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GEOLOGY

OF THE

QUICKSILVER DEPOSITS

OF THE

PACIFIC SLOPE

WITH AN ATLAS

BY

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CHAPTER VIII.

DESCRIPTIVE GEOLOGY OF THE KNOXVILLE DISTRICT.

[Atlas Sheet V.]

General character.—This district includes the point at which Napa, Lake, and Yolo Counties meet. It presents the usual characteristics of the Coast Ranges: low, rocky ridges, partially covered by brush and a scanty growth of trees and divided by narrow valleys. Though some pleasing views are to be had from the higher points, the region is not a picturesque one. It possesses great geological interest, however, for it affords an admirable opportunity for the determination of the age of the metamorphic series and for a study of the processes of metamorphism. It also contains a series of quicksilver deposits which show instructive features and which bear significant relations to the metamorphic rocks and to basalt.

The Knoxville series.—The area embraced in the detailed map contains fossils at a number of points, and study of the district shows that all of the sedimentary beds are probably of the same age, belonging to one division, the lower, of the Shasta group of Messrs. Gabb and Whitney. As has been explained in Chapter V, it is advisable to consider this series as wholly distinct from the Shasta beds on Cottonwood Creek, in Shasta County. It is characteristically developed in the Knoxville district, where also it is the only series exposed, and Dr. White and I have therefore christened it the Knoxville group. The Knoxville beds form a very large part of the Coast Ranges and of the auriferous slates of the Sierra Nevada.

A considerable portion of the rocks in this district are nearly or quite unaltered and consist of predominant sandstones interbedded with shales

ore forms a belt or seam, and a considerable quantity of it might be obtained were the material in sufficient demand.

Redingtonite.—On the 150-foot level of the Redington, at a point where solfataric gases still issue, a hydrous chromium sulphate occurs in fissures in silicified serpentine. This substance is doubtless the result of the action of the gases upon chromic iron. Qualitative analysis showed that it is a hydrous sulphate of chromium, containing some aluminium and iron probably replacing chromium. The mineral is a finely fibrous mass, and sometimes the fibers are only just distinguishable under the microscope. The color is pale purple. The aggregates of parallel fibers sometimes appear white, excepting on the surface perpendicular to the fibers. Under the microscope the mineral is colorless, the fibers are extremely fine, and no crystal form is visible. The fibers possess double refraction and never extinguish parallel to the nicol planes. The angles of extinction vary between 13° and 38°. The crystals are therefore probably triclinic. It seems appropriate to give the name redingtonite to this hitherto unknown mineral.

When this mineral is heated it turns green without losing all its water, and coatings of this green sulphate occur upon the redingtonite. Under the microscope this green sulphate is found to be composed of rhombic tables with angles of 78° and 102°. The cleavage parallel to the base is excellent, and it also possesses good cleavages parallel to the prism faces and to the macropinacoid. It is somewhat pleochroitic, and the color is most intense when the short diagonal is parallel to the principal nicol plane. The refraction and the double refraction are of medium strength. The mineral seems to be isomorphous with copiapite. The tables are too small to show the emergence of the optical axes; but tests with the mica foil show that of the two axes of elasticity lying in the basal plane the one parallel to the brachyaxis is the larger. This agrees with copiapite, which is negative. The detection of these minerals is due to Mr. Lindgren.

Silicification.—There are two distinct periods of silicification traceable at Knoxville. One of these is represented by a fine net-work of quartzose veins intersecting a great proportion of the metamorphosed rocks. Silicified shales or phthanites are particularly prominent in this respect; but altered