

short extent, and differ very much both in direction and angle of underlay, the latter ranging from vertical to less than 20°. Some of the reefs show also much irregularity in their course, for they expand and contract, twist and curve in strike and dip in quite a peculiar manner, and are, what is the case also with most of the others, frequently faulted by slides and cross-courses, so that it requires very great attention and perseverance on the part of the mining managers not to lose them. Considering all these points in connection with the fact that the country—a rather soft phyllite—is also very much disturbed, both in strike and dip—steep and flat dips alternating and changing in direction within short distances—it appears next to certain that not only the peculiar soft and gravelly nature of the reefs, but also the exceptionally flat dips of some are not original, but due to strong pressure, friction, upheaval, &c.; and as the cause of these disturbances appears the most likely the intrusion of the dark hornstone-porphry, which, as mentioned at another place, occurs in small knobs and dykes at several places on the range (near Carricktown). Unfavourable as these features no doubt appear, touching straightforward and uninterrupted working of the reefs in future, I feel no apprehension of the latter giving out suddenly, or at a limited depth, for they are in every respect true lodes, crossing the country both in strike and dip, and showing most frequently the hanging wall, less frequently the foot wall, and in some instances both walls well defined and separated from their mass by clayey casings, mostly polished and striated, representing the so-called “slicken-sides,” which afford unmistakable proof of movements of the walls of the reefs.

The gold, both in the quartz and mullock, is very fine, and, owing to the soft and ferruginous nature of the stuff, specks can but very rarely be seen during working. Judging from the crushings and occasional washing of prospects, it occurs chiefly in shoots dipping in strike, less in irregular patches, but seems also to be pretty generally distributed throughout the whole extent of the reefs, as far as opened. The yields of most of the reefs opened have in the average been very fair, as they ranged between  $\frac{1}{2}$  and  $1\frac{1}{2}$  oz. per ton. On account of its softness the quartz mullock is easily crushed, but the saving of the fine gold requires great attention; and, as the supply of water, which the proper treatment of this kind of stuff requires, is rather above the average, but has at the existing machines been frequently much below it, and their saving appliances are not the most suitable ones besides, I am sure a great deal of the gold has been lost in the tailings. There is at the level of even the lowest workings not much pyrites observable in the reefs: still the ferruginous character of the mullock, as being no doubt a result of its decomposition, points to its former presence in larger quantities, and it may with certainty be expected to increase in abundance in depth. As regards the expense of working the reefs, the soft nature of both the mullock and country renders it small in one respect, viz., that of exploitation proper; in another, however, viz., that of supporting the workings, rather large, on account of the high price of timber, and the expense in this respect increases of course, in order to avoid accidents and collapse, the flatter the dip of the reefs. Fortunately there are on this field experienced managers and miners, well able to cope with this difficulty in the most economic and practical manner.

FOURTH GROUP: *The Reefs of Arrow and Skipper's Creek.*—The only reefs of this group in course of being worked, and of which I was able to examine the workings, are “Southberg's” and the “Nugget and Cornish,” Skipper's Creek; still, from examination of the outcrops of some reefs at Arrow, and information received about the character of a number of others once worked, but since abandoned, in both districts, I was enabled to form the following opinion on the general character of the group: These reefs are true massive lodes, ranging from 4 to over 20 feet in thickness, which cut through the country both in strike and dip—the latter being generally steep—and show more or less well-defined walls, with clay casings; a number are traceable for long distances—some for miles—in strike. In point of composition and structure they approach, however, far more mullock reefs than true quartz reefs—they represent, in fact, fissures partly filled with *débris* from the country, full of interlaminated quartz, partly occupied by bunches and veins, of variable size, of true reef quartz. The mullock seems in the larger reefs to be generally predominating, and forms, in places where their width very much increases, by far the greater part of their mass. In fact, experience tends to prove that the thicker a reef is, or the wider it becomes, the more mullock it contains, whilst, on the contrary, decreasing thickness is connected with a relative increase in quartz, and the reefs become also better defined. The bunches and veins of reef quartz occur either on the hanging or foot walls, or on both walls, rarely in the centre. They appear to dip shoot-like in strike, and are generally payably or richly auriferous; but the somewhat mineralized mullock, with its interlaminations and fine cross veins of quartz, has also, in all the reefs opened, been found to contain gold throughout, though generally only in payable quantity within the line of the quartz shoots, or where the reefs much contract in size. The yields have ranged from several dwts. to over 4 oz. of gold per ton, but average from the reefs at present worked about 10 to 16 dwts. per ton. Although none of the reefs at Skipper's Creek have as yet been opened below permanent water level, they are already highly charged—both quartz and mullock—with pyrites, which seriously interferes with the satisfactory saving of the generally fine gold during crushing. This led the Phoenix Company, after Mr. F. Evans, the manager, had proved the payably auriferous character of the ore as such, to erect in connection with their crushing mill the necessary works for extracting the gold from the large quantity of it saved on long blanket strakes. The country is, with regard to most reefs, very favourable for their being easily and cheaply worked, owing to the highly precipitous nature of the mountains which they traverse, and the deep valleys and gorges from which they can be opened, either directly in strike, or by but short cross adits. Still there is at Skipper's Creek one serious drawback to regular and systematic working, affecting the most important of the reefs within certain depths, namely, although the country rock—mica schist—appears on the large scale but little disturbed in strike and dip, it is throughout highly fissile, and traversed by numerous cracks and joints; and these features combined, aided by percolation and freezing of water, have originated enormous slips from the precipitous mountain sides—faults, in a certain sense—by which the continuity of the reefs is completely broken. In fact, nowhere on the slopes of those steep mountains can the miner be certain of having a reef exactly in its original place or unshifted. These disturbances, which render working dangerous and cause much expense in timbering, extend, however, to within the level of the nearest gorges or valleys only; below this, there is every