reproduction and tissue formation. It provides, as well, a form of explanation without a central, partly necrotic tissue fragment, from which undefined substances are released into the medium such as to render it less suitable for quantitative determinations of metabolic processes.

It has been found that explanted suspensions containing cells originating from different organs, and from different animals, can form a cell reticulum and tissue continuity. This method can therefore be used for studying problems of protoplasmic specificity. There is some reason to justify the assumption that the method will prove convenient in providing a substrate of tissue for the propagation of viruses.

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Manuscript received April 2, 1952.

A New Criterion for Weathering in Soils[1]

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Weathering consists of the mechanical disintegration and chemical deterioration of minerals at or near the ground surface. In soils, this process usually results in the development of a profile that may be described in terms of A, B, and C or D horizons. The greatest weathering occurs in the surface horizons, with a gradual decrease in intensity downward toward the parent rock. This simple picture of a soil profile is essentially that of a monogenetic soil defined by Bryan and Albritton (*1*) as one that has matured through a relatively uniform climate. Polygenetic soils (*1*) are those that have matured through at least two time intervals of different climates, with profile types superimposed one on the other. Such soils are not easily distinguished in the field. In addition, glacial, alluvial, and eolian depositions are common sources of superimposed profiles of weathering.

Differentiating between monogenetic and polygenetic profiles and recognition of buried profiles require distinction of the various soil horizons on the basis of an objective weathering criterion. This paper proposes such a criterion.

Recent studies by the authors have revealed a positive criterion for differentiating weathering regimes in a soil profile. The basis for this criterion is x-ray examination of the clay and silt fractions of the various horizons in the soil profile. If examination reveals the presence of mica minerals in either of these size fractions, the means are at hand for identifying the sequence of weathering. As this mineral group occurs so frequently in soils, the method of diagnosis should prove generally useful to pedologists and geologists.

Mica weathering is essentially a process of potassium depletion. Vadose water actively enters into hydrolytic interplay with the interface K^+ of the mica lattice. In the usual acid medium near the ground surface, this activity results in the displacement of this cation, with a consequent loosening of the bonding effect between mica sheets. Brown (*2*) has suggested the name "hydrous mica" for all those minerals that are hydrated micas, and the authors will follow this suggestion.

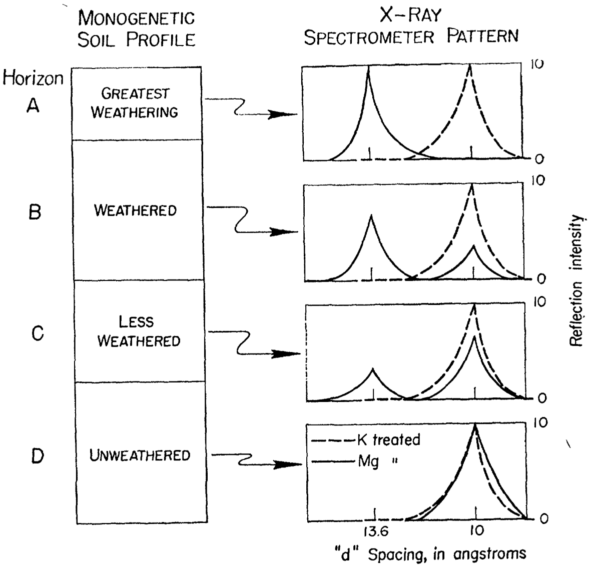

FIG. 1. Diagrammatic illustration of the weathering criterion.

Mica in the unweathered state has a basal "d" spacing of 10 A, whereas the weathered, or hydrous, mica has a basal spacing that is directly dependent upon the saturating cation. In short, differential cation treatment of mica minerals will reveal the degree of weathering. Unweathered mica is tightly bonded by the interlayer cations and will maintain its 10 A basal spacing regardless of treatment. Weathering, however, with its accompanying cation depletion, results in a progressively greater response to differential cation treatment.

With respect to a monogenetic soil profile, the hydration effects of such divalent cations as Ca^{++} and Mg^{++} will be greatest in the A horizon and will gradually diminish toward the parent material. This is in accord with the concept that hydrous micas will dominate the surface horizon, whereas the D horizon will be composed of the unweathered, unhydrated form.

An example of such a monogenetic profile of weathering was first found in the Shackham Brook watershed located near Cortland, N. Y. The clays were saturated with 1 *N* MgAc (50 ml to 150 mg clay) and

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[1] Contribution from the U. S. Geological Survey, Water Resources Division, and Department of Agronomy, The Pennsylvania State College, State College, Pa. Approved by the director, Geological Survey, and authorized for publication on May 13, 1952, as Paper #1734 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

allowed to stand overnight on a steam bath. In the surface horizon where the hydrous mica was dominant, the basal spacing was 13.6 A. The amount of hydrous mica decreased consistently with depth until it was barely present in the fresh parent material. To prove that this spacing is merely the hydrated form of mica and not chlorite or montmorillonite, as sometimes reported, the same clays were then similarly treated with 1 *N* KAc. In all cases, the 13.6 A spacing was contracted to 10 A. Fig. 1 is a diagrammatic representation of this weathering sequence.

An application of this criterion may be of interest to geomorphologists and soil scientists. Thorp *et al.* (*3*), Schultz *et al.* (*4*), and others are using ancient soils (called paleosols by Hunt and Sokoloff [*5*]) as evidence of periods of stability and weathering during the deposition of river alluvium and loess. Under certain conditions, a paleosol buried by later deposition may be recognized in the field by dark bands. A technique such as the one described here should prove useful in differentiating bands that are the result of pedogenic processes from bands that may be caused by stratigraphic sequences of materials of varying texture, color, or consolidation.

Studies of kaolinite development in soils indicate a similar trend. Weathering and base depletion are greatest at the surface, and this is the zone of greatest kaolinite formation. Kaolinite thus serves as a corroborative check on hydrous mica with respect to weathering.

Application of the weathering criterion to a large number of agricultural soils in the U. S. has been made, and a detailed study will be published in a forthcoming paper.

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Manuscript received May 19, 1952.

Comments and Communications

Sympathetic Blocking β-haloalkylamines

In 1949 (*1*) we reported the synthesis of a quaternary derivative of dibenzyl-(β-chloroethyl)-amine with a very high adrenergic blocking activity. Of special physiological interest was the rapid onset of the block, which was complete within a few minutes after intravenous administration in animal experiments (*2*). Further investigations on the substance supposed to be dibenzyl-(β-chloroethyl)ethyl-ammoniumbromide revealed that it must have another structure. The doubt concerning the quaternary nature of the compound was expressed in a communication by F. Lund (*3*) in connection with the delivery of an investigational sample, and quite independent of the observations made by J. F. Kerwin *et al.* (*4–6*). These authors stated that the compound (which we have called "Q") is identical with the hydrobromide of dibenzyl-(β-bromoethyl)-amine, when it is mixed to a slight degree (8%) with the hydrobromide of the corresponding chloro compound.

Elementary analyses on Q showed that it was not the expected quaternary derivative. Attempts to determine ionogenic Br^- failed, as it was impossible to obtain reproducible results.

Infrared spectrograms were then made by the Nujol mull technique. These showed a strong absorption around 3.9 μ that was unquestionably due to an amino salt grouping. Such an absorption is not shown by quaternary ammonium salts. On the other hand, the infrared spectrogram of pure dibenzyl-(β-bromoethyl)-amine hydrobromide was not identical with that of our preparation Q in the region of 7–13 μ. The bromo compound has a very strong absorption at 11.12 μ that is not at all represented in the Q spectrum. Instead, our substance Q has a spectrum that very closely resembles that of dibenzyl-(β-chloroethyl)-amine hydrobromide. In the spectra of some preparations, however, the absorption of the bromo compound at 11.12 μ (899 cm^{-1}) is obvious. It seems reasonable, therefore, to assume that our Q compound is chiefly dibenzyl-β-chloroethylamine hydrobromide mixed with the hydrobromide of dibenzyl-β-bromoethylamine. After several recrystallizations from a series of solvents, the end product is the bromo compound, dibenzyl-(β-bromoethyl)-amine hydrobromide.

In our animal experiments, both this compound and the Q-substance display very high adrenergic blocking activities. The temperature of the solvent used in the animal experiments, however, has a great influence on the activity; hence, a separation on a physiological basis seems very difficult.

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