

MARCASITE AT RENISON BELL: ITS OCCURRENCE

By

PATRICK ARTHUR HILL

Carleton University, Ottawa, Canada

ABSTRACT

Despite a possible earlier abundance, marcasite at Renison Bell is today, an elusive, supergene mineral found only between undisturbed gossan and oxidising pyrrhotite. It is a transitional product in the formation of limonite boxwork.

BACKGROUND

For more than fifty years marcasite has been reported at Renison Bell where massive pyrrhotite is being mined for its cassiterite content. Ward (1909) reported it as being "always present" on the surface of exposed pyrrhotite, Reid (1925) as forming "large bodies" at the intersections of faults and ore sills, and Conder (1918) as being recent, i.e., post-mine, formed where pyrrhotite oxidises with a limited supply of oxygen. These three authors believed the marcasite to be supergene.

Stillwell and Edwards (1943), on the other hand, believed the marcasite to be hypogene, formed by "solution of the pyrrhotite in carbonate solutions which developed during the late stages of crystallisation of the lodes. The dissolved iron sulphide was reprecipitated, as fine pyrite, sometimes as fine marcasite, when it commonly shows a finely banded, colloform structure." These authors describe the marcasite as being in parts of the orebodies, particularly at the Black Face . . . the dominant sulphide.

The present study was undertaken to determine whether marcasite was indeed present, whether it was as common as the above descriptions seemed to indicate, and whether it was hypogene or supergene. All workings known up to 1961 were searched, over 3000 feet of drill core inspected, and 75 carefully polished sections (from DDH's 48 and 60) examined. Selected specimens were subjected to the classic AgNO₃ stain test (Dana-Ford 1932) and were X-rayed.

RESULTS

No marcasite could be identified with certainty in the field, or in the hand specimen, or in drill cores whether polished or unpolished. At the surface pyrrhotite where dry and well-drained, exfoliates to form tough rounded boulders covered with scales of iron oxide; where damp and sheltered from the sun, it crumbles to a black powder.

Specimens in which marcasite might conceivably—on the basis of colour or tarnish—have been present were boiled in a 3 per cent solution of AgNO₃ for 50 minutes. It soon became evident, as no doubt others have found, that determinations made solely on the basis of AgNO₃ staining were misleading for samples tentatively identified as

marcasite proved on X-ray analysis, to be pyrite (Table 1).

The only locality where marcasite was discovered was in a zone a few feet thick between undisturbed gossan and pyrrhotite at Dunn's Workings. Specimens are medium grey in colour and are covered with yellow and greenish-white encrustations of sulphur and ferrous sulphate. The specimens when cleaned, showed under the stereomicroscope a reticulated oxidation boxwork—a more advanced stage of Gilbert's (1924) "gratings". The walls of the boxwork are composed of layers of a grey and a fine sugary, brassy material.

After impregnation and polishing the brassy material is seen, under oil immersion, to consist predominantly of colloform, botryoidal pyrite with minute angular patches and finely decussate specks of lighter coloured, pleochroic marcasite. The pyrite is of at least two generations or sub-generations one of which is intimately associated with the marcasite. Both pyrite and marcasite appear to be supergene. Identification of the marcasite was confirmed by X-ray.

CONCLUSIONS

Marcasite at Renison Bell is elusive and supergene. Because no gossans are today being stripped, it is not now "always present" at the surface. It appears only between undisturbed gossan and oxidising pyrrhotite and is a transitional product in the formation of limonite boxwork. Marcasite at other localities (Foslie 1950; Marmo 1953) may similarly be transitional.

ACKNOWLEDGEMENTS

William Petruk of the Mines Branch, Ottawa, confirmed and identified the marcasite from Dunn's Workings. Ramsay Ford and George Chao undertook miscellaneous X-ray analyses. The work was begun at the University of Tasmania.

REFERENCES

- CONDER, HARTWELL, 1918.—Tin field of north Dundas, *Tasmania Geol. Surv. Bull.*, v. 26, 96 p.
 DANA, E. S. AND FORD, W. E., 1932.—Textbook of mineralogy, Wiley and Sons, New York, 851 p.
 FOSLIE, STEINER, 1950.—Supergene marcasite replacing pyrrhotite, *Norsk. Geol. Tidssk.*, bd. 28, 2-4., pp. 144-150.
 GILBERT, GEOFFREY, 1924.—Oxidation and enrichment at Ducktown, Tenn., *Am. Inst. Min. Met. Eng. Trans.*, v. 70, pp. 998-1023.
 MARMO, VLADI, 1953.—Supergene alteration of pyrrhotite in the sulphide-bearing schists of Nokia, South Finland, *Comptes Rendu Soc. Geol. Finland.*, v. 26, No. 159, pp. 109-123.
 REID, A. McINTOSH, 1925.—Dundas mineral field, Tasmania, *Geol. Surv. Bull.*, v. 36, 102 p.
 STILLWELL, F. L. AND EDWARDS, A. B., 1943.—Mineral composition of the tin ores of Renison Bell, Tasmania, *Proc. Aus. Inst. Min. Met.*, No. 131-132, pp. 173-186.
 WARD, L. KEITH, 1909.—The tin field of north Dundas, Tasmania, *Geol. Surv. Bull.*, v. 6, 166 p.

TABLE 1

AgNO₃ STAIN AND CONFIRMATORY TEST (WITH STANDARDS)

Sample	Locality	Description	Reaction: Tarnish	Tentative Identification	X-ray
B 2	Battery Fault	Vertical vein 2" wide	Brown and blue patches: minute black crystals produced	Pyrite and marcasite	Pyrite
B 3a	" "	Vertical vein 1" wide	Brown and blue patches	Pyrite, some marcasite	n.d.
B 3b	" "	" " "	" " " "	" " "	n.d.
B 4	" "	Vertical vein 10" wide	" " " "	" " "	n.d.
B 8	" "	"Stepped" crystals along main fault	Negative: no reaction	Probably pyrite	n.d.
28	Montana South Lower Workings	Sample on mine dump	Brown and blue patches	Pyrite and marcasite	Pyrite
82	Dunns Workings	Sample from decomposing pyrrhotite	" " " "	Pyrite, some marcasite?	n.d.
125	Cable Workings	Loose float	Brown tarnish only	Pyrite	n.d.
198	Montana North N-S Cut	With quartz from wall of cut	Blue tarnish only	Marcasite	Pyrite
201	Battery Cut	Vein east wall of cut	Negative: sample crumbles	?	n.d.
209	Black Face	With quartz, capping pyrrhotite	Blue tarnish only	Marcasite	Pyrite
252	Central Cut	"Stepped" crystals with quartz	Nondescript motling	Pyrite?	n.d.
383	DDH S53	With quartz at 157 ft.	Brown, some bluish veinlets*	Pyrite, some marcasite	n.d.
451	DDH S60	Base of pyrrhotite at 167 ft.	Brown and blue	Pyrite, some marcasite	Pyrite
457	DDH S71	With carbonates at 238 ft.	Silver pp. on gangue, pyrrhotite blue-black, pyrite unaffected	Pyrrhotite + pyrite	n.d.
—	Main Road	Spherulitic concretion 1½" long along lamination (bedding) of "slates"	Negative: specimen crumbles	Marcasite?	Pyrite
Standard 1	Egremont, Cumberland, U.K.	Marcasite, Krantz collection	Negative: no tarnish	?	Marcasite
Standard 2	Welkeunaedt (Belgium ?)	" " "	" " "	?	n.d.

*Microscopic examination (anistropy, colour) suggests that the veinlets are marcasite