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).

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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).

ties of bentonites. The technique consists of moistening the dry clay with a solution of zinc uranyl acetate and exposing it to ultra-violet light. Under these conditions, it is stated, swelling bentonites fluoresce immediately, whereas other clays do not. The explanation advanced is "interfacial dehydration of the zinc uranyl acetate and ultra-violet fluorescence of the anhydrous salt." This phenomenon arises from "the dehydrating powers of the clay involving free energy levels of the order chemisorption."

It may be readily demonstrated, however, that such fluorescence could be due to sodium zinc uranyl acetate, a strongly fluorescent material, which is precipitated by the exchangeable Na^+ of the clay mineral. Since the reagent contains a quantity of Zn^{++} in excess of that required for precipitation of $NaZn(UO_2)_3(C_2H_3O_6)_9 \cdot 6H_2O$, the original Na^+ would presumably be replaced by Zn^{++}.

Naturally occurring montmorillonites, e.g. Wyoming bentonite, generally contain appreciable quantities of Na^+, as well as K^+, Ca^{++}, Mg^{++} as exchangeable ions. Consequently, they fluoresce more or less intensely, depending upon the quantity of Na^+ present. If, however, a sample of Wyoming bentonite is leached with $CaCl_2$ solution to remove all cations excepting Ca^{++}, no fluorescence is observed.

Further, since the solid sodium zinc uranyl acetate fluoresces intensely, even a coarse-grained kaolinite, if its exchange positions are saturated with Na^+, should give a positive test.

To verify this, a sample of kaolinite (cation exchange capacity = 3.8 milliequivalents/100 gm.) was treated with just sufficient NaOH to ensure saturation, the pH of the resultant suspension being 7.0. When a dried specimen of this clay was moistened with the reagent and irradiated with ultra-violet light, an intense fluorescence was observed.

The correlation between intensity of fluorescence and gell strength, green compressive strength, etc., follows from the fact that such properties are largely controlled by the nature and amount of exchangeable ions present.

If a positive test is obtained, it may be assumed that the clay mineral contains adsorbed Na^+. This cannot, however, be taken as an indication of the presence of montmorillonite, nor indeed of any particular clay mineral. Brown mentions that "the part the sodium plays has not been determined, but it may prove to be considerable." It is not clear whether this refers to the actual fluorescence, or to the hydration of the montmorillonite. In any case, precipitation of sodium zinc uranyl acetate seems a more likely explanation of the fluorescence than a process of "interfacial dehydration."