ON THE MINERAL RESOURCES OF KILKIVAN, WIDE BAY, AND ON THE RECENT DISCOVERY OF COBALT ORE IN THAT DISTRICT;

BY

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(Read on the 6th August.)

THE metal cobalt is scarcely known to Queenslanders as a metal. We have all seen it or heard of it as a pigment, and have witnessed its effects in the hands of the artist and painter, in the colouring of porcelain and other earthenware, and perhaps more frequently in the varied shades of colour infused into glass. But in the normal condition of a metallic ore it has not up to the present time enriched the colony; for, although small quantities, traces, so to speak, have been found in some ores, it does not appear to have occurred, even to the sanguine mind of the prospector or speculator, that, in any case, there has been sufficient found to give so much as an appreciable addition to the value, estimated on other considerations, of the discovery.

The neighbourhood of Kilkivan, however, adds to its already varied laurels in the production of minerals, by presenting a possession unique, not only for Queensland, but so far as the entire Australian continent is concerned, and probably in some essential particulars unsurpassed anywhere. It may be mentioned that the immediate locality has been found to be rich in nearly all the precious and useful metals. The gold of the "Rise and Shine," the "Long Tunnel," the "Black Snake," and other lines of reef at various divergent points, has from time to time aroused the energy and raised the hope of the prospector, and its discovery stimulated the enterprise of the hardy miner, attracted the attention of the investor, and, in many cases, excited the cupidity of the speculator. Gold has, however, been obtained both from the alluvium and quartz reefs of the neighbourhood, and occasionally, as

at "Black Snake," in rich patches, where, it is said, on the prospectors turning over a log, three black snakes were disturbed from their lair, and some pounds weight of gold exposed to view, which fortunate circumstance originated the gold and other mining enterprise of the neighbourhood, and gave it the name which, under any other circumstances, would not have conveyed any very pleasurable sensations, nor have had a very welcome reception by the diggers or any other class of bushmen.

Silver has also been found in the neighbourhood; sometimes associated with gold, sometimes with copper and other minerals, and occasionally in thin lodes of galena, which, with the lead and sulphur, generally carries a small percentage of silver. The silver, however, constitutes the most valuable and only product likely to make galena lodes worth working, under the peculiar conditions of labour and carriage attendant on the utilization of minerals in the remote and hilly districts outside the general line of railway communication; although the time is not far distant when the township of Kilkivan will enjoy the benefit of railway connection with the rest of the colony, as it is now blessed with telegraphic, when it is to be hoped that great impetus will thereby be given to the prosecution of an industry in which the district gives abundant promise.

In addition to gold, silver, and lead, copper may be incidentally mentioned, and to win this a considerable amount of work was done in erecting furnaces, sinking shafts, &c., but, unfortunately for the district and the colony, the difficulties of labour and transit, and the low price of the metal, effectually prevent the prosecution of such an enterprise at present.

Touching another of the metallic ores found in the neighbourhood, a much more hopeful and promising condition of things appears to exist. Some years ago certain veins of cinnabar were discovered, and for some little time worked with the most primitive appliances, and, as is usual on new mining fields, under very great disadvantages. With the assistance of an old oil-drum, for a retort, however, as much as 2½ per cent. of mercury was, I am informed, obtained from the ore. Now, when it is understood that one per cent. is nearly equal in value to 1 oz. of gold per

ton of stone, and the difficulty and cost of extraction very much less than in the case of gold from auriferous quartz, it will be seen that with any reasonable quantity of ore there should be no difficulty in working these mines at a handsome profit. Indeed the British public have apparently arrived at this same conclusion, for we find that a company, with a capital of £400,000, has been formed in London to work these mines, and, by recent reports, a manager, with some of the necessary plant and appliances, has already arrived and operations will shortly be, if they have not already been, commenced.

Bismuth and zinc ores have also been found in small quantities in the neighbourhood, but the ore most recently brought under notice is a compound of cobalt nickel and manganese; all of value in the arts and manufactures of the world, although the last mentioned has been found in quantity at Gladstone and has not been worth working on its own account. Whilst, however, under the peculiar circumstances of the colony, it may be valueless when found unassociated with more valuable minerals and perhaps in a refractory state, that is no reason why, when obtained as a residual or by-product in the extraction of such minerals, it may not be a very considerable element in the gross returns of the undertaking.

Touching the value of the other constituents mentioned, there can be no question, whilst the minor accompaniments, such as arsenic and sulphur, may or may not be turned to account.

The reef or lode of this ore now being opened is situated on one of the spurs near the heads of Wide Bay Creek, and between the tributaries of that watercourse known as Fat Hen Creek and Copper Mine Creek. This spur slopes away from the place where the mine has been opened in a northerly direction, and is probably 1,000 to 1,200 feet above the valley and may be nearly 2,000 feet above sea level, although having been unaware, when leaving Brisbane, that I would be in that or any similar locality, I was not provided with an aneroid, and consequently speak from very imperfect data. The crown of the hill known as Mount Clara is a little to the south of the mine, and the outcrop of the reef runs along the eastern slope not far from the top

and almost in a true north direction. Immediately beneath the opening the reef measures 21 feet 8 inches in thickness, dipping heavily to the west. The tunnel which has been driven has been begun on the top of the reef in a partially decomposed very soft serpentine rock, and dips two in three, *i.e.*, at an angle of about 34 degrees. The top of the reef is not closely followed, however, but is evidently lost after going a few feet, the rope wearing a projection of it to a fine polish of a beautiful blue colour and metallic lustre. This is 10 or 12 feet in from the outcrop; but at 12 yards in, an offshoot, several feet in thickness, is cut, and at 18 yards another such offshoot is reached. At 28 yards, driving has been stopped in the westerly direction, and a backset begun in a south-easterly one at an angle dipping very little from the horizontal, and in this excavation the two offshoots mentioned above are cut through; whilst at 12 yards the main lode, or what appears to be the main lode, is intersected and carries very good mineral. (A sample of this, broken off at the face, was shown at the meeting.)

It must not be supposed, however, that the whole 21 feet of reef is constituted on a par with this particular sample; it would be contrary to the known composition of lodes generally, and especially those of great thickness, which, though carrying valuable, precious, or useful ores of metals, these are rarely the unaccompanied occupants of them. The other chief components, however, being of commercial value, particularly the nickel, this thickness will not be so much of a bar to profitable working as it must be in cases where the "gangue" is valueless. And when it is remembered that the veins of cobalt ore hitherto discovered and worked are very thin, and that the supply being limited there has been no inducement to find out other applications for it in the arts, it may readily be surmised that the discovery is expected to effect a very considerable change, both in the supply of raw material and in the application of the purified article to the various arts of civilised life. The difficulty of extraction, however, may be a bar to the application of scientific chemistry on the spot, and the refractory ore may even require to be sent abroad for manipulation, but with a railway to the mines and with this unusually large supply

it may fairly be hoped that we have here another pledge of the future prosperity of the mining industry in a district which has already given promise of reward to legitimate enterprise in various classes of mining.

I have found great difficulty in obtaining any statistical information touching the quantity of cobalt used, or its value either in the raw state as ore, or at any of the stages through which it may have to pass in process of extraction and purification, and the value of the product of a chemical operation is often only a poor guide to an estimate of the value of the raw material employed. Consequently little can be known here of the actual value of the ore in the mine. It may be safely assumed, however, that whether operations be confined to mining the ore and shipping it, for sale abroad, or it be chemically reduced on the spot; the discovery and working of another mineral not hitherto produced by the colony, and one which is found richer in metal and in larger quantities of ore than is usual, is a not unimportant step in our onward progress; for on the percentage composition of the ore, the quantity of ore in the vein, the thickness of the lode, and all the other incidentals of locality, cost of labour, carriage, and the like, the profitable working of a mine principally depends.

The statistics of quantity and value which I have seen, in most cases, put the ore as of nickel and cobalt. In the United States of America in 1882, the value was £3000, but the quantity is not stated. In Germany in 1881, 191 tons value £13,005, equal to £68 per ton. In Spain in 1882, 40 tons value £1046, equal to £26 per ton. In Norway in 1878, 108 tons value £11,112, or £103 per ton. Sweden produced an average of 153 tons per annum during 10 years, but the value is not stated. The value of ore of nickel and cobalt is given variously at from £40 down to £4, according to quality and locality.

There is no definite information obtainable touching the value of any specific quality of ore with which to test the value of the ore now mentioned as having been recently discovered.

These points are referred to because, although not new or scientific, and therefore perhaps not quite within the scope of the Society, they very materially affect the

important consideration of the value of the discovery to the colony.

Touching the uses and qualities of cobalt, Greenwood says—"Cobalt is chiefly used in the arts in the form of oxide, silicate, or other chemical combinations constituting the bases of a large number of pigments and material largely employed for imparting a blue colour to glass, enamels, &c." The specific gravity of the metal is given as 8·957; it is highly magnetic and of great tenacity, a wire of cobalt supporting twice the weight required to break a similar wire of iron; it is considered the most malleable of metals, and it is not sensibly oxidised by exposure at ordinary temperatures.

The following is an analysis of the ore here referred to, presumably by Mr. K. T. Staiger, appended to an exhibit in the Queensland Museum :—

Cobalt	22·207 per cent.
Nickel	3·510 ,,
Iron	29·130 ,,
Manganese	2·360 ,,
Copper	0·103 ,,

Cobalt glance and cobalt pyrites have been found richer than this analysis shows, but Overman, who gives the analyses, does not say where nor in what quantity these particular ores occur, but it is probable as accidental minerals in connection with others, and not in sufficient quantity to be worked for their own intrinsic value. The general value of the ores of commerce appears to be much less, probably not more than from 2 to 10 per cent., and consequently the Kilkivan ore, with 22 per cent. cobalt, should be very valuable.

This is a matter of some public importance apart from and in addition to the mere question of the profitable occupation of miners.

A branch railway from the Maryborough-Gympie line is now in course of construction to Kilkivan, and grave doubts have been entertained touching the prospect of sufficient traffic to justify such an undertaking. There is no other industrial enterprise, however, into which colonists can enter there which is so likely to give traffic to

a railway as that of mining, whether it be of cobalt and nickel ores, of cinnabar, galena, copper, or gold, all of which, as we have seen, are found in greater or less abundance in the neighbourhood.

Coal, it is admitted, yields more work for railways, but could scarely be mentioned in connection with the metallic ores, but the coal of Miva and Munna Creeks, near the Kilkivan line now in course of construction, has long been known as a prospective, if not a present, source of wealth, and very excellent specimens were shown me by the contractors for the line, Messrs. M'Dermott and Owens, who have in a praiseworthy manner taken special note of the mineralogy of the district which this line is traversing.

The branch line is now opened to the Mary River, a distance of four miles from the junction. A bridge of very considerable dimensions is erected across the river suitable, not only for the railway, but for ordinary vehicular, horse, and foot traffic. The rails are laid a distance of 12 miles further still, and the contractors' engine travels that distance. In the cuttings near the river the aqueous deposits of the coal measures are visible, but further on a varied and interesting exhibition of volcanic and plutonic phenomena is seen exposed, particularly in the sidling cuttings on Bong Millerer Creek.

The line may thus be said to be completed as far as Woolgar, and its construction is well advanced, a distance of 10 miles further, towards Kilkivan, which will be the terminus of the line, so far as at present arranged. The distance hence to the newly-opened cobalt mine is about 10 miles by the nearest practicable route, the direct distance being probably from five to six miles. The Mount Corra and Black Snake are in the immediate neighbourhood ; also, if a somewhat more circuitous route be taken, the cinnabar mines would be included within the operations of such means of communication.

As this would probably, however, be a question for the mine owners, we can only conclude with a hope that the wealth of minerals proved to exist in that neighbourhood may, within a reasonable period of time, add to the realised wealth of the colony and assist in relieving the present somewhat depressed condition of mining in the neighbour-

ing gold mining township of Gympie, which, in its early days, did such good service in lifting the colony out of the slough of despond engendered by the depression of 1866, severely felt and long remembered by many of the residents of the city of Brisbane in the earlier days of our now prosperous colony.

NEST AND EGGS OF THE JABIRU;

BY

W. T. WHITE, Esq.

WITH AN

INTRODUCTORY NOTE;

BY

HENRY TRYON.

(*Read on 6th August, 1886.*)

Our Australian Jabiru, though never met with in Victoria or South Australia, is generally distributed throughout the remainder of the continent, being for the most part restricted to the coast districts, and seldom found more than 300 miles inland. It is nowhere plentiful, though it may be occasionally seen in some numbers about such estuarine waters as those of the Herbert River. Difficult to approach, its large size and conspicuously handsome appearance render it a favourite mark for the sportsman's rifle, so much so that already it is a bird unheard of in the neighbourhood of settled districts. That the Jabiru is doomed to extinction, unless steps are taken to prohibit its slaughter, there can be little doubt; the description, however, of its habits and representation of its appearance given by the Nestor of Australian naturalists, Dr. G. Bennett, in his "Wanderings," not to speak of the accounts of less popular writers, will help to perpetuate its memory. Its history, however, is not yet completely written, since its nidification and the character of its eggs are subjects which do not appear to have been