NOTES AND NEWS

NOTES ON SOME MINERALS FROM SOUTHERN CALIFORNIA. II*

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INTRODUCTION

In this paper have been grouped a number of brief descriptions of new mineral localities in southern California, and observations on some localities previously described. It is the intention of the writers to publish similar assembled data from time to time, in the hope that in this way the information may be made more readily available than if issued as separate items.

INYOITE CRYSTALS FROM DEATH VALLEY

Fresh inyoite crystals in a cavity with the usual meyerhofferite pseudomorphs were recently collected from the classic locality originally described by Schaller[1] from Mt. Blanco, Death Valley, Inyo County, California. The specimen contained three transparent crystals, the largest of which was one-half cm. in its greatest dimension. Measurements on the two-circle goniometer gave specific determinations of crystal forms which were unobtainable at the time Schaller published his paper. These are apparently the first inyoite crystals found at this locality on which accurate measurements could be made. The writers wish to thank Mr. and Mrs. V. D. Myers of Santa Monica who collected the material, for giving the crystals for study.

In Table 1 are given the measured and calculated values for the forms present.

TABLE 1

Letter	*Symbol*	*Measured*		*Calculated*	
		ϕ	ρ	ϕ	ρ
m	110	51°13′	90°00′		
		51°90′	90°00′		
	Average	51°11′	90°00′	51°06′	90°00′
p	111	62°06′	56°01′		
		61°58′	56°01′		
		62°01′	56°08′		
	Average	62°03′	56°03′	62°00′	55°57½′

* Notes on some minerals from southern California: *Am. Mineral.*, **23**, 349–355 (1938).

[1] Schaller, Waldemar T., Inyoite and meyerhofferite, two new calcium borates: *Mineralogic Notes* (3) *U. S. Geol. Surv., Bull.* **610**, 35–55 (1916).

Table 1 (*continued*)

Letter	*Symbol*	*Measured*		*Calculated*	
y	$\bar{1}11$	31°22′	39°00′	30°53½′	39°00′
c	001	90°00′	24°09′		
		90°00′	24°03′		
		90°00′	24°12′		
	Average	90°00′	24°08′	90°00′	24°01′
b	010	−0°02′	90°00′	0°00′	90°00′

The crystallography of inyoite has been accurately determined by Poitevin[2] on crystals of translucent inyoite in crevices in massive gypsum from the Whitehead Quarry, Hillsboro, New Brunswick. The crystals from this locality were more complex, showing 12 forms compared to the 5 forms on those from Death Valley.

Celestite and Barite Nodules from Avawatz Mountains, San Bernardino County

Irregular concretionary masses of celestite with some barite included, occurring in gypsiferous clay shales, are found in manganese deposits at the west end of the Avawatz mountains, San Bernardino County, California, at Owl Hole Spring, T. 27 S., R. 3 E., Avawatz Quadrangle. The nodules have a distinct cauliflower appearance. The celestite, which composes the major part of the nodules, is massive, snow white and sugary. It is stained slightly in spots with a small amount of limonite, but large areas of pure celestite are common. Sectioning of the concretionary masses shows no megascopic structure internally.

The manganese deposit with which these nodules are associated was described briefly by Mann,[3] who outlined the general stratigraphic setting as a sedimentary sequence of Jurassic (?) lake beds, limestones, gypsum, and shale, approximately 1000 feet thick. In the sedimentary section pyrolusite is found. The shales of the lake beds contain the concretionary masses of celestite. The mode of origin and source of the strontium is unknown, but it may have been concentrated by circulating ground water from the gypsiferous shales. The nodular masses are apparently similar to those of strontianite and calcite found in an area to the south which has been described by Knopf,[4] where, however, celestite

[2] Poitevin, Eugene, and Ellsworth, H. F., Inyoite from New Brunswick: *Canada Geol. Surv., Bull.* **32,** 1–8 (1921).

[3] Mann, R. L., Owl Head manganese deposit, San Bernardino County, California: *Mining World,* **44,** 743–744 (1916).

[4] Knopf, A., Strontianite deposits near Barstow, California: *U. S. Geol. Surv., Bull.* **660,** I, 263 (1918).

is found only as microscopic constituents of recrystallized limestone and small glassy crystalline aggregates.

Calcite Nodules from Mojave Water Camp, San Bernardino County

About one-half mile north of Mojave water camp, on the Barstow-Needles highway, is a deposit of bentonite probably in the Manix beds of Pleistocene age.[5] In this bentonite, is an abundance of nearly spherical concretions ranging in size from an inch up to three or four inches in diameter. On being broken open, these are seen to be made up of calcite, in radial crystalline grains, and showing concentric "growth rings." They are usually solid, but occasionally the center shows a small vug, lined with calcite crystals.

Sand Calcite Crystals, Red Rock Canyon, Kern County

Calcite crystals with inclusions of sand grains up to 65% of their volume, and known as "sand calcite," have long been known, originally from Fontainebleau,[6] and in this country from Rattlesnake Butte,[7] near Interior, South Dakota. Similar examples were found in Monterey County, California, in the Cholame Hills, and were described by Rogers and Reed.[8] These showed only the negative rhombohedron $(02\bar{2}1)$, sometimes as four-fold cyclic twins, and averaged 65% sand content.

Sand calcite crystals have also been found in Red Rock Canyon, California, just north of Ricardo. They occur here in a rather incoherent sandy layer interbedded with the series of pyroclastics of the region. The crystals vary from one-quarter to one-half inch in size up to short stout prisms as much as one inch across. Some are separate individuals, but usually they occur in clusters or irregular aggregates with no apparent crystallographic relationship. The dominant form is the prism, and this is usually terminated by a rounded end, although rarely a suggestion of a rhombohedron may be detected. Relatively few have clearly developed prism faces, and from this they grade downward, increasingly imperfect and vague, to rounded concretionary aggregates showing no crystal form whatever. The steep scalenohedron, so typical of the South Dakota locality, is entirely absent here.

The amount of sand inclusion, roughly determined by dissolving the calcite in dilute acid, is approximately 64%.

[5] Ellsworth, E. W., and Blackwelder, Eliot, Pleistocene lakes in the Afton Basin: *Am. Jour. Sci.*, (5) **31**, 453–463 (1936).

[6] Haüy, C.: *Traité de Mineralogie*, **2**, 184 (Paris, 1801).

[7] Wanless, H. R., Notes on sand calcite from South Dakota: *Am. Mineral.*, **7**, 83–86 (1922).

[8] Rogers, A. F., and Reed, R. D., Sand calcite crystals from Monterey County, California: *Am. Mineral.*, **11**, 23–28 (1926).

Additional Note on Veatchite from Tick Canyon, Los Angeles County

Another visit to the borax mine at Lang was attended with better success than the first, and a number of specimens of this rare and newly described[9] borate were obtained. The mode of occurrence in these is somewhat different from any previously described. The mineral occurs in thin seams cutting a fine blue-gray clay along irregular fractures. It runs in flat lying individuals which show their pearly cleavage when the rock is split along one of these fractures, and not in cross fiber structure. Usually associated with it are similar seams of colemanite, but the pearly luster and two cleavage directions are sufficient to distinguish it from the latter. A particularly favorable location is in a rather thick layer of pure clay, between thin-bedded dark-gray stained layers which are high in lime. All material was found in boulders on the dump, as it is impossible to get safely into the workings of the mine.

Rhodonite, Cajon Pass, San Bernardino County

During field work in connection with the occurrence of alurgite,[10] in the Cajon Pass area, several boulders of rhodonite were found in the alluvial deposits on the summit of the pass. These boulders were black, and massive, and upon opening were found to consist of cores of pink rhodonite, oxidized outward more and more completely to psilomelane. Associated with the rhodonite were boulders of psilomelane which contain needles of a sub-metallic mineral, which was identified as manganite. Material may be collected from any of the ravines running in a northeasterly direction from the Cajon Pass fan, although the boulders are far from abundant.

Axinite

Two new localities of plum-colored axinite have been visited recently, in rather widely separated areas. In one area, the axinite is abundant in irregular and bladed crystalline masses; in the other, it occurs as subhedral grains and imperfect small crystals. Yet a third locality near Woody, Kern County, California, has been reported but as yet unverified.

Erskine Creek, Piute Mountains, Kern County

A large contact zone between quartz monzonite and metamorphic

[9] Switzer, George, Veatchite, a new calcium borate from Lang, California: *Am. Mineral.*, **23,** 409–411 (1938); Murdoch, Joseph, Crystallography of veatchite: *Am. Mineral.*, **24,** 130–135 (1939).

[10] Webb, Robert W., Investigation of a new occurrence of alurgite from California: *Am. Mineral.*, **24,** 123–129 (1939).

rocks in the southern part of the Kernville quadrangle, Kern County, contains abundant irregular masses and bladed subhedrons of plum-colored to brownish-blue axinite. The locality is specifically on the south fork of Erskine Creek, in T. 28 S., R. 33 E., sec. 6, Kernville quadrangle.

The contact zone varies from 1 to 6 feet in width; along it has developed a massive tactite, with epidote, garnet, diopside, axinite, calcite, quartz, and orthoclase in irregularly distributed sub- to anhedral grains. Large crystalline masses of axinite occur, with long bladed masses showing a few faces. Optical examination of the axinite showed the usual properties.

The metamorphic rocks in which the mineral occurs consist chiefly of mica schists, little quartzite, and much marble, although marble is subordinate at the actual contact. A fuller description of these rocks and the associated quartz monzonite intrusive will be found in another paper.[11]

Rademacher-Terese, Inyo County

A deposit of wollastonite in large masses of crystalline limestone has been known for sometime to occur between Terese and Rademacher sidings, on the Southern Pacific (Owenyo Branch) Owens Valley line, Inyo County, California, in T. 27 S., R. 39 E., Searles Lake quadrangle. Recently, while collecting in this area, contact zones in the marble were seen in which calcite and epidote were hosts to subhedral grains of plum-colored axinite. The axinite looks almost exactly like that found at Crestmore, in Riverside County, California.

Garnet and Epidote near Daggett, San Bernardino County

Alluvial fans just to the south of Daggett, California, carry boulders of an amygdaloidal lava, which in some instances contain a rather interesting combination of minerals in the amygdules. The lava is basaltic in character, very fine-grained and dark, weathering to a purplish-gray on the exposed surfaces. The amygdules are filled with epidote, in radiating prismatic aggregates. No terminated crystals were seen, but in some cases the cavities were incompletely filled. In a few cases, calcite is associated with the epidote, deposited on its surface, and in such cases a number of honey-colored grains were seen embedded in the calcite, or perched on the surface of the epidote. On examination with a hand lens, these were seen to be euhedral crystals of garnet, showing the single dodecahedron. The index of refraction of this garnet was determined to be well over 1.75, and is presumably almandite. This occurrence of garnet in the vesicles of a lava is rather unusual, and worthy of attention.

[11] Miller, W. J., and Webb, R. W., Descriptive geology of the Kernville quadrangle, California: *Calif. Jour. Mines and Geology* (in press).

Some of the lava cavities are lined with thin specularite flakes, none of which was found in combination with the other minerals, so that the age relationships could not be determined.

Fayalite in Spherulites from Inyo County

Near Coso Hot Springs, Inyo County, there is an occurrence of lithophysae in obsidian, which has been described by Rogers.[12] The writers have collected considerable material obviously from the same locality and wish to add some observations to those previously reported.

The material occurs in an obsidian flow on a steep hillside, a few miles west of Coso Hot Springs, and can be reached easily by a road branching eastward from the Owens Valley highway just north of Little Lake. The lithophysae are very numerous in some portions of the rock, ranging up to one and a half inches in diameter. Most of them are quite regular, nearly spherical in outline, showing little sign of stretching, and in large part they are almost solidly filled. Where cavities occur, they may be irregular central openings, or more commonly meniscus shaped gaps between layers of the concentric structure. On the walls of such cavities, as Rogers notes, there are minute spherulites of cristobalite which in many cases are crusted over with platy crystals of tridymite. In addition, the writers found some of these spherical aggregates to be made up entirely of tridymite plates. The radial and concentric structure which he mentions is in some cases very pronounced, and often spotted throughout with nodes of apparently structureless material. Rogers mentions these, and suggests that they were incipient spherulites. In the more solid lithophysae, the central portions are ordinarily quite dense, whereas the center parts, especially near the cavities, are very friable, and consist apparently of the radial rods or fingers of orthoclase (Rogers, p. 214).

Rogers (p. 215) notes minute tabular crystals of fayalite. The writers have observed crystals up to 3 mm. across, and by observation and goniometric measurement have recorded the following forms: (100) most prominent, modified by narrow development of (101) (010) (120) (021) (111); rarely other prism faces, as (110) (230) (130) (140); occasional pyramids (121) (131) and very rarely, faces in the zone (111)/(100), poorly developed, but giving positions corresponding fairly well to (322) and (211). These did not give satisfactory signals, and should be regarded as doubtful forms.

Some of the lithophysae were ruptured, with cracks extending to the outer surface, producing a curious explosion effect which is shown in the accompanying photograph.

[12] Rogers, A. F., A new occurrence of cristobalite in California: *Jour. Geol.*, **30,** 211–216 (1922); Natural history of the silica minerals: *Am. Mineral.*, **12,** 76 (1928).