balance the electrical charges of all cations (including hydrogen) in their proper ratios against the 18 negative charges of the 9 oxygen atoms. The calculations are given in Table 1 and can be cast in the form of a structural formula, thus:

$$(Mg, Fe, Mn)_{2.97}[Si_{1.75}Al_{0.01}(H_4)_{0.24}]O_5(OH)_{4.00}.$$

Here it has been assumed that tetrahedral hydroxyl groups substitute for silica tetrahedra. The agreement is exceedingly good inasmuch as the octahedral cations differ from the theoretical requirement by merely one per cent if other constituents exactly match the requirements. To obtain this agreement it is necessary to assume that all of the water shown in von Knorring's analysis is essential to the structure.

These results offer further indirect evidence of the occurrence of hydrogens in substitution for silicon (i.e. tetrahedral hydroxyls) in structures of this general type. Although this hypothesis was originally presented in order to explain certain data for montmorillonite, it has been admitted (McConnell, 1951, p. 188) that the occurrence need not be restricted to montmorillonite.

I am indebted to Brindley and von Knorring for an opportunity to examine their results prior to publication and for their interest and cooperation.

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ALLANITE PEGMATITE, SAN GABRIEL MOUNTAINS, LOS ANGELES COUNTY, CALIFORNIA*

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This short note is intended to bring to the attention of mineral collectors an intriguing locality for pegmatite minerals.

Pre-Cretaceous pegmatites, generally of simple mineralogy and of small size, abound in and near the anorthosite massif in the San Gabriel Mountains, Los Angeles County, California. One of these pegmatites is exceptional for its content of well-formed crystals of allanite, apatite, beryl, uranothorite, and zircon. This pegmatite occurs in a norite facies

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of the anorthosite massif, in a small land-slide-scar amphitheater on the south wall of the South Fork of Pacoima Canyon. A well-maintained Forest Service road is in the bottom of the canyon. The pegmatite is in the northwest portion of the 6-minute Trail Canyon quadrangle and is in a land-grant area in what would be Sec. 17, T. 3 N., R. 13 W., S.B.B.M.[1]

The pegmatite consists of a number of irregular bulging and fingering lenses along a single, nearly horizontal plane. For the most part the pegmatite consists of very coarse grained subhedral light pinkish-brown perthite and white quartz, containing a few large blobs of quartz and partly replaced by anastomosing veinlets of quartz; no zonal structure is evident. In three places swarms of parallel biotite crystals transect both quartz and perthite; individual biotite crystals measure in cross section from ½ inch by 6 inches to 6 inches by 5 feet. Small amounts of fine grained anhedral oligoclase are present. Red perthite pods and lenses containing the rare minerals are irregularly distributed throughout the pegmatite. A few of these pods occur in the metamorphic aureole. The total volume of red perthite in the pegmatite is probably less than 10 per cent, and in the metamorphic aureole the volume is less than 1 per cent. Both ends of the pegmatite are fault contacts.

The wallrock of the pegmatite is a medium-grained uralitized ilmenite-bearing norite of the kind assigned to the border facies of the San Gabriel anorthosite massif (Higgs, 1950). Locally, a banded structure, striking N. 65° W. and dipping 80° S., is present in the norite. A discontinuous sheath of metamorphosed norite surrounds the several pegmatite lenses. This sheath is remarkable for its grain size. Grains in places average 1 foot in maximum dimension; they vary irregularly from less than ⅛ inch to 2 feet or more. The metamorphic rock consists largely of hornblende, oligoclase, and biotite. Microscopic constituents include garnet, sphene, zircon, carbonate, allanite, and ilmenite. Generally the crystals of the metamorphic aureole are anhedral, but euhedral prisms of hornblende and euhedral tablets of biotite are common in the coarser-grained parts.

The metamorphic rock is sharply bounded against the pegmatite in most places, but locally it grades into the pegmatite within the space of a few feet by changes in the mineral proportions and in texture. Gradational contacts are most common in the western end of the pegmatite, which is exceptionally rich in oligoclase, hornblende, and biotite. This part of the pegmatite contains remarkably large euhedral hornblende crystals, no one of which is fully exposed. One crystal has exposed dimensions of 3½ feet by 4 feet by 1 foot and two others are larger than 2 feet by 3 feet by 1 foot. The weight of the largest crystal (computed on

[1] I originally mistakenly reported the locality to Murdoch (Murdoch and Webb, 1952' p. 34) as being in section 6.

the basis of the exposed dimensions) is at least 850 pounds; each of the three large crystals might actually weigh in excess of half a ton.

A 2-foot-thick vein of granular carbonate, seemingly pure, is present in the eastern end of the pegmatite. A swarm of fine-grained hornblende-biotite-plagioclase lamprophyre dikes, 1 to 4 feet thick, transects both the norite and the pegmatite, and parallels the pegmatite. The dikes contain small pegmatitic pods; they also show a banded structure reflected by small variations in grain size. No contact effects are apparent.

The presence of a discontinuous sheath of very coarse grained hornblende-(and/or biotite)-oligoclase metamorphic rock seems to be a common feature of the many small pegmatite bodies in this region. Many of these pegmatites can be seen along the road in the upper reaches of the North Fork of Pacoima Canyon. Short lenses of this metamorphic rock are also present in the norite away from known bodies of pegmatite. Such lenses are common in the vicinity of the allanite pegmatite, where a few contain small pods of red perthite, very rarely with zircon and allanite.

The minerals of special interest are found in the small pods of red perthite in the pegmatite and less commonly in the metamorphic aureole. Allanite, apatite, beryl, and zircon occur together. Except for the smallest of the zircon crystals, crystals of all four minerals are finely and pervasively fractured. All four are found in well-formed euhedral crystals, uncommonly slightly replaced by quartz. Associated with them are small amounts of anhedral oligoclase.

Allanite occurs in thin tabular black crystals, ranging from $\frac{1}{2}$ inch by $\frac{1}{4}$ inch by $\frac{1}{8}$ inch to a known maximum of $\frac{1}{2}$ inch by 10 inches by 18 inches. In thin section, the color is light to dark pinkish orange. It is the most abundant of the unusual minerals. No alterations are evident and powder photographs show very slight evidence of metamict structure (J. Berman, personal communication).

Zircon crystals occur as doubly terminated square prisms that range in size from those barely visible with a hand lens to a known maximum of 1 inch by 8 inches. Despite the intense fracturing, no evidence of alteration or metamictization is apparent. The color ranges, according to the extent of fracturing, from purplish white to deep purple. Under the short-wave ultraviolet lamp the crystals fluoresce a deep orange yellow with little variation in the intensity of the color.

Beryl is rare; most of it occurs in one small part of the pegmatite. The crystals, highly fractured, are short prisms, which have a maximum size of $\frac{1}{4}$ inch by $\frac{1}{2}$ inch. They are colored a very light greenish white.

Microscopic crystals of apatite are present in the pegmatite and in all of the surrounding rocks. Apatite is most abundant, and its crystals—

stubby prisms up to ¼ inch—are largest in association with allanite and zircon, in both of which it is a common inclusion.

Uranothorite was found in only one small red perthite-quartz pod, where it apparently occurs without allanite, apatite, beryl, or zircon. The largest crystal found measures ½ inch by 1½ inches. It is dark brown with many streaks and irregular masses of orange color. It is apparently completely metamict. Unlike allanite, apatite, beryl, and zircon, the uranothorite crystals are not fractured. Aureoles of the apple-green fluorescence common to secondary uranium minerals surround the crystals; the fluorescing substance is not visible in ordinary light. The identification as uranothorite was kindly checked by Joseph Murdoch.

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A MODIFICATION OF THE CHAYES POINT COUNTER STAGE

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In 1949 Chayes described a point counter suitable for attachment to a standard Spencer or Bausch and Lomb petrographic mechanical stage. In this device leaf springs mounted on the stage engage click wheels mounted on the horizontal and vertical shafts to furnish the point stops used in count analysis (see Chayes' description).

The present modification, designed and made by Mr. W. F. Mueller,* is an improvement over the original in three respects:

1. Lighter clicking action requiring less work for each point change.
2. Positive centering at each point (*i.e.*, no play when the plunger is engaged in the click wheel).
3. A simple arrangement for disengagement of the point-counting device so that the stage may be used for ordinary traversing.

The point counter stage is shown in Fig. 1; a cross-sectional diagram of the working mechanism is presented in Fig. 2. A pointed plunger (*a*) is mounted in a housing (*b*) containing a light coil spring. The plunger point is sharper than the indentation in the leaf spring of the original design; this permits deeper and narrower slots in the click wheel (*c*) and thus reduces play. The shoulders of the slots are slightly rounded as is

* Supervisor, Instrument Shop, Magnolia Petroleum Co., Field Research Laboratories. The stage is a Bausch and Lomb model 31-59-54.