

ART. II.—*Report by Lieut. JOHN GLASFURD, Executive Engineer Kumaon division, on the progress made up to the 1st May, 1839, in opening the experimental Copper Mine in Kumaon.*

The ground selected for the experiment is at Pokri in the Pergunnah of Nagpoor in Gurhwal, where mines of Copper have long been worked.

The mines, or rather excavations, are numerous, and are situated on the western side of a steep hill in talcose schist and clay slate. The soil is extremely soft and decayed, and has defied all the efforts of the present race of native miners, according to whose accounts the workings do not extend beyond 120 feet from the entrance in any of the excavations, which are constantly liable to accidents, and of which a new one is generally commenced after every rainy season. It is however universally admitted that the Pokri mines have been very productive, and it is said that the one known by the name of the Rajah Kān, yielded one year upwards of 50,000 rupees. Judging from the ruins of the houses, workshops, &c., and the accumulation of slag, the working must have been carried on, on an extensive scale.

The village of Pokri is situated about 6,100 feet above the level of the sea, and 3,800 above the Alukmenda river, from which it is distant nearly nine miles; the distance from Almora is eighty-six, and from Sreenuggur little more than thirty miles, and to both of these places there are good roads. The climate is good but changeable, owing to the vicinity of the Snowy range; and the temperature is from the same cause as cold as that generally found at elevations from 7,000 to 7,500 feet. The vegetation, as might be expected, is European in its character, and the forests of oak, rhododendron, and the common long-leaved pine are almost inexhaustible in the immediate neighbourhood of the mines. During the greater part of the year there is water sufficient for washing the ores in the immediate vicinity, and at a distance of about two miles, there is enough for the purposes of machinery throughout the year. The village consists of eighteen to twenty-two houses, and from sixty to eighty inhabitants, who are chiefly of the Chowdry and Mining castes. The right of mining was rented by them from Government on a quinquennial lease of 100 rupees per annum, which expired about a year ago; but the people are so poor, and their resources so limited, that they have been unable to undertake any new lease, and indeed before the present experiment was commenced they hardly attempted more than the re-smelting portions of the slag from the old working.

The mining ground lies in two ravines, both on the western face of the hill, and about 500 yards apart, separated by a low ridge, the direction of the ravines being nearly east and west. The most northern of the two, and in which the village is situated, is where the old mine called the Rajah Kān was. The right, or northern side of the ravine is of dolomite, the left being talcose schist, which forms the ridge separating the two. The southern ravine is known by the name of Chumittee, and is full of old excavations; the formation is talc, bounded on the south by a dolomite limestone, and on the north by the low ridge of talcose schist through which in one or two places granite protrudes. Besides these, there are several other localities on the same hill where copper has been extracted; one very promising situation is an old mine known by the name of the Dandu Kān, or hill mine, about four miles from Pokri, and there are also many other places in the Pergunnah of Nagpoor, where copper is known to exist.

The experimental works now in progress were commenced in January last, and consist of two adits, or galleries, one in each ravine; that in the northern, or Rajah Kān ravine, has been driven and secured with timber to a distance of $149\frac{1}{2}$ feet from the entrance; the gallery is six feet high by three feet wide, and the frames, which are oak branches of three and a half to four inches diameter, are placed from two to two and a half feet asunder; the top and side sheeting are also of oak branches, the diameter of which is about two and a half inches. The gallery is being carried in with a slope of one inch per foot nearly on the ruins of an old working, which has been roughly secured with timber, but has long fallen in. The soil is an alluvial deposit filled with masses of rock, chiefly of dolomite, and the water proceeding from the gallery is slightly impregnated with sulphate of copper. When about sixty-three feet from the entrance the superincumbent soil gave way, and fell in on the head of the gallery; this breach has been cleared and converted into a rough shaft, which at present answers for the purpose of ventilation, but as it is directly in the line down which the water runs in the rainy season, it will probably be necessary to close it.

In the Chumittee ravine a gallery has been driven and secured with timber to a distance of 111 feet from the entrance; it is in size and mode of timbering exactly similar to the other, the slope averaging only half an inch per foot. The first seventy-five feet were driven through talc slate, with occasional beds of quartz, in which were small quantities of copper pyrites; the next six feet passed through an old working which apparently went down obliquely, and had been regularly timbered with deal; on reaching this working, traces of copper were found, but were lost on entering it. The next twenty-four feet went

through firm talc slate in which copper ores, in trickling strings, and also disseminated, were found. The ores were of various kinds, but vitreous copper ore predominated. From these twenty-four feet fifty-eight or sixty seers of rich ores, worth about twenty per cent. of copper were obtained, one-half of which reverted to the miners, according to previous agreement, also a quantity of stuff supposed to contain about forty maunds, which would probably produce twelve to fifteen per cent. of copper. The last six feet of the gallery passed through another old working exactly similar to the former, and which also appears to have gone down obliquely. A perpendicular shaft has been commenced 150 feet from the entrance of the gallery, for the purpose of ventilation; it has been sunk to a depth of thirty feet, and it is expected that by the time this shaft has attained the requisite depth, the gallery will have advanced far enough to join it. The dimensions of shaft are 6×3, the frames are of oak, and the sheeting fir; the first three feet were through alluvial deposit, the next ten through talc slate, and the next five through what appears to have been an horizontal adit filled with deal timber and blue talcose mud, ten pounds of which on being washed, left four ounces of ore, worth probably ten per cent. The remaining twelve feet went through alternate talc and dolomite, or rather having talc on the north side and dolomite on the south. The water oozing from the old working has much impeded the shaft, the quantity discharged by wooden buckets averaging daily about 500 gallons.

The supply of iron required for the works is obtained from the mines of that metal in the Khutsaree valley, about forty miles from Pokri, on the road to Almora. In this valley there are large repositories of compact red iron ore in clay slate, containing beds of limestone. The manufacture of iron is carried on here more extensively than at any other place in the province, and the metal produced is considered superior to any other here manufactured. There is no want of iron ore in the district, and it exists in many places nearer to the Pokri mine than Khutsaree. At Dewalpurh, half way between Pokri and Sreenuggur, good iron is worked, and about two miles south of the village of Pokri there is an old deserted mine, the specimens from which are specular iron ore, which might probably be worked with advantage.

The present race of native miners have been at Pokri for three generations, and have no recollection or tradition of fir timber having been used in the mines; and until it was found on the old workings, they strongly protested against the use of it. The timber found in the Chumittee gallery appears to have been put together with considerable

care, and where firmly bedded in the mud is perfectly sound, but where at all exposed it is much decayed.

The natives of the place are well satisfied with the experiment as far as it has gone, and the applications for employment are more than required; they are also very willing to adopt any improvement on their own rude system, and readily falling into and becoming expert in the use of the tools, &c. The work in the galleries has been performed partly by contract and partly by hired labour; in the former mode the rate paid is about one rupee per foot with half the ores found, and in the latter two annas per day. In the Chumittee gallery the people prefer contracting, in the hope of obtaining profit from the ores found; whereas in the Rajah Kān gallery, as no copper can be expected while passing through the alluvial deposit, they are not at present willing to contract.

The result of the experiment so far may be considered satisfactory, and it is quite certain that copper in considerable abundance has existed in the ground through which we are now passing in the Chumittee ravine, assuming that this ground has been more or less disturbed to a depth of 120 feet—the greatest the native miners say has ever been attained by them, although I question if ever they got so far. We may reasonably hope that by the time the gallery has reached to a distance of about 280 feet we will enter upon ground hitherto untouched, and until this is reached no fair criterion of its capabilities can be formed. I do not expect to make much progress during the rains, owing to the very loose nature of the soil; wherever we have passed through old workings considerable delay has been experienced from the constant falling in of the soil.

(True Copy,)

H. T. PRINSEP,

4th July, 1839.

Secy. to the Govt. of India.

ART. III.—*Account of a Journey from Sumbulpūr to Mednipūr, through the Forests of Orissa.* By LIEUT. M. KITTOE.

(Continued from page 383.)

I resumed my march towards Mednipūr at 3 A. M. the following day, and reached Deogurh, the capital of the Baumurra district, at 8 o'clock; on leaving, it was too dark to see any distance, this was of no consequence, as there were high hills close on either side. I had to descend a slight ghát, at the foot of which I crossed the Burghat torrent; were the dawk road to pass this way it would be necessary to have a suspension bridge over it, likewise on most of these hill torrents. For the first