (unaccompanied, apparently, by bluestone) again obtained. At one spot (and there only in quite small quantities) an interesting ore was met with, which yielded an average of 0.5 oz., a selected specimen as much as 13.65 oz., of gold per ton. A partial analysis of the selected specimen is as follows:

SiO ₂	28.8 per cent.
Fe	21.0 per cent.
Cu	5.6 per cent.
Bi	8.5 per cent.
Ag	6.00 oz. per ton.
Au	13.65 oz. per ton.

Anal. R. Rae, Widnes. Communicated by Mr. Griffith J. Williams and Mr. J. L. Francis, by permission of Mr. Toiler.

It occurs in lenticular aggregates along the divisional planes (evidently cleavage, see p. 483) of altered shale, and is an intimate intergrowth of several minerals. Pyrite, chalcopyrite, and fibrous quartz are all visible under the microscope, a considerable residue of the latter being left on dissolving in aqua regia. The proportions of these components appear to be sufficient to account for the iron, copper, and silica. Of greater interest is a mineral which has a foliated or scaly structure, a steel-grey tint with a bright metallic lustre, and is opaque even in the thinnest flakes. Its specific gravity is high, its hardness about 2.0, and it gives a lead-grey streak, also soiling paper, though with difficulty. As these characters were suggestive of the presence of tellurium, a small fragment was sent to Mr. Hadley and Dr. H. H. Thomas. Mr. Radley found a considerable proportion of sulphur (which probably makes up most of the undetermined 36.1 per cent.) and that tellurium was present, but only in very small quantity, whence it would appear that the bismuth must exist mainly in the state of sulphide. Dr. Thomas, after careful examination, writes that the crystalline form (so far as he can make it out) while recalling that of tetradymite, is not inconsistent with the orthorhombic nature of bismuthine. With regard to the gold, none, indeed, was observed under the microscope, and the only available specimen was so small that no satisfactory determination could be made of the condition in which it and the silver are present; but when in this association, they are known to, be often in the free state. The ore may therefore be regarded as composed of bismuthine, pyrite, chalcopyrite, and quartz, and as carrying free argentiferous gold.

Porth Helygen — A level was once driven for copper in the Gneisses a little to the south of this cove (p. 328), and chalcopyrite was obtained. Lead is also reported to have been worked near Dulas.

Ogo-fawr — There are two small old levels in the shales just above the chasm, on the south side of the basic sill. In the diabase itself some of the quartz-veins contain a little chalcopyrite and some strings of malachite, but the thickest veins are not more than about five inches across, and even they are chiefly quartz.

Rhosgoch — A little chalcopyrite was found in the shales about 150 yards north-north-east of the station a few years ago, and was explored for a while.

Pant-y-gaseg ridge — The quartz-lode, or rather zone of silicification (for it is not a fissure-lode) has been partly described on pp. 570–71 because of its being the source of the now well-known kaolinite. The mine appears to have been working in 1859, by means of the level driven in from the cliff's foot, but was abandoned. Later on, a shaft was sunk upon the ridge, but the work was again abandoned about 20 years ago, then resumed once more, and carried on till 1906. The measurements quoted for the level show that it and the shaft were in the same 'lode'. Chalcopyrite, blende, and siderite occur among the quartz. The siderite lines comby veins or druses, and upon it occur a few lumps of cherry-coloured blende about half an inch in diameter. Some of the blocks in the shaft spoil-bank are quite rich in chalcopyrite, but these must be exceptional, or the work would have been continued.

Hell's Mouth — There is an old level in the fault-breccia (pp. 311, 474), said to have been merely a trial, presumably for chalcopyrite.

Pen-bryn-yr-Eglwys — Along the northern boundary of the Gader Gneisses there runs for about half a mile a breccia cemented by quartz, with some small aggregates of limestone. Three shafts were sunk along it, apparently in search of chalcopyrite, but seem to have been failures, as the works have been abandoned for 40 or 50 years.

Mynydd y Garn — A level has been driven into the Gwna Beds, a short distance to the south-east of Hendre-fawr, apparently intended to reach the local zone of silicification along the Carmel Head thrust-plane. There are also one or two old shafts close to the Garn thrust-plane, on the south side of the hill.

Bron-heulog, Llanfaethlu — Copper, apparently chalcopyrite, is being worked near this place at the present time (1912), but whether in the Ordovician rocks or the Mona Complex is not yet known.

Pentraeth — There are said to be old shafts for copper in the Gwna Beds near Plâs Gwyn; and a little galena has been noticed in the Carboniferous Limestone near Tan-y-graig.

Llanddona — The old level referred to on p. 364 was driven for lead, and there is said to be another by the river. In the year 1623, Sir John Wynn, of Gwydir (cited by Lady Boston), writes to the 'Prime Officer' of Beaumaris, 'I pray you do your endeavor to sell my lead ore that is att Beaumaris'. The source is not mentioned but seems likely to have been Llanddona.

Llangaffo — In the years 1888 and 1889 eight assays (kindly lent by Mr. H. O. Hughes of Cefn-mawr) were made of quartz, pyrite, and galena from a high boss alongside a road that runs down to the marsh, north-west from Llangaffo Smithy, close to the 100-foot contour. No great quantity of pyrite was found, but in parts it contained 22.6 per cent. of copper, thus approaching chalcopyrite. Silver was found in some of the galena to the extent of 1025 dwt. per ton. The principal interest of the minerals, however, is that one specimen of pyrite yielded as much as 8 dwt. per ton of gold (others yielding 4 dwt. or less). All the quartz exposed when that ground was being surveyed belonged to the lenticular augen of the Penmynydd mica-schists, but the spot is on the strike of the zones of silicification mentioned on p. 568.

Miscellaneous

Strike-veins of Barytes a few inches thick occur in the Carboniferous Limestone at Ffrwd-onen, Llangristiolus; Ty-calch and Ty'n-llwyn, Trefdraeth; 250 yards north-west of Ty-pigyn, Bodorgan; and in the Mona Complex close to the Carboniferous south-east of the Smithy, Llangristiolus. A 12-inch vein also occurs in Mynydd Bodafon, by the parish boundary, close to the A'. The third, fifth, and sixth were determined chemically as BaSO₄ by Mr. J. O. Hughes.

Small patches of copper-salts are not uncommon, and do not imply the presence of workable quantities of ore. Some from the glaucophane-schist at the Column quarry, and from about a furlong west of Dinam, Valley, were found by Mr. J. O. Hughes to be a carbonate, and therefore, from their green colour, malachite. The object of the shafts in the boulder-clay on Penrhiw drumlin (p. 732) has not been ascertained. As a report was current that nickel was being sought

there in boulders of the hornblende-picrite, Mr. Hughes examined a specimen from Llandyfrydog, where the rock is *in situ*, for that metal, but none was found, nor was there any in the analysis quoted on p. 491. The graphite which is a constituent of certain members of the Mona Complex occurs in very thin films, and is quite unworkable.

Ironstones

The Ordovician ironstones (for description, analyses, and localities of which see pp. 406–7, 414, and Chapter 14<ref>An account of them will also be given in a forthcoming volume of the 'Special Reports on the Mineral Resources of Great Britain', a series now being issued by the Geological Survey.</ref>) have been worked here and there from time to time; that of Llangoed having been reopened a few years ago, but again abandoned, apparently from being too siliceous. Twenty-five assays were made by W. W. White in 1873–5 from the 'open quarry or cutting, Garn Redwin', evidently the ironstone of Bonw by the Garn (p. 465), which is not far from Rhyd-wyn. They record 'metallic iron' ranging from 33.89 to 69.00 per cent., results which should be compared with the analyses given on p. 407. 'Chromium' to 17.50 per cent. is also recorded. Various trials yielded silver from 2 oz. per ton and upwards. A 'picked piece of silver ore' yielded 344 oz. 2 dwt. 24 grs. of silver, while 1 oz. 12 dwt. 16 grs. of gold (both presumably per ton) is recorded from what seems to have been the same specimen; but no further information has been obtained concerning this substance. In any case', it is certain that the enterprise had soon to be abandoned, for the Bonw quarries are barely 100 yards in length. Local ferrifications of various beds, such as those mentioned on pp. 455–6, are usually insignificant, and should be distinguished from the true oolitic rock.

The borings in the Coalfield (pp. 664, 820) record a good many thin ironstones, and two analyses are quoted on p. 818, but not much is yet known about them. The ferruginous deposits mentioned on p. 774 are quite thin and of small extent.

In case of misunderstanding, it may be well to explain that the 'iron-ores' frequently referred to in Chapters 4, 16, 28, and elsewhere are not workable deposits. They are little grains chiefly of magnetite, ilmenite, and pyrite; which, disseminated in small quantities, are common rock-forming minerals. Nearly all rocks, indeed (as may be seen from the analyses given in those chapters) contain some proportion of iron.

Note on Gold and Silver

There are now 10 records of these metals in Anglesey, seven of which are from Parys Mountain, and the rest from Llangaffo, Rhosmynach, and Bonw. It may perhaps be as well to remark that gold, in small quantities, is a far less uncommon metal than is usually supposed. Pyrite and chalcopyrite, in fact, will often yield a little, if subjected to sufficiently drastic analysis; while nearly all galena will yield some proportion of silver. The Parys Mountain silver is undoubtedly contained in the galena which is (pp. 827–8) one of the minerals of 'bluestone', while the gold is probably contained partly in this silver, partly in pyrite. The Parys anglesite was also argentiferous. In eight of the Anglesey cases, there is the well-known association of gold with sulphur and silica, while silver and gold occur together in all of them save, possibly, the anglesite. That these metals should be present in the oolitic ironstone is more unexpected, but as pyrite is also present, they may be contained in that. In two of the Parys ores there is a little arsenic and bismuth, while the Rhosmynach ore contains no less than 8.5 per cent. of the latter. The curious association of gold with bismuth, a long-established phenomenon, has doubtless a genetic significance.