

Without attempting an authoritative statement as to the source of the gold, the writer believes it to be derived from quartz veins in the granite and schists just below the projecting headland east of Shandon. The facts on which this conclusion is based are (1) the occurrence and distribution of the gold in the granitic sand over a limited area west of the escarpment; (2) the coarse, unworn character of the gold, which, taken in connection with its distribution, indicates that it has not been transported far; (3) the occurrence of veins of quartz in the granite where exposed in that vicinity. Several well-marked veins were observed here running nearly north and south. It is not known that these carry gold. However, there may be others that do, or it is not improbable that the ore shoot may have been entirely carried away by erosion. The fact that no gold is found in the sand near the veins may indicate that it came from above the present surface.

Sierra County produced 1,111 fine ounces of placer gold in 1904 and 2,316 fine ounces in 1905. Most of this came from the Pittsburg camp. Since then the production has declined to nominal amounts, operations at the Shandon mines being suspended.

CABALLOS DISTRICT.^a

GEOGRAPHY.

The following notes describe the deposits at the north end of the Caballos Range.

The Caballos Mountains trend about north and south on the east side of the Rio Grande. The length of the range is 30 miles, and it attains a maximum elevation of 10,000 feet at Timber Hill, which lies south of the copper and lead deposits described below. The range consists mainly of a monocline bounded on the west by a great north-south fault scarp overlooking the Rio Grande. Where visited at the copper and lead mines in the vicinity of Palomas Gap the average elevation of the crest is about 6,500 feet; the average width of the mountains is 4 to 6 miles, including a foothill belt several miles wide on the east.

GEOLOGY

The most prominent feature of the mountains is a great limestone and quartzite series, 1,200 to 1,400 feet in thickness. It consists chiefly of heavy-bedded, massive, gray or blue limestone, with some intercalated shale, and has at its base about 100 feet of hard quartzite. Much of the limestone is semicrystalline and some of it contains black flinty or cherty nodules or inclusions. Part of it is greatly crushed and recemented by calcite veins. The amount of shale in the series is small.

The quartzite at the base of the limestone series ranges from 50 to perhaps 200 feet in thickness; it is massive or heavy bedded and consists of black and red beds resting upon the granite. Its age is probably Cambrian. The granite is a medium-grained reddish or brownish rock, which from the uniformity of its contact with the overlying quartzite seems to be basal and older than the quartzite. In some places the two rocks appear to be perfectly welded, but this is probably due to subaerial disintegration preceding the deposition of the marine sediments.

Besides the reddish granite there is also present a medium or somewhat finer grained dark igneous rock which probably is an intrusive diorite.

South of the Marion mine, at the Lone Tree prospect, the granite and quartzite are cut by a pale brownish-gray porphyritic dike or intrusive rock.

ORE DEPOSITS.^b

Occurrence.—The Caballos Range is crosscut by a system of steeply southward-dipping east-west fault fissures, some of which are filled with gangue and ore deposits. The pre-Cretaceous rocks are all more or less jointed, the granite by far the most, and the quartzite and limestone series is also gently folded or warped and in some places, particularly north of Palomas

^a By F. C. Schrader.

^b The ore deposits of this range have been briefly described by C. R. Keyes (Eng. and Min. Jour., vol. 80, 1905, pp. 149-151).

Gap, where the range is deeply cut by a tributary to the Rio Grande, it is on edge or overturned. The copper deposits are located mainly along the steep westward-facing slope of the range, 2 to 3 miles southeast of Palomas. Prospects are, however, also found north of Palomas Gap.

The copper ore seen at the Marion and Oohoo mines and the Lone Tree and other prospects occurs in steeply dipping east-west fissures as bornite, chalcopyrite, red copper oxide, malachite, azurite, and glance, all more or less mixed. The gangue is chiefly quartz, and the prevailing geologic horizon of the copper is in the quartzite just above the granite and quartzite contact; in places it reaches farther up into the quartzite or even into the limestone. The lead occurs as galena in a calcite and barite gangue in the overlying Carboniferous limestone, and is contained in veins similar in strike to those of the copper deposits. The ores are poor in gold and silver.

Copper deposits.—Several copper prospects have been developed in this district by the Victorio Chief Copper Mining and Smelting Company, the principal workings being at the Marion and the Oohoo mines. The Marion tunnel is situated about 3 miles south-southeast of Palomas at an elevation of about 5,000 feet, in the basal Cambrian quartzite of the range. It follows a fissure trending east and west and dipping 80° S. The hanging wall is fairly good, but the foot wall is poorly developed. The length of the tunnel in 1906 was about 600 feet. Bodies of copper ore, partly oxidized, partly also of chalcopyrite, have been found in the hanging and the foot walls of the fissure, associated with quartz, as well as with gritty and clayey gangue. The face of the tunnel is in quartzite.

The Lone Tree prospect is situated at approximately the same elevation.

The Oohoo incline is about a mile north of the Marion, at an elevation of 5,300 feet. It is contained in limestone which dips 25° E. The incline is now inaccessible, but is reported to be about 400 feet in length, following the dip of the limestone. The deposit seems to be connected with an east-west fissure like the Marion, but the walls are not regular. The limestone near the tunnel is hard and silicified. The Oohoo is reported to have produced a considerable amount of oxidized copper ore, some of which remains in sacks at the mine. The copper ore from this locality is said to contain \$3 or \$4 to the ton in gold and silver.

Lead deposits.—In the Carboniferous limestone of the Caballos Range lead prospects have been found at several places. At the Engle lead camp, 18 miles southwest of Engle station, on the Santa Fe Railway, the Southwestern Lead and Coal Company is engaged in development work on a series of veins in upper Carboniferous limestone. The veins, which are nearly vertical, carry rather small amounts of galena in a gangue of quartz and barite and extend about parallel with the dip of the beds, which is 15° N. 72° E. At the mouth of the tunnel the vein is about 7 feet wide. Exposures of the overlying Carboniferous "Red Beds" occur less than half a mile to the east. The development work consists of a tunnel, which in 1906 was 450 feet in length, and two shafts 80 and 120 feet in depth. Some picked ore has been shipped. About 5 miles north of the lead camp the same company is sinking a shaft on a small coal seam in the hope of finding a sufficient supply of this fuel to operate the power plant designed to generate electric power for use at the lead mine. The coal occurs in two seams 6 inches in thickness, separated by a 4-inch layer of shale and overlain by several feet of shale in which another seam of coal 2 or 3 inches thick appears. These beds occur in the Cretaceous sandstones, which dip to the northeast at a high angle (45°) and are cut at short intervals by basic dikes. A shaft sunk on the seam had reached a depth of 75 feet without showing any essential change in the thickness of the vein. Work was much impeded by water in the mine.

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coal

(Engle Field)

LUNA COUNTY.

By C. H. GORDON and WALDEMAR LINDGREN.

GENERAL FEATURES.

Luna County, which was organized in 1901, contains 2,946 square miles. It is bounded on the west by Grant County, on the north by Grant and Sierra counties, and on the east by Dona Ana County. Mexico adjoins it on the south. (See fig. 28.)