SOIL classification and cartography in relation to other soil research

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Soil research has become increasingly specialized and sectionized as it has developed, despite the obvious interrelationships among the several parts. This is partly because the technics of many other sciences, more or less modified, are used in soil science. Some make particular use of the technics and materials of geology, others of chemistry, of physics, or of biology. Many researches in soils are so technical that a high degree of specialization, for a large number of workers at least, seems essential; although the need of some acquaintance with several sciences, as a necessary prerequisite to the study of the fundamental principles of soil science, is being appreciated more and more. To a considerable degree, these principles are developed through the integration of the principles and laws of other sciences; but not through simple addition, any more than the properties of water can be learned by adding those of pure hydrogen and pure oxygen. These two elements must be studied together. One cannot come to a useful understanding of the course of water through a soil, of the genesis of a soil profile, or of the probable production of hay that will follow the planting of alfalfa seed on a certain soil, from the single approach of chemistry, of geology, of physics, or of biology.

Specialization may also arise from a wholly different course — from the nature of the problems being investigated. Like all applied sciences, applied soil science is shaped to a considerable extent by the nature of the problems pressing for solution. Let us take soil physics as an example. There may be studies from the point of view of problems in highway construction, of the erosion problem, of the problem of soil structure maintenance, of problems in land drainage, and so on. Although each investigator, if he digs at all beneath the surface, ultimately finds himself concerned with the same fundamental properties of soils, each may develop more or less individual technics, and accumulate particular kinds of data, according to the original approach. Naturally, this process cannot go on very far or there would be hundreds of kinds of specialists, one group for each important problem, with no end of confusion and duplication.

The great emphasis given to studies of soil chemistry in relation to problems of soil fertility in western Europe, as compared to the emphasis given to studies of soil morphology and geography in Asia, no doubt reflects differences in the natural problem to be solved — in the one case an improvement on soil naturally unproductive for crop plants, and in the other the organization and improvement of a great continental empire.

Thus, specialization in soil science has arisen because of variations in scientific training and occupation, and because of differences in the problems to be solved. That there is some confusion of purpose, of methods, of concepts and of nomenclature in modern soil science, can scarcely be denied. If results a modern book dealing with general chemistry or geology, one knows about what to expect, but if one looks into a new book on general soil science, it may be a new adventure. Yet what is amazing, at least, is not the present confusion, but rather the newness of the science, the commonness of the problems, and the wide variety of approaches that must have been made.

The objectives of soil science

Before one can examine profitably the results of one wheel to another in a machine, or of one color to another in a painting, some concept must be had of the machine or the painting as a whole. Therefore, the general objective of soil science must be restated as simply as possible. Even if there is agreement, at least the assumption used in this discussion may be plain. It is proposed that the objective of soil research is to determine the yield, and quality of plants that can be produced on alternative, physically defined, systems of management on the various types of soil, and then to devise these systems upon the long-time productivity of the soil types. It must be added at once that these researches will be directed toward this immediate problem. The fundamental purpose of science is to make predictions; and these are made upon the basis of the general objective of soil research to determine the yield, and quality of plants that can be produced on alternative, physically defined, systems of management on the various types of soi