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Notes on the Geographic Significance of Soils-I: A Neglected Side of Geography

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from those written by each pupil individually and at other times it was written by the class together, all contributing from texts and supplementary books. This was a very popular exercise.

A recent visitor asked if I thought the children had learned the geography required by the course of study. I have not given a written examination but, from frequent oral reviews incident to our project, I have every reason to believe that the children have acquired fully as much knowledge as any class I have had.

The question was also asked, "Hasn't it taken too much time?" Frankly, yes, it has. It has taken some sixteen weeks, when the time usually given to foods is ten weeks. The subjects of clothing and shelter have had to be studied partly in silent reading and science periods. Our study of economics has included such subjects as production, transportation and consumption of goods.

The important outcome of the project from a purely educational standpoint has been in the development of the pupils' initiative, power of organization, and skill in judging. Under its influence, I have seen one Armenian boy aroused from an indolent, uninterested child to the most alert, active pupil in the room. In the fall, I called him lazy. In January, I found him the first to discover that the new "World Almanac" has "lots of things about sugar," that this or that reference book has a whole chapter about fruits, and "please may I use it in class?" I have seen a gradual but sure development of a spirit of courtesy and helpfulness toward each other. The pupils' eyes have been opened to discover interesting geographical items in the newspapers, so that one whole section of our bulletin board has been given over to such clippings. I believe that to some degree geography has become to the pupils a subject of live interest; and, from the viewpoint of a teacher of geography, I believe this to be the most important result of our Thanksgiving Menu.

NOTES ON THE GEOGRAPHIC SIGNIFICANCE OF SOILS—I

A NEGLECTED SIDE OF GEOGRAPHY

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The science of soils has been growing vigorously year upon year with a very fine amount of achievement to its credit. It has long since achieved recognition as a distinct branch of knowledge. In some curious manner this subject has received but slight attention from the

geographer. Our competence to evaluate soil conditions is in general slight, and does not extend much beyond a few poorly understood generalizations of soil fertility and geologic origin. It is possible that soils are to be ranked quite as high in the environment as is surface. In generalizations covering large areas they are of much inferior value to climate, but usually the smaller the region the more significant does an understanding of soil conditions become. And the future of geography as a field of research lies immediately in the more intensive working of restricted areas.

The matter of soils cannot be dismissed by the notion that soils are fertile or infertile any more than climate can be disposed of as being beneficial or hindering. There is little or no critical value attached to most of the meagre statements about soils that appear in the literature of geography. How much attention is paid in our geographic instruction to geological formations as sources of soil materials or to physiographic processes as soil forming agents? The study of physiography as a group of dynamic processes modifying the earth's crust is really a phase of dynamical geology. As the study of the origin and nature of land forms and of soils, together with the study of weather and of climate, it becomes the physical background of geography. Such a course, however, is practically not in existence. This physical background is developed adequately only on the climatologic side. The study of land forms is still largely a hope and that of soils is essentially a missing quantity in physical geography today.

Physical geography needs redefinition from the geographic standpoint and soils should be considered in it not merely (1) as the products of geologic formations and (2) as the result of physiographic processes, but as well (3) as being biologically modified, (4) as being profoundly affected by climate, and (5) as being changed by the processes of time. These five things represent the genesis of a soil and are fundamental and similarly significant notions of soil science. With the idea of the differentiation of soils according to origin in mind, the geographer is further interested in this subject in two ways, the question of soil fertility, and of the management of soils for specific production. Soil origin is the study of the environment that has resulted in the soil, soil fertility is the study of soil properties that affect its use, and soil management is part of the record of man's experience in gaining a livelihood from the land. Are not all three considerations so important that they must find emphatic recognition in the field of geography? One looks in vain in any textbook of geography or of physiography for

an even partially adequate recognition of this factor. Only one school it would seem has considered a course in soil geography.¹

Soil geography is as appropriately a branch of geography as is climatology. The study of soils as such is a separate science from which the geographer should learn to borrow, but in which considered separately he is no more interested than he is in meteorology. Meteorology as such is properly considered a branch of physical science. It has come to be taught in connection with geography at a good many institutions because often the geographer has been more interested in it than has the physicist, but the observations and principles of meteorology are essentially not in the province of the geographer. Similarly, where no courses in soil science are given in agricultural or other divisions, it may be desirable that the geographer provide them for his own interests. But this is not soil geography. Soil geography as yet is unformulated, but its guiding purpose is the study of the utilization of soils by man. We should have a knowledge of the different types of utility of the various types of soils, of the problems and possibilities of their improvement based on economic rather than technical considerations; in short we should know the economy of each important soil. It is possible also to study soil regions in terms of use as we study climatic regions in terms of human activities and progress. Agricultural colleges in many cases do that sort of thing now as an appendix to soil work, but they do it incidentally and mostly from the standpoint of individual crops. A soil region embraces a group of soils, in which certain dominant soils usually determine the soil practices for the area. In the soil region the utility of the individual soil can be considered only in terms of what might be called the soil association. This group economy has as yet received no systematic investigation. A balanced soil geography will inquire into the whole matter of the economy of the soil region, the competition between farm crops, and between plow use and grazing and forest use of the land. It will register the experiences of past and present use as to destructive exploitation or sustained yields of more intensive production. It deserves recognition as an important adjunct to the balanced study of the economy of the land.

At the least every student of geography should have training in the origin, fertility, and management of soils. These matters should form part of any serious introductory course in geography, whether it be to freshmen in college or to the teachers who are preparing at normal

¹ The University of Chicago established such work in 1921.

schools. The professional student of geography should have a course in soil science comparable to his work in meteorology, physiography, and plant ecology. And finally, perhaps, it may be hoped that the geography student of advanced standing will have the opportunity of studying at competent hands the soil geography of the world, and that laterite, chernozem, and podsol will become as intelligible terms to him as are mesa, fiord, and doldrum.

He who would read on soils can do no better than to begin with "Soils," by E. W. Hilgard, which after fifteen years is still without need of major revision. Hilgard went into exile as State Geologist of Mississippi, as his colleagues who were hard rock geologists thought. On the Gulf Coast he gained the experience that made him the pioneer of American soil work. In this geologically apparently uninteresting area he found a virgin field of soil studies which have become of classical significance. With his widened experience he later became the builder of scientific research in agriculture thru the monumental development of experiment station work under his direction at the University of California. Hilgard's "Soils" is a book of extraordinary experience and wisdom. Professor King's "The Soil," in the Rural Science series, is the other and earlier American classic, perhaps most highly interesting in its discussion of drainage and irrigation. To these two primers of soil science should be added A. D. Hall's "The Soil," summarizing the British view-point in particular and based largely on the work of the world's most venerable experiment station, at Rothamsted, England. To this general list may be added a thoroly modern handbook by Lyon, Fippin, and Buckman, "Soils, Their Properties and Management," the most symmetrical treatment of the general subject in English.

It is proposed herewith to publish in the *Journal of Geography* a series of summaries of recent work in soils that is of general geographic significance. These summaries will appear from time to time under the heading employed in this introductory statement.

GEOGRAPHY AND THE AUTOMOBILE

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Geographic factors have affected the automobile industry. Furthermore, its rapid expansion has made it difficult for teachers to keep up with its growth. Hence the following summary may be helpful.

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