

phenomena attendant on the occurrence of cinnabar will lead us further afield. The portion of the district carrying copper ores is a small one, lying immediately east of Copper creek and forming Lookout Point, 850 feet above the lake. The extent of it is about 1 square mile. Copper is known outside of this, but no deposits of note have been found. The formation is of Tertiary age, and originally consisted of stratified tuffs and arkose, the greater part of which belongs to the Tranquille beds. These are intersected by dykes and sheets of basalt and porphyry. The tuffs have been so contorted that their dips and strikes vary every few feet. Through them a dyke of augite porphyry has been thrust. Its direction is nearly north, its dip almost vertical and to the east. It throws out some smaller dykes running nearly at right angles. Its thickness will average 800 feet. This dyke, as well as the beds of ash, is intersected by a sheet of basalt, dipping 45 degrees east and throwing out numerous vertical or nearly vertical dykes. This basalt is the ore-bearer of the camp. The ore-bodies of importance, so far as known, are all actually upon or close to the contact of the basalt and porphyry. The basalt itself carries some copper at almost every point. Both of these rocks carry the metal at the contact, distinct veins of quartz in them being of very secondary importance. The porphyry is traversed by numerous such small veins, usually carrying grey copper.

The principal work has been done on the El Progreso and Tenderfoot claims. In both these areas, ore is

being followed which lies along the contact of the basalt and porphyry. That in the porphyry is bornite, while much of that in the basalt is copper pyrites. One of the principal paystreaks is a narrow dike of basalt which has been shattered and re-cemented with veinlets of lime. The El Progreso carries a good proportion of gold, while 4 tons shipped from a 6 inches vein of dolomite in the Tenderfoot claim yielded copper 21.97 per cent and some gold and silver. In the El Ultimo, a dike carries bornite where it is traversed by quartz veins. In the Caledonia a decomposed dike holds some native copper. The composition of this is probably peridotite, but it is so rotten that this is not easily ascertained. In the gulch below, much native copper occurs from the denudation of this. No doubt this is where the Indians obtained their copper, on account of which they called the stream hard by Copper creek. The dike does not seem to contain any appreciable quantity of the metal now.

Near this, on the Last Chance, is a quartz vein containing molybdenite associated with copper pyrites. The copper of this area is no doubt derived from the underlying nicola rocks as they are traversed by numerous small veins of copper pyrites of high grade, the metal in which was gathered up by the heated waters attending the intrusion of the basalt and porphyry, deposited in the fissures opened in them during the period of their cooling. It is very likely that the granite eastward of the creek had partially concentrated the copper previous to the intrusion of these volcanic rocks. There is reason to suppose that this granite belongs to the end of the nicola period. This would explain why the metal is only found in appreciable quantities over such a limited area. Nearly all the later Tertiary dikes in this area contain some copper.

Copper occurs west of Mamit lake in black basaltic rock at its contact with porphyry. Shipments have