

18. *The PAMBULA GOLD-DEPOSITS.* By FREDERICK DANVERS POWER,  
Esq., F.G.S., M.Am.Inst.M.E. (Read November 9th, 1892.)

[Abridged.]

THE Pambula Goldfield is situated in the parish of Yowaka, county of Auckland, in the south-eastern corner of New South Wales, and is about 11 miles north of Twofold Bay.

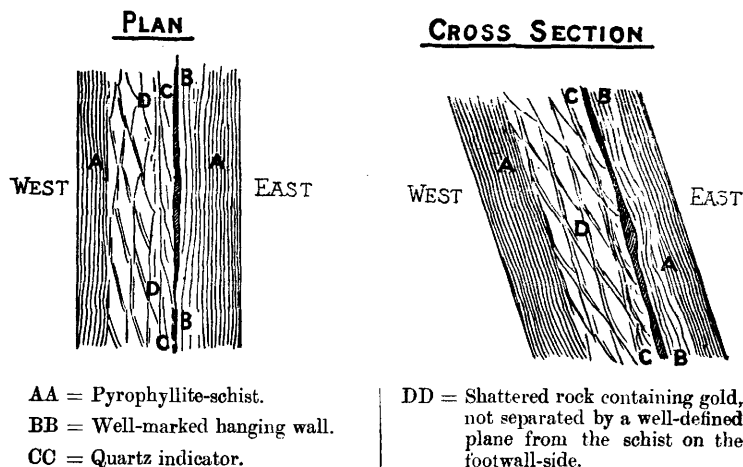
Most so-called 'practical' miners, especially those accustomed to well-defined quartz-reefs, acknowledge that these deposits are quite different from anything they have ever met with, and admit that they do not understand them. This is not surprising, for, if the observer takes a cursory view, without giving due weight to minor details, these lodes do indeed appear different from the general run of auriferous deposits, chiefly owing to the fact that the material filling the ore-channels does not differ much in appearance from the enclosing rock ('country'), and is but slightly impregnated with metallic sulphides.

The ore-deposits of Australasia are for the most part confined to certain belts of country, running more or less parallel with the sea-coast and with the main ranges of hills. The rocks which contain the Pambula gold-deposits are no exception to the general rule, their average strike being 12 deg. W. of N. The enclosing rock or 'country' is pyrophyllite-schist, interbedded with felspar-porphry, sometimes merging into quartz-porphry, the whole of which is tilted at a high angle; near the surface the rocks dip considerably to the east, while deeper down they are almost perpendicular. The planes of cleavage and the planes of bedding of the 'country' appear to be coincident.

Examined microscopically, the structure of the schist is lenticular, and this is repeated on a macroscopical scale, more especially in those zones of disturbance which now form the lodes. The lenticular structure is carried still further, for the lodes themselves, while tending to a north-and-south strike, cut up the field and form a network; but of the whole system, it is only the main or central lode which has been worked at a profit. Some of the lodes are accompanied by a quartz 'indicator': that is to say, either a succession of small detached veinlets of quartz or one continuous vein ('leader'), 9 inches wide, as shown in the figure on p. 234. Curiously enough, however, this quartz contains little or no gold, the precious metal being found in the shattered 'country' lying on the 'footwall' side. This shattered zone always has a good 'hanging wall,' whether the quartz indicator is present or not, but on the footwall side it gradually merges into the normal rock. The width for which it may be profitably worked varies from a few inches to 5 feet, and is not defined by any sharp line. In Faulkner's Claim there are rich lenticular parts of the shattered zone which measure as much as 18 feet long and 18 feet deep. The richness of

234 MR. F. D. POWER ON THE PAMBULA GOLD-DEPOSITS. [May 1893,

these lenses varies, but several of them in succession will form a 'shoot.' These shoots have a southerly 'pitch,' and as a rule are short, but one at Faulkner's, running into the Pambula Company's ground, has so far proved to be from 400 to 500 feet long. The more broken and wider the lode, the richer it is found to be. The spaces between the lenses, where they overlap one another, are occupied by clay, and when this material is scraped out it has at times yielded as much as 1 lb. of gold to the 'dish.'<sup>1</sup> On the



surface the lode material is bleached by organic matter; a little lower down it is tinted red, owing to the decomposition of iron pyrites; while still deeper the rock has a greenish hue, and is more or less impregnated with iron pyrites. In Pipe Clay Creek, a dyke of clay running E. and W. diverts the course of the lodes where it cuts them, but the latter eventually return to their original direction. This dyke is 2 or 3 feet wide, and 'underlies' slightly to the south.

From the above data it will be observed that there are many points in common between these deposits and those which are universally acknowledged to be lodes. These deposits have a general course parallel to the sea-coast, but individually run in such directions as to divide the district into large, irregular lenses, which together form a system of gold-deposits. Those zones of disturbed rock which are off the main line are poor in gold. The deposits have at least one good wall, and are made up of shattered 'country,' sometimes showing a brecciated structure, the broken particles having been more or less rounded, perhaps by corrosive liquids. Evidences of motion are also to be seen in the striations on the quartz forming the indicator, and in the clay between the lenticular masses of rock. The gold occurs in 'shoots' which 'pitch'

<sup>1</sup> The 'dish' is a measure of capacity=572 cub. ins.

southerly (the most usual direction for shoots in Australia), and these are richest in loose or soft 'country,' but gradually become poorer towards the footwall-side, where the stone becomes 'tighter.' Iron pyrites, though not in a massive form, is associated with the gold. The course, 'underlay,' and width vary in these lodes, within certain limits, as in others, and they are also affected by a dyke which crosses them. The country is hilly and disturbed, as is generally the case where lodes occur.

Some observers term these deposits 'true fissure-lodes'; but many miners believe that the word 'fissure' suggests an open crack of some importance. In the gold-bearing portion there is no evidence that such an open crack ever took place; the rupture was caused by pressure, which would not allow of an open crack existing. The minute joints between the lenses cannot, with the greatest stretch of the imagination, be called 'fissures.' The quartz indicator runs parallel with the cleavage of the surrounding rocks, and evidently occupies a cleavage-joint which was gradually filled with quartz; for the grooves on the face of the quartz, where it has rubbed against itself, prove that motion has taken place since some of the quartz was deposited. Lodes in soft rocks are not so likely to be well defined as those in hard, so the merging of one 'wall' into the enclosing rock was to be expected. The foliated structure of this enclosing rock is not obliterated in the ore-channel, except in very rare instances. The difference between these lodes and lodes abundant in sulphides is due more to degree than to any fundamental character; it seems greater than it really is, on account of the difficulty of distinguishing between the ore-channel and the enclosing rock, a distinction rendered less easy because the ore-channel is for the most part a 'bedded lode,' and has not been subjected to a metasomatic change, nor had it wide interstices which could be filled by extraneous minerals.

These lodes are worked with profit on the top of Mount Gahan (named after one of the original prospectors), where rock has been crushed, yielding 1 oz. 12 dwt. to the ton, and also in Pipe Clay Gully, 493 feet below, where the picked stone sent to the battery gives 11 oz. per ton. The rock is naturally looser on the surface than deeper down, and therefore it is to be feared that, since the spaces between the lenses are so minute on the surface, they will be still smaller as the depth increases, until finally the 'country' becomes so 'tight' that there will be no place for the gold to lodge.

#### DISCUSSION.

Mr. H. BAUERMAN said that the condition of occurrence noticed by the Author was characteristic of a considerable area in North America, in the States of North and South Carolina and Georgia, where gold has been obtained from pyrophyllite and other soft schists associated with quartzite and irregular quartz-veins, the latter not being always gold-bearing. As a particular instance, he mentioned the Brewer Mine in South Carolina.