

rock, and they stopped altogether when they approached the boulder-like undecomposing cores. (Reports, Geological Explorations, 1868-69, p. 35.) If the gold had come up from below we can see no reason why it should specially affect the decomposed rocks.

“The fourth argument is taken from the very recent origin of some of the gold-veins. This might be inferred from those cases like Puriri, just mentioned, where the decomposition is evidently due to surface weathering, and the gold-veins appear to have been formed *pari passu* with the decomposition. But stronger evidence was found in the old Star of the South No. 2 Claim, which was situated on the spur facing Shortland, between the Karaka and Hape Creeks. Here irregular veins of quartz occurred at the junction of the face of the rock with slipped ground, due evidently to a landslide, and these veins contained gold. (Reports, Geological Explorations, 1868-69, p. 26, fig. 2.) We can hardly suppose that the thermal springs have brought up gold so near to the surface and at so recent a period, and yet have left no other evidence of their existence.

“The fifth argument is founded on the quality of the gold itself, which is an electrum similar to that found in similar volcanic rocks in Hungary and Nevada, but different from that usually found in older formations.

“I think, therefore, that we must look to the volcanic rocks themselves for the source of the gold, and with the gold the quartz also; and that we may dismiss all idea of either of them having been brought up by thermal springs. If the quartz of the buck-reefs, which are either barren or do not contain more than 10 dwt. of gold per ton, is also due to lateral segregation, as appears probable, then we may suppose that in these cases the greater part of the gold was deposited from solution in the feeders before reaching the main fissure. It is more probable that the bulk of the gold should have been deposited in the fissures which were feeding the buck-reef than that the whole of the gold should have come from the buck-reef, and the bulk of it should have passed out into the small fissures. The process I have suggested seems to have taken place at Coromandel and at Te Aroha; but Mr. Cox has pointed out that in the Moanataiari Mine an auriferous vein, with clearly defined walls, crossed a buck-reef obliquely. (Reports, Geological Explorations, 1882, p. 25.) In this case undoubtedly the buck-reef is the older of the two, but this single fact is not sufficient to form the basis of an induction that all buck-reefs are older than the auriferous veins. Sir James Hector is of opinion that the quartz which forms the veins and infiltrates the auriferous gangue must have been introduced into these rocks subsequent to their original formation, but not derived from their partial decomposition, as the rocks themselves are deficient in silica, considering the felspathic nature. (Reports, Geological Explorations, 1868-69, p. 27.) But my microscopic examination of the rocks has shown that large quantities of silica have been removed from the bisilicates and from the feldspars, only small portions having remained as secondary quartz, and this silica must have gone somewhere. That the rocks are now deficient in silica goes far to disprove the opinion which Sir James Hector would found upon it.

“*Indications of Favourable Country-rock.*—Mr. Cox says that ‘the white, fairly-hard stone is the best country’; that ‘reefs in good ground are remunerative, but in hard ground do not pay’; that ‘hard green dioritic belts and jointy or shingly ground are not good for gold’; that ‘moderately hard country traversed by small veins and of a pyritous nature near the reefs is the best’; and that ‘it is universally admitted throughout the field that a moderately hard tufaceous sandstone country is the class of rock most favourable for gold, and that where this is pyritous and carries small black veins—(of proto-sulphide of iron (?))—which run into the reefs, rich deposits almost always occur.’ (Reports, Geological Explorations, 1882, pp. 23-44.) Sir James Hector also says, ‘All varieties of these rocks are auriferous only in proportion to the amount of sulphides they contain.’ (Reports, Geological Explorations, 1868-69, p. 27.) From this we may infer that the most favourable country is where the rocks have gone through the first and second stages of decomposition already described, having been changed into what the miners call ‘kindly sandstone,’ and especially where these rocks are abundantly charged with pyrites. However, we must remember that numerous auriferous veins occur in the hard rocks also, and that the greater expense of working them here may account for some of them having been failures. Also, I much doubt if Sir James Hector’s induction is founded on a sufficiently wide basis of fact; but I shall have to return to this subject again.

“*Facts connected with the Lodes.*—Gold occurs in the veins in four ways: (a) In auriferous pyrites; (b) scattered in small grains through massive quartz; (c) in threads or scales, some of which are pseudomorphs, after botryogen or copiapite (Campbell, Trans. N.Z. Inst., xiv., p. 457), between the points or quartz crystals in comby veins, the quartz at the base of the crystals being often stained red; and (d) in calcite, at the Success Mine, Coromandel. It is never found enclosed in a quartz crystal. Mr. W. Skey (Reports, Geological Explorations, 1870-71, p. 84) says that he was not able to observe any other matrix than quartz or highly quartzose rock, where the gold at least was in paying quantity.

“In some of the claims in the upper and middle portions of Tararu Creek manganese oxides occur along with the gold to the almost exclusion of iron compounds. (Reports, Geological Explorations, 1870-71, p. 85.) The auriferous veins usually contain abundance of pyrites, but other sulphides—stibnite, blende, arsenical pyrites, copper-pyrites—are in small quantity only, and these have been introduced subsequently to the gold. (Reports, Geological Explorations, 1868-69, p. 24; and *ibid.*, 1882, p. 44.) Carbonates of lime and of iron have been introduced into the veins after the quartz. (Reports, Geological Explorations, 1867, p. 8, and *ibid.*, 1868-69, p. 23.)

“According to Mr. Davis, the occurrence of ‘pyrites in the matrix of the lodes is a *sine qua non*,’ that ‘the hanging-wall of roof need not of necessity carry pyrites, but rather the richness of the reef is increased by the diminution of pyrites in the roof, provided that the foot-wall is rich in them,’ and that ‘leaders joining the reef on the hanging-wall probably increase the yield of the gold for a time, but leaders from the foot-wall seldom.’ (Reports, Geological Explorations, 1870-71,