

gregates of magnetite, allanite, and biotite. The uranothorite was hand-picked and identified by an x-ray pattern. A spectrographic analysis by Helen Worthing of the U. S. Geological Survey is as follows:

Over 10 per cent—Si, Th
 5-10 per cent—U
 1-5 per cent—Al, Fe, Pb
 0.1-1.0 per cent—

Recently, Neuerberg (1954) has described the mineralogy and features of a large pegmatite dike that crops out on the south wall of the South Fork of Pacoima Canyon, Los Angeles County, Calif., about 90 miles west of the Alger Creek deposits. The pegmatite in Pacoima Canyon contains an assemblage of minerals similar to that here described, including very large euhedral crystals of allanite and zircon, and much smaller crystals and grains of uranothorite; it also contains sparse grains of beryl and apatite which are not recognized at Alger Creek. In contrast, however, the pegmatite in Pacoima Canyon presents definite, sharp boundaries to the host rock, norite, which is a border phase of a large mass of anorthosite, whereas the Alger Creek body is much smaller and shows transitional boundaries to the host rock, granite gneiss.

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IDENTIFICATION OF THE 14 Å CLAY MINERAL COMPONENT

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In clay mineral identification an $00l$ spacing of 14 Å which does not expand with glycerol treatment is attributed to chlorite and/or vermiculite. Differentiation is accomplished in several ways; one is based on the collapse of the 14 Å spacing to 10 Å when vermiculite is saturated with potassium. It has been reported that vermiculite found in some soils resists collapse by this method when a salt such as KCl is used. Collapse has been achieved when hot KOH+KCl or NH_4F were used (2, 4). However, both treatments are relatively drastic. Rich (4) reports that NH_4F should be limited to five minutes to minimize clay destruction and that prolonged treatment with KOH+KCl was also found to be destructive.

Since the soils of New England contain high amounts of the 14 Å component which resists collapse with KCl treatment, studies were conducted to characterize this component as well as to develop a procedure which would be less destructive than the NH_4F or $\text{KOH} + \text{KCl}$ treatment. The results obtained thus far are highly significant in identifying the 14 Å component found in these soils and should caution against the use of NH_4F or $\text{KOH} + \text{KCl}$.

Only the clays in the two lower horizons of a New Jersey Brown Podzolic soil (Table 1) exhibited an 18 Å spacing diagnostic for montmorillonite after treatment with calcium chloride and glycerol with and without free iron oxide removal. Heating the clays at 100° C. with N KCl gave the same results except that the montmorillonite clay showed a 14 Å spacing. Applying the $\text{NH}_4\text{F} + \text{KCl}$ treatment used by Rich (4), the clays showed varying degrees of collapse. The montmorillonite sample showed complete collapse to 10 Å. With the exception of the montmorillonite-containing horizon, the mineral identification would be that the 14 Å component is a vermiculite-chlorite interstratified system. Heating the clays to 550° C. showed that spacings greater than 10 Å were still present thus confirming the chloritic component.

Evidence thus far obtained on these clay systems points to hydroxy aluminum ($\text{Al}(\text{OH})_2^+$ type) compounds as being responsible for non-collapse of vermiculite (4, 5). On this basis the beneficial action of OH^- and F^- ions is apparent. It was further reasoned that the citrate ion should also complex the alumina; preliminary tests on these clays confirmed this reasoning (5).

Although the free oxide removal treatment used on this system contained sodium citrate as a compound, tests showed that the clays did not change in spacing but the intensity of the patterns were increased. Significantly Barshad (1) has shown that the free oxide removal treatment employing citrate improved the sensitivity of x -ray diffraction identification of clay minerals. These clays then were treated for three hours in N potassium citrate ($\text{pH} = 7.3$); no changes were noticed in spacing characteristics. However, when N sodium citrate ($\text{pH} = 7.3$) was used with calcium saturation and glycerol treatment, the clays from Connecticut and New Jersey expanded; the spacing ranged from near complete conversion to 18 Å in the New Jersey soil to 14–18 Å range in the Connecticut Brown Podzolic soil clays. This series of tests show that the 14 Å component is a montmorillonite-chlorite interstratified system.

These series of tests should caution against the use of NH_4F or KOH treatments as diagnostic for vermiculite if preliminary tests show non-expansion of the 14 Å component with glycerol. Since NH_4F and KOH

TABLE 1. EFFECT OF VARIOUS TREATMENTS ON THE EXPANSION AND CONTRACTION OF THE 14 Å COMPONENT; DATA TAKEN FROM FREE OXIDE REMOVED 50 MGM SAMPLES

The saturating salt, complexing anion and glycerol applications are listed in order

Source and depth (inches)	CaCl ₂ 0.1 gm.	KCl	KCl 0.1 gm.	NH ₄ F+KCl Fluoride	K-citrate citrate 0.1 gm.	CaCl ₂ citrate 0.1 gm.	CaCl ₂ * citrate 0.1 gm.
Hartford Co. Connecticut							
0-3	14 vs†	14 vs	14 s	—	14 s	18 m 14 m ^b	14 w 10 m ^b
3-8	14 vs	14 vs	14 s	14 m 10 mw ^b	14 s	18 m 14 m ^b	14 w 10 m ^b
8-18	14 vs	14 vs	14 s	14 m 10 m ^b	14 s	18 m 14 m ^b	
18-28	14 vs	14 vs	14 s	—	14 s	18 ms 14 m ^b	12 w 10 m ^b
28-48	—	14 vs	14 s	—	14 s	18 m 14 m ^b	14 w 10 m ^b
Essex Co. New Jersey							
$\frac{1}{2}$ -4	14 vs	14 vs	14 s	14 w 12 m ^b	—	—	—
4-8	14 vs	14 vs	14 s	14 w 10 w ^b	14 s	18 m 14 m	14 m 10 m ^b
8-16	14 vs	14 vs	14 s	14 w 10 m ^b	14 s	18 ms 14 w	—
16-30	18 vw 14 s	14 vs	14 s	—	14 ms 10 vw ^b	18 ms 14 w	14 vw 10 m
30-40	18 s	14 vs	18 vw 14 s	10 ms	14 m 10 w ^b	18 s	12 vw 10 s
40-54	18 s	14 vs	18 m 14 m	—	14 m 10 w ^b	18 s	—

* This sample is the same sample used in the previous column except that it was heated for 2 hours at 550° C.

† v=very; s=strong; m=medium; w=weak; b=broad spacing; these letters refers to the intensities of the diffraction maxima and the character of the maxima.

have been used to identify dioctahedral vermiculites, identification would be tentative until the above tests with citrate or its equivalent are made. The "non-expanding" montmorillonite of these soils verifies the laboratory synthesis of this type of mineral by Caillere and Henin who used magnesium saturated montmorillonite made basic with ammonia and dried at 1000° C. (3).

The importance of this identification is exemplified by considering the New Jersey profile. With the identification of montmorillonite below 30 inches, it was difficult to consider the solum as being derived from the underlying material if the 14 Å component was concluded to be vermiculite. However, with the identification of the component as montmorillonite, the pH, base saturation, and clay content can be correlated with the existing information on the genesis of this soil. A detailed report of this investigation will be reported later; this note emphasizes the necessity of testing for expansion even though preliminary tests may show non-expansion before concluding that the 14 Å mineral is vermiculite.

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USE OF THE TERM "ALTERITE"*

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Some Dutch mineralogists use the term "alterite" for those mineral grains which are difficult to identify because their optical properties have been changed or altered by weathering processes. Thus, in describing the size-frequency distribution of some heavy minerals from the Rhine

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