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## CORRELATION WORK IN PEAT-LAND PROBLEMS

A. P. DACHNOWSKI

A detailed account has recently been published by the writer showing for the first time the different types of plant organic material which are found in peat deposits within the glaciated area of this country.<sup>1</sup>

It was pointed out that this aspect of the peat problem had a practical importance for the close correlation which exists between the botanical composition of the different types of peat material and its corresponding physical, chemical, bacteriological, or other merits. Research of preliminary character along these lines on at least two distinct types of peat was reported in 1912.<sup>2</sup>

More extended field work, including peat in the southern states and the Pacific Coast, not only has confirmed that further research in these directions would be very desirable, but emphasized that it is precisely this information upon different types of peat material which supplies the essential criteria concerning the development and structure of peat deposits. Moreover, the facts are of fundamental importance also in the selection of workable tracts and in questions relating to the best means and practices of utilizing this source of national wealth for intensive or diversified agricultural and industrial purposes.

Peat deposits afford a large and profitable scope for a combination of scientifically directed industrialism and agriculture. They are an important national asset for fuel and power, for food and for certain products, and their best development will come when industries move to or near well-chosen, interconnected accumulations of peat, in order to insure a regular and continuous supply of different materials and to meet the demands of different markets. A great advantage would result from a better understanding of peat

<sup>1</sup> DACHNOWSKI, A. P., Quality and value of important types of peat material. U.S. Dept. Agric., Bull. 802, 1919.

<sup>2</sup> ———, Peat deposits of Ohio. Geol. Survey Ohio Bull. 16., pp. 424. *pls. 8, figs. 29*. In cooperation with the U.S. Bureau of Mines, 1912.

deposits and what they mean as raw materials to certain industries and to the investigators themselves.

Whatever the purpose for which a peat deposit may be used, it should clearly be understood that individual deposits of peat material present considerable variation, both in structure (the relative position of different layers) and in content (the character and quality of the different types of plant remains). All deposits are not the same; they will not yield to the same treatment, and they do not have the same value for scientific studies or for crops and for manufacturing purposes. It is largely on account of the failure to recognize these differences in stratification and in the quality of the peat materials that much of the scientific work in chemical analyses, in fuel and fertilizer determinations, in absorption and other data in the field of American peat investigations does not meet practical requirements. Inability to select suitable peat materials and workable deposits has made the peat-land problem difficult and uncertain. Crop yields and manufactured peat products have been unsatisfactory in many cases because definite information is not available as to the character of peat deposits in the United States, their actual acreage, and distribution. The data are still lacking on which to base the percentage of peat-land now in use and the real value of the unused areas of peat-land in this country.

This situation is significant in the efforts now being made to use these resources for fuel. It is no doubt possible, in most cases, to extend the agricultural uses of peat deposits and at the same time to meet the industrial needs with suitable deposits for centralized power stations or other manufacturing interests. At present these problems are not being met with the aid and cooperation necessary for various sections of the country. A comprehensive national program or policy of peat-land utilization may now be formed with safety. It should provide for the present and future needs of peat problems, for the conservation of unworkable deposits of peat, and for the best methods of combining agricultural and industrial interests where conditions favor the production of fuel and finished peat products as well as the demand for food. Furthermore, the basic principles and characteristics governing the utilization of peat deposits should be set forth for the

education of those concerned with the practical management of peat-lands. It is this phase of the problem concerning which the least has been done.

The basic importance of the stratigraphy of peat deposits and of development methods and principles in the interpretation of plant remains, such as peat deposits represent, has not as yet been generally recognized in this country. The investigator who views products and processes from the genetic and correlational standpoint has not become as prevalent in the field of peat investigations as one might surmise, and naturally there is still wanting the proper understanding of the profile structure of deposits which would make possible a satisfactory coordination of scientific activities as well as the effective agricultural or industrial use of specific peat-land areas. The scientific as well as the economic consequences of peat deposits under utilization are only made clear by a knowledge of the structure of the deposits. Not only commercial considerations but also the grasp of past and present modifying field conditions, the habit of regarding peat deposits from the broader scientific, even though at times rather theoretical, point of view will further and extend the possibilities of peat-lands.

To obtain information on yields and cost of production, or pertaining to experimental work which will permit interpretation of results, there must be more definite knowledge than is available now in regard to peat deposits and their materials. There is need, among other things, of a comparative study of the structural features of American and European peat deposits. The areas selected should comprise the latest and most authoritative investigations of workers in peat problems. The aim should be to state the stratigraphic facts fully as the data available permit, and it should include views, correlations, and, where the scope of the work warrants, advice on matters pertaining to investigations or securing information in the general field of peat-land problems.

The method of procedure in comparing profile features of peat deposits should be based on the botanical composition and physical appearance of the layers of peat. These furnish the information that strata of a certain type occur in certain localities on the American and European continents; that they replace one another, the

later ones being superimposed upon earlier layers; that they were formed in the course of a characteristic sequence or succession of vegetation units; and that the layers are more or less evidently connected with responses to changes in basic habitat factors.

It is of great importance to realize the influence which structural differences in the peat deposits exert upon the progress of peat-land agriculture, upon the advancements in the peat fertilizer industry, and upon improvements in mechanical devices for excavating, pulping, drying, or converting peat into fuel and other products.

Peat investigations in this country have reached the stage where basic correlations are possible between pleistocene geology, the distribution of peat deposits and their post-glacial vegetation units, and the climatic factors which in the past controlled the development and structure of peat accumulations. Clements<sup>3</sup> has recognized the need of extending peat investigations into the past, correlating geology, climatology, and the migration of former plant populations. A complete study of peat deposits is no longer possible without the aid of other sciences. It will now be practicable to extend European investigations dealing with climatic changes to the morainic systems of North America and to show whether or not glaciations have been contemporaneous, whether they depended upon general or local causes, and whether plant populations have immigrated and were affected by alternating dry and humid periods.

The information upon the different types of peat material offered in Bulletin 802 will aid in a tentative way, it is hoped, toward a solution of various peat-land problems. There are numerous questions in physical, chemical, and bacteriological studies, and also in physiological investigations dealing with peat materials which can now be attacked more successfully from this new standpoint.

The improvement of the present situation in matters of drainage, the management and the general uses of peat deposits for agriculture and for technical industries, should become obvious if consideration is given to the structural differences of deposits, especially to those deposits where systematic field experiments are to be carried out or various lines of practices are to be tested. Peat-

<sup>3</sup> CLEMENTS, F. E., *Plant succession: An analysis of the development of vegetation*, pp. 512. Carnegie Inst. Washington, publ. 242. 1916.

land differs very much from that of mineral soils. The bulk of a peat deposit is water and must contain not less than 65-70 per cent of water to be serviceable for the growth of crops. Moreover, in the great manufacturing states, particularly of the east and south, workable peat deposits are often involved which have a considerable acreage. On account of the fact that drainage and the utilization of such areas must frequently ignore state lines and control canals, dams, and the use of water for transportation or for irrigation purposes, the lines along which production should arise within certain selected areas of peat call not only for policies and organization, but also for extensive operations and for the collective working and association of small holdings into larger units.

It is not too late to adopt a national policy with regard to the conservation and utilization of peat deposits that are too large for individual enterprises, or which have been reserved for colonization. The only safe course is to determine carefully the character of the peat-land in the various regions of this country, and to lay a foundation for the methods and practices which will convert suitable land into productive areas. This policy of aiding and cooperating with the several interests should have national importance as well as state and local significance.

The relatively small quantity of plant remains in any peat deposit with a 65-70 per cent water content has not only unusual physical properties, but it contains various groups of organic compounds of great technical importance, and provides also the culture medium for bacterial organisms by means of which the organic matter may be made invaluable to agriculture. Peat materials are usually deficient in mineral salts suitable for the growth of cultivated crops, and they are not well balanced in fertilizer constituents. It is superfluous, therefore, to point out that the burning of organic material to increase the productiveness of the land is an erroneous practice which should be strongly condemned. As a general policy extensive drainage projects far in advance of the actual utilization of the peat deposits concerned should not be regarded as economical.

Engineers in various professions, after a careful study of peat-lands in relation to the nitrogen problem and the question of central electric power stations, have arrived at the conclusion that we are

only on the threshold of the great returns which workable peat deposits hold out to the industries combined with agricultural production. Until field work and experiments in this country begin to be conducted systematically on peat deposits, however, with a well-understood profile structure, and provision made for complete and continuous records, the methods and the results obtained in Germany, Sweden, and Holland will remain the chief sources of information and of practice. A critical and comparative study of the structural features and field conditions of American peat deposits is alone decisive. It is prerequisite in establishing the scientific foundation and the best practices which are necessary to successful utilization of peat-lands in this country.

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