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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near Wageningen, the following minerals are listed by Van Andel (1952, p. 22)—garnet, epidote, alterites, blue-green hornblende, and augite. In his description of the minerals in the Rhine region Van Andel (1952, p. 45) defines alterites as "very fine-grained aggregates of unknown composition. They have probably originated by the alteration of various minerals. In some cases this can be proved by the existence of transitional forms. The word must be understood as a group name that has no mineralogical significance." He goes on to give diagnostic features of alterites such as roundness, lack of extinction between crossed nicols, interference colors evenly gray or variegated, specific gravity ± 3.1. In general, "if more than $\frac{3}{4}$ of the grain has been altered, it has been called alterite"; further, "coarse aggregates of epidote in which the individual crystals can still be distinguished, are also called alterites if the particles are not uniformly oriented." Van Andel (1952, p. 46) then describes a number of different kinds of alterites which have been recognized:—aggregate-alterite (with transitions to epidote alterite), epidote-alterite, hornblende-alterite, augite-alterite, saussurite.

Recently in North American literature the term alterite has been introduced by Groot (1955) in his study of the Cretaceous rocks of northern Delaware. In his Table IV (p. 32) "alterites" are listed with other heavy minerals in the various formations. The average content of "alterites" based on grain counts, rises to 34 per cent in the Patapsco and Raritan formations, 8 per cent in the Mt. Laurel and Navesink formations and 12 per cent in the Magothy formation. Such grains are present in all the Cretaceous formations examined. In Table III (1955, p. 30) "alterites" are given as characteristic of the mineral suites of the Patapsco and Raritan and the Patuxent. Figure 4 (1955, p. 38) shows very clearly the proportion of "alterites" in the heavy mineral suites of the Patuxent, Patapsco and Raritan formations and Pleistocene deposits at New Castle, Delaware. However, Groot gives no definition of the term "alterite."

In a paper on "Lower Cretaceous heavy mineral suites from the New Jersey and Pennsylvania subsurface" presented by McCallum at the southeastern section meeting of the Geological Society of America in March, 1956, "alterite" was listed among the heavy minerals, similarly with no definition or explanation, though such may well appear in the published paper.

It is felt that use of the term "alterite" merely obscures facts of mineralogical significance and that every effort should be made to identify such mineral grains as completely as possible.

Van Andel's list (*op. cit.*, p. 46) contains minerals that are low on all mineral stability lists (Pettijohn, 1949, p. 380–382), and are exclusively ferromagnesian in composition with the exception of saussurite, which is a feldspar mass more or less completely altered to a mixture of zoisite, new feldspar, actinolite, chlorite, etc. In any heavy residue containing ferromagnesians, grains of "alterite" are likely to be found, but it serves no useful purpose to hide their real identity under this name, even though identification may be difficult. If, for example, a heavy residue consists largely of transported epidote, such as occurs in a stream sand near its source of supply, among the fresh epidote grains there will be many which can be called alterite-epidote, and all stages between fresh epidote and very much altered epidote can be recognized. The composition of such a residue could be stated to be 25 per cent epidote and 50 per cent "alterite" but it would have much greater mineralogical accuracy to state the epidote content as 75 per cent. If "alterite" is to be used at all as a descriptive term, its parent mineral should be stated, but it is preferable to list such grains as altered epidote, or merely to include this altered epidote in the total epidote percentage and to describe the optical characters leading to the identification. Altered grains of amphibole, pyroxene, epidote, biotite, chloritoid, and andalusite observed by the writer are recognized by their variation in optical properties. In strongly weathered soils, for example, amphibole may have been changed to a chloritic or micaceous substance which has the same general appearance as the unaltered mineral but has a lower index of refraction and birefringence. Many such grains do not extinguish under crossed nicols; others have a very low interference color and may even be isotropic. In biotite the interference figure is reduced or lost completely as described by Denison *et al.* (1929), and the mineral, if colored, undergoes a loss of color.

An interesting point about the presence of "alterites" in any heavy residue is that they indicate a stage in the removal of a mineral from its environment. Mineral suites obtained from river sands which are derived from freshly eroded rocks containing ferromagnesian minerals will generally contain altered grains, and it should be recalled that the Dutch mineralogists introduced the term for heavy minerals in river sands where source areas supplied ferromagnesian minerals in some quantity.

The term "alterite" should not be used in the description of heavy minerals obtained from sedimentary formations or from unconsolidated deposits of any kind; there the name serves no useful purpose and obscures mineralogical facts. In the hands of inexperienced mineralogists it will merely be used as a "sack" term.

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A NEW OCCURRENCE OF MILLERITE

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INTRODUCTION

A previously unreported occurrence of millerite and other associated nickel minerals was recently observed at the Klau quicksilver mine in the Santa Lucia Range, San Luis Obispo County, California (sec. 33, T 26 S, R 10 E). The only other occurrence of millerite in the southern part of the state is described by Eckel *et al.* (1941) from the nearby Libertad mine.

GEOLOGIC SETTING

Mineralization at Klau occurs along the Los Tables thrust zone, a major structural feature of this part of the coast ranges. At Klau the thrust zone is a mass of gouge and breccia nearly a thousand feet wide. Most of the gouge has been derived from the serpentines of the Franciscan formation which crop out on either side of the fault zone. Most of the brecciated blocks are shales and sandstones of probable lower Cretaceous age. The entire gouge and breccia zone as well as some of the adjacent rocks has been extensively altered by hydro-thermal action which has produced a silica-carbonate rock.

MINERALIZATION

The quicksilver veins at Klau exhibit several groups of minerals which are not commonly associated with cinnabar at other places in California and Nevada. Open cuts made during the past year provided much information on the deposit and the sequence of mineralization. Most of the earlier workings had caved so badly that they were not examined.

The following brief descriptions are confined to the minerals closely associated with the ore deposits and the gouge zone. The most striking mineral associations are found in the silica-carbonate masses in the main