BOOK REVIEWS

Experimental Pedology
Univ. of Nottingham Eleventh Easter School in Agricultural Science, 1964


This book contains the proceedings of the Eleventh Easter School in Agricultural Science held in 1964 at the University of Nottingham. The second soil science school in soil science history, the first was on the subject of soil zoology in 1935. The book contains 29 papers, arranged in five sections: Geochemistry and Weathering of Soil Minerals (5 papers); Redistribution of Inorganic Substances (6 papers); Biological Aspects of Soil Formation (8 papers); Pedogenetic Studies (7 papers); and Demonstrations of Techniques (3 papers).

The editors' preface sets an unfortunate stage for the contributions. To one familiar with the methods of the earth sciences, experiments may be planned, but there are also natural experiments—situations where soils formed under different sets of environmental factors can be compared. The earth scientist seeks out the natural experiments and from them develops his science. Geology and pedology have developed largely by such studies. The chemists and physicists have used planned experiments. Both, however, are experiments. The editors say "it is now possible in pedology to put up a hypothesis and to submit it to the same kind of experimental investigations that has been responsible for the dramatic advances in other branches of science over the last fifty years." This other extreme view may have led to the emphasis on planned experiments and virtual exclusion of reports of studies of natural experiments.

The contributors have presented substantial evidence that it is possible to plan laboratory and field experiments of the processes of weathering, clay formation and other mineral and organic alterations, translocation of mineral substances, and other processes of soil formation. This phase of pedology has been neglected, partly because of its great difficulty. A number of the papers mostly confirm the knowledge we already have from studies of natural experiments, but the development of techniques described here promises to carry thecapable investigations that seem to be coming in the next few decades. The reader need not expect to find ready-made methods to reproduce the conditions in real soils. Problems of methods are difficult and only partially solved. For example, some experiments reported involve continuous leaching, a characteristic of only a few soils of the world. Most of the soils that furnish our food and fiber are subject to seasonal leaching, interrupted by seasons of saturation deficit with partial or complete drying of one or more horizons to wilting point. The effects of alternate wetting and drying are more difficult to study—one paper recognizes this as a factor.

The concluding paper that attempts to relate "experimental pedology" to the classification of soils is an extreme disappointment. It primarily reflects lack of experience within real soils. The author, Hallsworth, forgets the extensive cracking clays when he says "the evidence for downward movement of materials is the most entirely related to the movement of water." He fights straw men, for example, when he emphasizes that an A horizon is not necessary to form a Podzol. Anyone who has seen the Podzols of subtropical and tropical regions already knows this and those who read the literature should know it. It is important to understand the mechanics of iron removal, but little is gained by whippings a dead horse. His proposed classification of soils is possible because he seems not to know many of the problems. Chernozems, he proposes, should have heavy textures and secondary carbonates. What, then, does one do with sandy soils that are otherwise like Chernozems, or soils formed in noncalcareous materials that lack secondary carbonates but are otherwise like Chernozems?

Nevertheless, we must take our first step before we can take the second. This book represents the first faltering step of what may well become a valuable tool of pedological experiments are not apt to replace studies of natural experiments, particularly those involving geomorphology, but they could become extremely valuable as a supplement to present methods. The importance of the second is as much in the techniques that are reported as in the results obtained.

The discussions of the papers, reported in some detail, are also of importance in highlighting the shortcomings of the methods and the hopes of the investigators that they can improve the methods. The emphasis on the biologic aspects of soil formation is an excellent continuation of the theme of the First Easter School. Centered in every aspect of soil genesis, he should read it with a critical attitude.—GU Y D. SM ITH, Soil Survey Investigations, SCS, USDA, Washington, D.C.

Spuren tierischer Tätigkeit im Boden des Buchenwaldes
(Imprints of the Faunal Activity in Soils of Beech Forests)

By Gerhard Zachariae, Paul Parey Verlag, Hamburg and Berlin, 1965. 68 p., 20 illus., DM. 12.80 (Approx. $4.00).

This is an outstanding contribution to our knowledge of soil fauna, a sadly neglected pedogenetic factor. While in the past hundred odd years the students of soils spent untold hours in investigating physicochemical soil properties, these authors pursue their professional career with a mere extra-curricular knowledge of a single member of soil fauna—fishing worms. Actually, the genetic profile of many soils of the world owes its origin to the complex of animals ranging from the surface-inhabiting Callem-bola and Orbidites to large Annelidae and larger burrowers. These impart to soils definite morphological and biochemical properties which determine the course of soil development.

The essay of Dr. Zachariae incorporates results of a seven-year investigation of the activity of soil animals, conducted in several locations and during different seasons. The direct observations of soil population were supplemented by examination of thin sections and experiments in forest stands and in the laboratory. The most significant conclusion of the author is that in soils supporting beech stands the important soil-forming activity is limited to the larger worms, Enchytraeidae, and the smaller diplopods and larvae of Tipulidae, Bibionidae, Lycoriidae, and Scyphopilidae. The author is to be complimented on the concise presentation, an suggestive review of the literature, and a lucid exposition of the results of faunal activity in soil horizons. The volume is of interest to soil scientists, agronomists, foresters, and zoologists, particularly those concerned with plant protection.—S. A. WILDE and C. A. TANZER, The University of Wisconsin, Madison, Wis.

De Alluviale Gronden van de Maas, de Roer, en de Geul in Limburg
(Alluvial Soils of the Rivers Maas, Roer, and Geul)


A conversion by the Dutch people of an enormous area of sea into land is an accomplishment providing some justification for the aphorism that "the Lord created the World, but the Dutch created most of Holland..." However, a transformation of the sea into terra firma is not synonymous with an acquisition of productive soils. The amelioration and rational utilization of a sodium-enriched deposit with a critically high water table requires much additional effort. A large share of this is accomplished by a meticulous soil survey based on intensive research. The volume under the review illustrates the difficulties encountered by the Dutch pedologists in delimitation of their soils for agricultural production.

The classification of investigated soils was based on their hydrological features, granulometric composition, content of carbonates, and fertility levels. Marked differences in the specific surface of soils were correlated with varying contents of small soil particles in the fraction below 2 microns. The presence of active Fe and Al caused partial fixation of phosphorus, but calcium phosphates and organic phosphorus were readily utilized by plants. On the other hand, soils exhibited a high potassium fixation effected by open illite and weathered muscovite, including that present in the fraction exceeding 2 microns. Treatment of open illite (14A) with an excess of K+ ions changed the mineral to ordinary illite (10A) through contraction of the lattice layers. The potassium fixation decreased with weathering-caused transformation of illite into swelling illite and soil montmorillonite. The exchange capacity of soils was strongly influenced by the content of minerals possessing large intercalated surface, particularly illite and montmorillonite. A high silica-sequestric acid ratio has indicated a loessial origin of the alluvial soils. The chemical content of the soil, its physical properties, and supply of exchangeable bases were other factors that received consideration in the appraisal of the soils.

The authors stress the importance of classification of Dutch soils in the construction of field pedology and laboratory research makes possible the recognition of differences between soils which are not immediately evident from the morphology of the soil profile, and are significant from the standpoint of crop production.—S. A. WILDE and C. A. TANZER, The University of Wisconsin, Madison, Wis.