Sheet Anchor.

Various tests have been made on ton parcels from the mine, which is situated at Omahu. The reef lies nearly flat, is from 3 ft. to 9 ft. wide, and carries the best values along the foot-wall. The ore is brown quartz showing crystals and dark bands of silver-sulphide and some free gold, while occasionally a few filaments of native silver may be detected in the stone. Some of the quartz is of a glassy nature, and carries higher values, especially in silver, than the accompanying rubble. There is also a little iron-pyrites in the ore, but no great quantity. The following assays indicate the relative values in corresponding samples of the glassy quartz and rubble: Glassy quartz—Gold, 12 oz. 12 dwt. 1 gr. per ton; silver, 17 oz. 4 dwt. 3 gr. per ton: value, £62 2s. 2d. per ton. Rubble—Gold, 5 oz. 10 dwt. 22 gr. per ton; silver, 46 oz. 12 dwt. 15 gr. per ton: value, £26 16s. 11d. per ton.

By hot pan-amalgamation with chemicals 96 per cent. of the gold, 70 per cent. of the silver, and 92 per cent. of the value can readily be obtained by careful treatment. If after amalgamation the ore is concentrated to a quarter of its original weight, the sand tailings thus obtained assay nearly £5 per ton, showing a loss of £1 5s. per ton on ore originally worth £50 per ton, and equivalent to 2½ per cent. of the original value still left in the tailings. The remaining 3½ per cent. of the value is in the very fine slimes which float away very readily in water.

Cyanide treatment of these tailings is fairly successful, as 75 to 80 per cent. of the gold and silver can be extracted from them at small cost.

Chelmsford.

Parcel 1, consisting of splintery quartz, with red streaks of iron-oxides, was dried, dry-crushed, sampled, and assayed. The assay result was—Gold, 3 oz. 3 dwt. per ton; silver, 7 oz. 6 dwt. 5 gr. per ton: value, £13 6s. 7d. per ton. 500 lb. of the dry-crushed ore was pan-amalgamated, and yielded 1 oz. 11 dwt. 6 gr. of melted bullion, worth £1 12s. per ounce, which is equivalent to a saving of £11 4s. per ton, and shows a percentage saving of 85 per cent. of the gold, 57 per cent. of the silver, and 84 per cent. of the value of the ore. 1,400 lb. of the same ore was subjected to cyanide treatment, and 92 per cent. of the gold, 81 per cent. of the silver, and 91 per cent. of the value of the ore, equal to a saving of £12 3s. 8d. per ton, was extracted. The presence of a considerable amount of iron-oxide made the percolation somewhat troublesome; but on a working-scale, with suitable alterations in the method of treatment, a still higher extraction would be possible by the cyanide process.

The second parcel also consisted of splintery quartz, with seams of red oxide of iron. It was dried, sampled, and assayed, with the following result: Gold, 1 oz. 7 dwt. 17 gr.; silver, 2 oz. 0 dwt. 8 gr.: value, £5 14s. 10d. per ton. 560 lb. of the dry-crushed ore was pan-amalgamated, for a return of 14½ dwt. of melted bullion, worth £1 14s. 8d. per ounce, which is equivalent to a saving of 87 per cent. of the gold, 81 per cent. of the silver, and 87 per cent. of the value. 1,540 lb. of this ore was tested by the cyanide process, when 93 per cent. of the gold, 87 per cent. of the silver, and 93 per cent. of the value was extracted, equivalent to a saving of £5 7s. 8d. per ton.

The consumption of cyanide for both parcels was small, and the cost of cyanide treatment for these ores would be low. The gold occurred in a state of fine division, and was readily taken up by weak cyanide solution. A certain amount of slimes forms when these ores are crushed owing to the presence of oxide of iron, and the slimes carry a little value.

The method that would probably be found to answer for treating similar ore to these parcels would be to wet-crush, amalgamate part of the gold on copper plates, treat the sands direct by cyanide, and agitate the slimes with cyanide solution for the recovery of the appreciable values which would otherwise escape. The ore is easily crushed by stamps, and affords few difficulties in treatment.

SYLLABUS OF INSTRUCTION.

The following is the syllabus of instruction followed during the year:—

General and Mining Geology.—(Lecturer, the Director, Mr. F. B. Allen, M.A., B.Sc.)

Physical Geology.—The earth as a planet, its form and motions; geological climate; the atmosphere; ocean; solid crust; the interior of the earth.

Dynamical Geology.—Metamorphism; agencies modifying the crust of the earth—atmospheric, aqueous, chemical; weathering; sedimentation; classification of deposits—mechanical, aqueous, organic, and chemical; denudation and erosion.

Structural Geology.—Stratification; jointage; contortion; faults; conformity; unconformity; dip and strike; cleavage; metamorphic rocks; intrusive sheets, bosses, dykes, fissures; formation of quartz veins, lodes, and metallic deposits; dynamics of lodes; recovery of lost lodes.

Geological Surveying.—The practice of running natural sections; noting dip, strike, and inclination of strata and lodes; mapping geological formations; collection of mineral and rock specimens.

Stratigraphical Geology.—Classification of plants and animals; fossils; blending of species; geological record; the study of characteristic life, and distribution of formations from archæan to recent times, with special reference to the geology of New Zealand.

Mineralogy and Blowpipe Determination.—(Lecturer and Instructor, the Director.)

Systematic Mineralogy.—(1.) Physical properties of minerals, their hardness, S.G., &c. (2.) Optical properties: Refraction, reflection, polarisation, lustre, phosphorescence. (3.) Chemical properties. (4.) The application of the blowpipe, colour-tests, &c. (5.) Isomorphism, pseudomorphism, and allotropy. (6.) Distribution and paragenesis of minerals. (7.) Classification of minerals—chemical, economic.