FEDERATED MALAY STATES

NOTES ON THE OCCURRENCES OF LODE TIN-ORE IN THE KINTA VALLEY

BY

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September, 1923.

(1 pikul = 100 kites = 133 1/3 pounds avoirdupois).

INTRODUCTION.

The aim is to map all occurrences of lode tin-ore in the Kinta Valley that have been discovered up to the present date, but it is certain that some deposits have been missed. It is also certain that some of those who will examine the map and read the notes will be in a position to add to or correct them, and their help in revision will be very gratefully welcomed.

The granite contact was mapped by Mr. Scrivenor, and information about many of the lode occurrences was collected from his notes.

I wish to acknowledge my indebtedness to the gentlemen, named in the text, who have given so much information.

EAST SIDE OF KINTA VALLEY.

1. Sheet 119 S.W. Lot No. 9610 or thereabouts, on the 1909 sheet. A lampan in schists.

2. Sheet 129 N.E. Lot No. 11414.

Toh Kiri.—Mr. Scrivenor examined the mine in July, 1922. The deposit trends approximately north and south, being about 600 feet long, and more than 50 feet broad. It is an example of intense mineralisation of aplite, the mineralisation probably extending outwards from a north and south fissure. This was suggested by a section at the southern end of the deposit, but in the main mass of ore no such fissure could be seen.

The chief ore minerals are pyrite, arsenopyrite, and cassiterite, and other minerals are quartz, kaolinite, white mica, and fluorite. There was a quantity of a greasy mineral like steatite, which is the hydrated silicate of magnesium and aluminium found at Gopeng and elsewhere. The presence of this mineral, the fluorite, and the abundance of arsenopyrite might indicate that dolomitic limestone is close by.

The aplite was well exposed on the east side of the open cast mine. It contained veins and "blows" of quartz, and numerous veins of kaolin. It also contained veinlets of cassiterite without clearly defined walls. The felspar in the aplite had been completely altered to kaolin, for the most part completely, but specimens of comparatively hard rock could be found. The bulk of the aplite was soft enough to cut by hand.
3. Sheet 129 S.E. Lots Nos. 3356, etc.
   Big Lampans in Schists.—White pegmatites are intrusive in schists to the south.

4. Sheet 139 N.W. Lot No. 7800.
   TAMBUN MINE.—Stringers were known to occur both in limestone and schists.

5. Sheet 139 S.W. Lot 6062 or thereabouts.
   Lampan in quartzites and shales.

6. Sheet 139 S.E. Lots 7983 and 10359.
   There is lode tin on these lots, and further to the north, apparently along the same fault-line, there is scheelite, on Lot 8154.

7. Sheet 149 N.E. (1911) Lots 12484 and 8486.
   There are stringers of cassiterite in granite, some of them with direction N.W. by S.E.

   Tin-bearing stringers occurred here in soft decomposed granite.

9. GUNONG LANNO.—Although no details can now be gathered, yet it seems to be certain that lodes of tin-ore were known in Gunong Lanno, for the Director of the Imperial Institute (Bulletin Imperial Institute, Vol. VI, No. 2, 1908, pp. 155-157) published analyses of the ore in 1908.

10. Sheet 159 N.E. Plan Nos. 23535 and 11239.
    Mr. C. Pearse informs me that many years ago Mr. Ho Chun Fat and Mr. Alma Baker were working thin tin-bearing stringers rich in tourmaline, near the granite phyllite contact.
    The first block is now being worked at depth by Mr. Lee Kem Choon, and the second is worked by Mr. Eu Tong Sen.

11. N.E. of the town of Gopeng.—Some quartz stringers in phyllites were worked for wolfram and tin. Three of the stringers had directions E.N.E. by W.S.W., E.S.E by W.N.W. and S.E. by N.W., and they looked as though they would intersect, but they were not followed far enough to prove it. The usual output was 15 pikuls of wolfram a month, and 6 to 8 pikuls of cassiterite. There are other stringers near here.

12. LALANG KINTA.—The General Manager of Gopeng Consolidated Company informed me that a few years ago he put a tributor on to a deposit of lode tin in the limestone here. It was rich in pyrite and arsenopyrite. Nothing can now be seen of the deposit.

13. GOPENG CONSOLIDATED, SERDANG SECTION.—Coarse grained pegmatites on this mine contain as much as two katis of cassiterite per cubic yard. The felspar of the pegmatite vein has been completely changed to kaolin, and so the tin is easily recovered from the veins by hydraulicing.
14. **SUNGEI SIPUT NEAR KUALA DIPANG.**—Mr. Cheong Tek told me of a lode in limestone, near the contact of granite and limestone, on property owned by Messrs. Van Cuylenburg and Kellie Smith.

Lode tin-ore in large lumps has been found by Chinese near the well-known Jehoshaphat Mine, but nothing is known of its mode of occurrence, except that it occurred in limestone and was found high up in the limestone hills. Mr. Scrivenor saw specimens in 1904.

The deposit once worked on the Jehoshaphat Mine is commonly referred to as a lode, but it was formed by detrital tin-ores being cemented by calcite in a fissure.

15. **Sheet 189 N.E. Lots Nos. 18369 and 16068.**

**ULU PETAI.**—There are a number of lode deposits known at Ulu Petai on the slopes of the granite mountain Bujang Malaka, in or near the above blocks, and between the heights of 2180 feet and 2780 feet. The first known was on the north side of the valley. Mr. Scrivenor first visited it in February, 1909, shortly after work had begun on it, and it was examined on a number of occasions later. The body was roughly cylindrical and therefore is correctly termed a "pipe".

![Fig. 1.—A section of part of the Ulu Petai pipe, drawn to a scale of about 1 inch = 40 feet.](image1)

![Fig. 2.—A plan of part of Ulu Petai pipe. The pipe was roughly in the same plane, dipping at about 1 in 15 to the north until the point X was reached. At X the pipe dipped at 45° for about 20 feet, and it then continued at the former gentle angle.](image2)
Figure 1 gives a plan of the "pipe" looked at from the top. For the first 200 feet the body was almost horizontal, its inclination averaging about 1 in 15, but after about 200 feet, at the point x (vide fig. 2), there was a sudden dip for 20 feet at an angle of 45°, and after this, up to September, 1915, the pipe was followed at the former angle for about 80 feet in a general northerly direction.

The country rock was a felspar-tourmaline rock, containing some veins and patches of coarse pegmatite. There were no walls, and there was no brecciation or faulting.

The minerals found in and near the pipe were: orthoclase, soda plagioclase, quartz, zircon, chlorite, cassiterite, wolfram, fluorite, tourmaline, muscovite, apatite, topaz, pyrite, galena, chalcopyrite, arsenopyrite, blende. It is noteworthy that the amount of quartz present was small. The stone was patchy. The average yield of the stone treated was 5 per cent., but some of the stone taken out contained less than 1/4 per cent. of cassiterite. It was said that all the stone contained some tin.

Besides the pipe there are several smaller workings on the north side of the valley. It was said that the richer the stone was in tourmaline, the more cassiterite did it contain.

Other deposits were mined on the south side of the valley in a country rock of tourmaline aplite. One of these was a band of rock rich in sulphides, and large tourmaline crystals, with cassiterite, with a course partly irregular, and partly along a line going into the hill in a direction S. 25° E. In July, 1915, it had been followed for 180 feet by means of a tunnel about 6 feet wide, and work continued after this. Work had stopped a month or two before August, 1923, when the deposit was last visited. The band of stone above described was bounded on either side by a rock containing felspar, quartz, fluorite, pyrite, tourmaline, blende, and a white micaceous material.

There were other small workings on this side of the valley.

16. Sheet 189 S.E. Plan No. 16318, old No. 3679.

Mr. C. Pearse tells me that many years ago Mr. E. M. Hawes was working Tatlock's lode here, in granite. Mr. J. H. Tatlock was lessee in 1896 and he transferred it to Mr. E. M. Hawes in June, 1906.

It is evidently the same lode as that known as Batu Brankah lode. Mr. Scrivenor visited it in July, 1904, after work had been discontinued for a time. It was evident then that the owners had not provided enough capital for working a lode mine.

The vein had direction N. 80° E. by S. 80° W., and was 4 feet in width. It had distinct walls. The granite on either side contained sometimes 1 per cent. of tin, but sometimes also it was barren. The occurrence of ore in the lode was irregular, but it was said to average 2 per cent. tin dioxide.
WEST SIDE OF THE KINTA VALLEY.

17. Sheet 118 S.E. Lot No. 26000, old No. 3770.
Mr. C. Pearse informs me that more than twenty years ago Mr. G. L. Bailey and Mr. Foo Choo Choon were working stringers in schists. They were shafting through alluvium.

18. Sheet 128 S.E. Plan Nos. 3897 and 3619. Lessees Au Moo Yee and Young Shan Nam.

In September, 1914, the lode had been followed for about 100 yards, and at the north end a shaft had been sunk about 100 feet. The rest of the work was open-cut, three or four feet having been excavated.

The course of the lode was N., 10° E. by S. 10° W., the hade being very steep towards S. 80° E. It was a quartz vein about 1 foot thick, with chloritic rock. The country rock was non-porphyritic granite. Platy calcite was common both in fracture planes of the granite and also in the lode material.

The cassiterite was coarse grained, and "dark brown to cream coloured; it was accompanied by much quartz. A fine-grained pale green mica could be distinguished with a lens, tourmaline was present, and some sulphides. The presence of slickensided chlorite material suggested a fault fissure, but there was no evidence of brecciation on a large scale.

Some prospecting was done on a mineralised mass of hard schists, at its junction with granite, a quarter of a mile from the lode towards the 52nd mile on the Kuala Kangsar road, but pyrite was the only ore-mineral found.

There was shafting in ironstone gossan here. The country rock was granite.

There were lampans in the granite, near the contact.


Lessee, Dr. Rogers, Sub-lessee Mr. Leong Tean.

In September, 1923, the top of the lode in limestone was exposed in an open cast mine. The mine was within a few chains of low granite foot hills, and the lode was still partly covered with granite wash.

Fig. 3.—Selbin. Rough plan of top of lode, as exposed in the open cast.
The lode has strike direction N., 15° E. by S., 15° W. (see fig. 3), and at the surface it seems to be dipping steeply to the east side. The length of the ore body so far seen is 75 feet, but neither end is yet exposed and its total length may be considerably more. The width of the lode seems to be as much as 20 feet in the central part, though, as the lode is still partly covered with granite wash, it is not possible to get an accurate measurement. At the northern end the width is less. The exposed top of the lode slopes at about 1 in 6 from south to north, and a gravel pump is used to lift detrital material from a sump-hole at the lowest part of the open cast, near the northern end of the lode.

The top of the lode is deeply stained with iron, and considerable enrichment has taken place in this zone.

The stone below the iron cap contains a great deal of arsenopyrite, and there is said to be about 10 per cent. of cassiterite. Other minerals detected in the lode are calcite, tremolite, fluorite, scapolite, muscovite, pyrite, and bornite, besides scorodite and limonite in the oxidised zone. Some pieces of ore, showing markedly slickensided surfaces, consist of a light green, massive, compact variety of muscovite which is known to mineralogists as pinite. Under the microscope this pinite is seen to have been formed from tremolite, probably by the heat and pressure generated by faulting movements which occurred after the lode was formed.

During the few months which had elapsed since the discovery of the deposit, practically all mining work had been confined to winning detrital ore, which had been largely derived from the lode by weathering. In September, when the yields were not so rich as they had been, from 100 to 200 pikuls of concentrates were won each day. Owing to the presence of so much arsenopyrite, it is said that the price obtained per pikul was only from $12 to $30 although the price of tin-ore per pikul at the time was about $100. Besides arsenopyrite and cassiterite, the detrital ore contains quartz, tourmaline, zircon, and topaz, all of which were probably supplied by the weathering of the neighbouring granite.

The limestone near the lode is markedly dolomitic, and a few samples were analysed by Mr. Shenton, Chemist, Geological Department, for magnesia, in order to see if the intrusion of the lode, with the formation of large quantities of the magnesium-bearing mineral tremolite, had caused any dedolomitisation of the limestone.

<table>
<thead>
<tr>
<th>Sample of limestone.</th>
<th>Percentage of Magnesia MgO.</th>
</tr>
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<tbody>
<tr>
<td>6 inches from lode</td>
<td>13.6 per cent.</td>
</tr>
<tr>
<td>4 feet</td>
<td>14.78</td>
</tr>
<tr>
<td>8</td>
<td>9.96</td>
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These analyses give no evidence of such a change.

Chow Kai’s Lode.—This was a “pipe” in limestone. Mr. Chong Tek told me that originally there was a big open cast mine, 60 feet deep, in alluvium, and the pipe was discovered on the limestone floor. Work started on it in 1911, and stopped when the shaft had been sunk between 200 feet and 300 feet. The land all around had subsided, causing water and tailings to fill the caves, and so work had to stop although there was abundant ore in sight.

The stone was gray in colour, being very rich in arsenopyrite, and it contained about 5 per cent. of cassiterite. The white arsenic collected from roasting operations was used as an insecticide on a rubber estate, but, owing to unskilful application, twenty acres of rubber trees were killed.

Very rich alluvial ore, giving 2 or 3 pikuls to the cubic yard, was found in caves, which were often met with during the sinking of the shaft.

The output from the mine was between 200 and 300 pikuls a month.

The greatest length of the lode was 70 feet, in a N.E. direction. The greatest width was 40 feet. Mr. Au Moo Yee, the owner of the neighbouring block (10780?), prospected just outside 21924, at a point north of the pipe, but without success.

Mr. Leong Sin Nam informed me that he prospected for lode tin in Mr. Eu Tong Sen’s property (10780) to the east of and just over the boundary of Chow Kai’s land, but also without success.


Changkat Pari pipe, worked by Mr. Foo Choo Choon more than twenty years ago.

It is not possible to get many details of this occurrence. The shaft was sunk 80 feet, according to one informant, and 200 feet according to another. Mr. M. C. Corbett informed me that the lode material was rich in sulphides. Apart from the tin-bearing stone rich in sulphides, there were isolated crystals of pure cassiterite scattered throughout the crystalline limestone away from the pipe. The stone of this pipe was not so rich in tin-ore as was that of Chow Kai’s lode. There was rich detrital ore in caves.

Mr. M. C. Corbett informs me that he has seen most of the limestone floor that lies between Telok Kruin Village and the Changkat Pari pipe, exposed at one time or another in mining operations, and that there are no lodes or pipes in it.


Mr. Lai Weng Hin had a half share in this mine about the year 1916, and he then transferred it to Mr. Leong Sin Nam.
The latter informed me that he sunk a shaft 180 feet on an ore body in the limestone. The body was 30 feet across. The stone was very rich in pyrite and arsenopyrite. Apparently it was not rich in tin, and when water stopped operations Mr. Leong Sin Nam had lost a considerable sum of money.

25. Sheet 138 S.W. In or near portion 11580. I understand that this lode was opened up by Messrs. Osborne and Chappel, but not very much work was done.

The lode consists of a number of thin tin-bearing veinlets traversing porphyritic granite, with direction N.65° E. by S.65° W. The veinlets contain abundant quartz, with chlorite, muscovite, and cassiterite. This occurrence is of the same nature as that on Chendai and Menglembu Lode properties.


Mr. Chong Tek sank a shaft on an ore body in limestone and a battery and a furnace were erected to deal with the ore. The stone was rich in sulphides, but there was little or no tin.

27. Sheet 138 S.E. Lot No. 16686.

This was a "pipe" in limestone at Guntong, near the Tamil Settlement.

Mr. Chong Tek sank a shaft for 80 feet on a body which showed visible tin, and a big heap of stone was collected for crushing. Some Penang miners, Mr. Yeong Wai Khee and others, then bought the mine, and when Mr. Scrivenor visited the place in October, 1914, the shaft was down 192 feet. The ore-body was 20 feet to 30 feet across. A ten-head battery was erected, and then the stone was found to be poor in cassiterite and a considerable sum of money was lost.

![Fig. 4.—Guntong. Section from blue print in Kongsj, 1914.](image-url)

28. Sheet 148 N.W. or sheet 138 S.W., in or near lot No. 22596. Lodes are known to be in this locality, but little is known of them.
29. 138 S.W. and 148 N.W. Lots numbers 5722 and 21674.

Sir John Campbell is the lessee. The ore bodies on these blocks are known as the Telok Kruin pipes, but this name is unsuitable, because there are several other pipes nearer to Telok Kruin village than these.

In August, 1923, work was being done on the middle of the three deposits marked on the map. Two pumps were being used to deal with the water problem. A fissure containing detrital ore was being followed in a direction west from the shaft. A point 100 feet measured laterally and 88 feet measured vertically from the shaft had been reached, and the daily output was about two pikuls a day. The walls of this fissure near the shaft were white coarsely crystalline limestone, with no sign of the banding which is common in the limestone pinnacles exposed on the surface, a short distance away from the ore-bodies. There were no signs of faulting in the walls of the fissure near the shaft. Near the surface the top of the fissure could be seen, with remnants of lode stuff adhering to the hanging wall. The ore consisted of cassiterite, some of which was magnetic, and arsenopyrite, the latter being in less quantity than is common in these deposits in limestone. The detrital ore being won from the fissure in August, 1923, contained, in addition, grains of quartz, zircon, and tourmaline.

Another fissure, from which detrital ore was probably taken some years ago, started in a direction S.E. from the shaft, and it was said that it could be followed for 100 yards.

About two chains north-east from the shaft was a cup in limestone which contained detrital ore and also an ore-body in situ. It was worked to a depth of 100 feet, and the deposit had then thinned to one inch in width, when operations were suspended.

The third occurrence is marked on the map a few chains to the south-west. Sir John Campbell worked to a depth of from 10 to 15 feet on an ore-body in limestone. There was a covering of decomposed iron-stained material at the top, containing some cassiterite and arsenopyrite, and, on sinking a few feet, unweathered stone was reached. It was expected to start work again on this deposit later.

The dip of the limestone near these deposits could not be made out everywhere, but on three sides it was clearly indicated by thin black streaks which represented slight impurities that were deposited in the limestone along the bedding planes, and which were converted to their present form at the time when the limestone was metamorphosed. These streaks often showed contortions into intricate minute folds, but they dipped constantly to the east over a distance of several chains all round the deposits. However, at the shaft of the first-described deposit and over a