NOTES AND NEWS

MINERALS OF THE EASTERN SANTA MONICA MOUNTAINS, LOS ANGELES CITY

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Mineral occurrences in the eastern Santa Monica Mountains are for the most part unrecorded. Some of these occurrences are of interest, and attention will be brought to them here. The more interesting localities are marked on the map (Fig. 1). The map shows that part of the Santa Monica Mountains north of Los Angeles from the University of California to the Los Angeles River on the east end of the mountains. The geology of the region has been described by Hoots (1931). The writer has a detailed investigation of this area in progress.

Zeolites. Zeolites and related minerals are common in the basalts of the Middle Miocene section, and have 3 types of occurrence. Amygdules, wholly or partly filled, comprise the most common type. Veins occur in a few localities. Zeolites and associated minerals occur interstitial to and replacing peripheral portions of the pillows in the pillow basalt exposed in Cahuenga Pass.

Most of the amygdaloidal basalts are intrusive; amygdules are irregularly distributed within any one intrusive with no evident relation to the shape of the intrusive. All of the vesicular basalts in this area contain amygdaloidal fillings.

The three modes of occurrence show some differences in mineralogy. Amygdules contain mostly natrolite with later analcite. Pyrite, pectolite, and griffithite occur, but are rare. Griffithite was first described from the basalts at the south end of Cahuenga Pass (Larsen and Steiger, 1917) (locality 1). This chlorite mineral also occurs in the Pacific Electric quarries in Brush Canyon (locality 2). Large, weathered, allotriomorphic amygdaloidal fillings of leonhardite, a variety of laumontite, occur at the south end of Caheunga Pass (locality 3) and along Mulholland Drive just west of Cahuenga Pass (locality 4).

Groups of radial natrolite crystals completely fill vesicles in a sill at the head of Brush Canyon (locality 5). The core of each radial natrolite group is colored a uniform pink. The contact between the pink and the outer white natrolite is sharp. There is a considerable disparity in grain size between the two colored varieities of natrolite, the pink variety being much finer grained. The color fades to disappearance after exposure for a few weeks. The color is suggestive of one of the oxidation states of

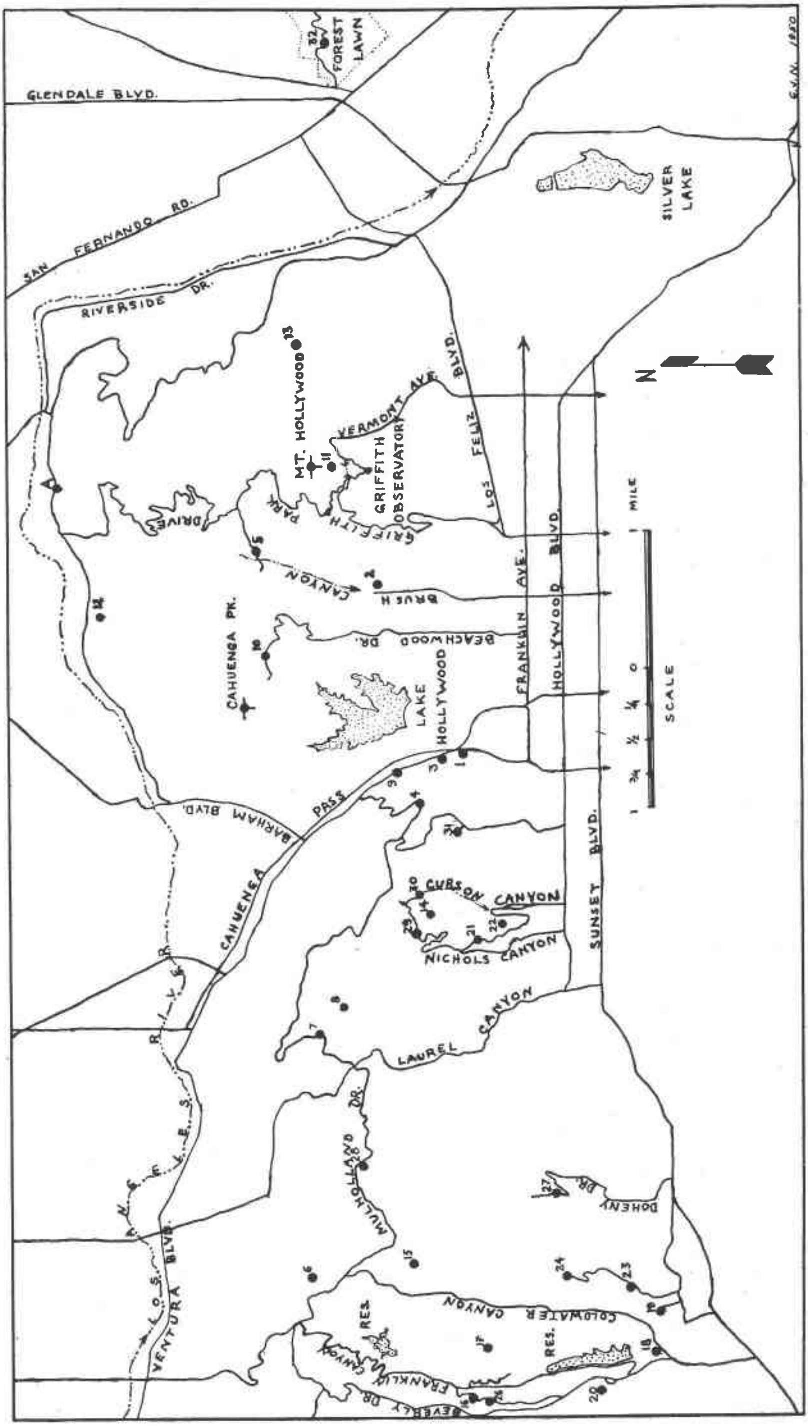

FIG. 1. Index map showing mineral localities of the Eastern Santa Monica Mountains.

manganese. In some places films of manganese oxides cover fracture surfaces in the basalt.

Incompletely filled amygdules in a pillow basalt at the head of Coldwater Canyon (locality 6) contain sheaf-like aggregates of tabular stilbite (?) crystals. Some of the amygdules are much larger and contain, in place of stilbite(?), cotton-like aggregates of a very fine fibrous white unidentified zeolite.

Veins with zeolites were found in only three localities, the Pacific Electric quaries in Brush Canyon (locality 2), the south end of Cahuenga Pass (locality 3), and on Mulholland Drive just east of Laurel Canyon (locality 7). The veins in Brush Canyon are thin, discontinuous, and vuggy. Prehnite occurs as deep sea-green, reniform crusts and as white fibrous aggregates pseudomorphous after tabular barite(?); the pseudomorphous crystals are perched on the reniform prehnite. One side of a large vuggy vein is exposed on a quarry wall. In this vein the most common mineral is trapezohedral analcite with natrolite and a minor amount of apophyllite perched on the analcite. Veins of pure apophyllite and natrolite also occur. The apophyllite crystals in these veins are tabular, pseudohexagonal, and up to about the size of a silver dollar. A single irregular veinlet of platy thomsonite was found at locality 2.

The veins at the south end of Cahuenga Pass contain calcite scalenohedrons and green prehnite. They occur in the basalt containing the leonhardite amygdules.

Rosettes of aragonite occur on fracture surfaces and in veins in an amygdaloidal basalt agglomerate just west of Laurel Canyon (locality 7). Associated minerals are natrolite, analcite, calcite, and several unidentified zeolites. Near here, amygdules of natrolite the size of a hen's egg occur in a basalt flow (locality 8).

In the pillow basalt of Cahuenga Pass (locality 9), pink heulandite occurs as selvages on the pillows. Veins and stringers of opaline and chalcedonic quartz occur in the interstices of the nested pillows and as replacements of basalt along the peripheries of the pillows and on either side of veinlets within the pillows. Crystal cavities with shapes suggestive of calcite rhombohedrons occur in many of these veins and are partly filled with clusters of capillary crystals of ptilolite and/or mordenite. Calcite, natrolite, pyrite, hematite pseudomorphs after pyrite, and an unidentified dull brownish black tabular mineral were found in the central parts of some of these quartz veins.

Zeolites are abundant in the many exposures of basalt on the northern side of the mountains west of Cahuenga Pass. This area of basalt exposure has not been investigated by the writer and many localities have probably been overlooked.

SULFATES. A sandy conglomerate just east of Cahuenga Peak (locality 10) contains a minor proportion of altered pyritiferous diabase boulders. These boulders are in various stages of alteration and contain pyrite, halotrichite, melanterite, jarosite(?), adularia, gypsum, and calcite.

The fresh diabase is a fine-grained bluish black rock. The altered boulders consist of a soft clay-like material in the center surrounded by hard shells of light yellow and red-brown, altered diabase. The clay-like center is of two types, a soft, yellow waxy material containing mostly gypsum and calcite and a dark bluish gray material containing the greater quantity of sulfates.

Pyrite occurs in the fresh material and in the dark blue-gray clayey material as small shiny grains. Halotrichite is limited to the bluish material, and fills abundant veinlets, $\frac{1}{8}$ to $\frac{1}{4}$ inch wide, in which the fibers are perpendicular to the walls. A small amount of halotrichite has been redeposited by ground waters in the form of loose, "corroded" crystals on the surfaces of diabase boulders. Melanterite is found as small clusters of colorless and light greenish crystals in cavities in the yellow waxy material and on the weathered surfaces of the boulders containing the bluish material. Jarosite(?) occurs as minute dust-like, orange-colored grains on fracture surfaces in both the yellow and bluish clay material.

OTHER MINERALS. Massive and drusy veins of calcite are common in the region. East of Cahuenga Pass, massive veins of coarse colorless calcite are found in all rock types. A vein just south of Mt. Hollywood yields fluorescent specimens (locality 11). Calcite from the veins along the Los Angeles River (locality 12) was mined by the early Spanish settlers who had a lime kiln nearby (locality A). Similar veins are found near the east end of the mountains (locality 13).

West of Cahuenga Pass, calcite veins are mostly confined to shear zones in quartz diorite. These veins are vuggy with flat rhombohedral calcite crystals having an iridescent coating of limonite. These crystals make quite showy specimens. They are found at the head of Nichols Canyon (locality 14), at the head of Coldwater Canyon (locality 15) and in Franklin Canyon (localities 16 and 17).

Abundant crystals of chiastolite occur in intensively sheared spotted slates and in some unsheared spotted slates at the mouth of Coldwater Canyon (localities 18 and 19). The crystals show no preferred orientation and were formed after the shearing. They are largely pseudomorphs composed of fine fibrous aggregates of muscovite.

Cubes of fluorite, averaging half an inch on a side, occur with calcite and milky quartz in cavities in a fault breccia on the west side of Higgins Canyon (locality 20). The fluorite cubes are partly replaced by calcite and have a thin crust of fine calcite crystals.

A single large platy crystal of molybdenite was found with pyrite in a quartz vein in the chiastolite spotted slates at the mouth of Coldwater Canyon (locality 18).

Thin acicular crystals of black tourmaline occur in small patches of fine-grained chlorite in quartz veins along shear zones in quartz diorite on the east side of Nichols Canyon (locality 21). Farther south on the same side of Nichols Canyon (locality 22), similar crystals occur in a quartz-feldspar-muscovite pegmatite vein in quartz diorite. Similar pegmatitic veins of black tourmaline, quartz, and feldspar occur in phyllite on the east side of Coldwater Canyon (localities 23 and 24), and at the head of Peavine Canyon (locality 25). Dravite occurs in a quartz vein in phyllite on the west side of Franklin Canyon (locality 26).

A bed of calc-silicate hornfels, consisting of wollastonite, diopside, and garnet also occurs at locality 26.

Small, white, dense, very fine-grained veinlets of zoisite occur in albitized malchite intrusions and in albitized quartz diorite in Doheny Canyon (locality 27), along Mulholland Drive (locality 28), in Nichols (locality 29), Curson (locality 30), and Outlook (locality 31) Canyons, and in Forest Lawn just east of Griffith Park (locality 32). These veinlets would appear to have originated as a consequence of the albitization of the malchite and surrounding quartz diorite.

Localities 2, 10, 16 and 18 are listed by Murdoch and Webb (1948).

References

Hoots, Harold W. (1931), Geology of the eastern part of the Santa Monica Mountains, Los Angeles County, California: *U. S. Geol. Surv., Prof. Paper*, **165-C.**

Larsen, Esper S., and Steiger, G. (1917), Mineralogic notes: *Jour Wash. Acad. Sci.*, **7,** 11.

Murdoch, Joseph, and Webb, Robert W. (1948), Minerals of California: *Calif. Div. of Mines, Bull.* **136.**

A NOTE ON THE FLUORESCENCE OF WYOMING BENTONITE

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A recent paper[1] describes a method which differentiates swelling clays of the montmorillonite group from kaolinite, illite, attapulgite and halloysite, and, futhermore, provides an estimate of certain physical proper-

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[1] Brown, B. W., A fluorescence study of Wyoming bentonite: *Am. Mineral.*, **34**, 98, (1949).