The Distribution and Diversity of Soil Fauna

It has become generally accepted, at least by ecologists, that the soil fauna play significant roles in soil systems. Various effects have been attributed to the fauna, the more general ones being regulation of decomposition processes in various systems. The nonspecialist who wishes to acquaint himself with soil fauna has had to cope with two types of literature: (i) the taxonomically-oriented introduction, often with an excess of minutiae, (ii) or, the highly specialized, jargonized research reports. John Wallwork, in this current book, offers an intermediate position which includes both a faunistic introduction and an evaluation of what the soil animals may be doing.

Wallwork begins with a brief "Introduction" to the soil fauna and methods for study. The main part of the text is a series of chapters organized by habitat; grassland, forest, and cold deserts, and so forth. Within each chapter the organization reflects the general theme of the book—identification of the factors influencing the distribution and diversity of the soil fauna. The nonspecialist may not be interested in a collection of species associations, but will find considerable value in other aspects of the discussions. Among these are a generalized description of the fauna to be found in this particular habitat, and, especially, the relation of soil properties to animal distributions and activities. A chapter on the influence of agricultural practices is particularly well done. Each chapter ends with a succinct, informative summary and a set of references which are remarkably current.

The book is well written, abundantly supplied with high quality illustrations, current, and well bound. For the price, it ought to be.—D. A. Crossley, Jr., Department of Entomology and Institute of Ecology, The University of Georgia, Athens, GA 30601.

The Development and Function of Roots

"Out of sight, out of mind." So has it been until relatively recently with our awareness of the microscopic structure of roots, their growth and functioning at the cellular and organ level, and their interrelationships in the biotic and abiotic environment. During the past 10 years or so, however, roots and root systems have come under intensified study by all manner of plant scientists, those with basic and applied orientations, plant anatomists and physiologist, biochemists, agronomists, and foresters. From this resurgence has come the volume under review, the result of a week-long symposium sponsored by Harvard's Maria Moors Cabot Foundation and held at the Harvard Forest, Petersham, Massachussets in 1973.

To evaluate critically the details of all 24 contributions making up this book is surely beyond the competence of any one reviewer, but it is reasonably possible to lay out for viewing a part of the broad compass of the symposium. It is useful to know that the book is divided in the following parts: (i) The largest of 275 pages concerns the organization and structure of roots; this is the section on cytology, anatomy, ecology, architecture, and growth and development. (ii) A second portion, 185 pages, is given over to papers which discuss the physiological aspects of root function as opposed to the mechanical functions of roots. Here we find information on cellular metabolism, auxin transport and production, geotropism, water relations, and ion transport. (iii) The third and smallest part of the book is about the relationships between roots and the soil microflora, ecology at the cellular level, if you wish. Here in only four papers are the fascinating—and important—stories of roots, nodule initiation, soil microorganisms, mycorrhizae, and the fixation of atmospheric nitrogen through symbiotic relationships between higher plants and actinomycete and other bacteria.

The papers are comprehensive accounts, thoroughly documented with extensive bibliographies in most cases, of original research by the authors themselves and other modern workers. In many cases there are attempts to relate recent work to historical studies. These sometimes tend to diminish the importance and validity of long-held beliefs and other times to lend increased support to studies performed many years ago. For example, the reader of one paper is "urged to discard the classical textbook idea of an "absorption zone" near the root apex and to believe rather that water and some cations may be absorbed along the [entire] length of the root..." On the other hand we learn that hoped for significant new information on endodermal structure using electron microscopy was not to result and we find that "modern microscopy has not added greatly to these early [i.e., late 19th and early 20th century] and impressive observations... except to show that the endodermis is a highly perforated structure..."

Auxin production, we have been led to believe, was the exclusive province of the shoot and we have read about apical dominance, *Avena* coleoptiles, and agar blocks ad infinitum. Now there is new evidence discussed for the role of auxins in roots, its production there in situ, its markedly acropetal movement toward root apices, and the potentially large effect on root growth and cell elongation. We are accustomed to think of genetic variability only in terms of the aeral parts of plants, yet, not surprisingly, we find that "the use of a spade to excavate roots in a commercial planting of any horticultural crop turns up much variability [in roots]..." which can be traced to the genetic system. This phase of root system study, i.e., the effect of the genome on the pattern of root growth, is relatively new. It is stated that "approximately 30% of the plant genome is involved in root growth and development..." and that there are... four main types of root based on the genetic, biochemical and developmental control of their initiation." Clearly, here is a fertile field for intensified research by plant breeders, biochemists, horticulturists, agronomists, and others.

The volume has been edited by John G. Torrey of Harvard and D. T. Clarkson of the Agricultural Research Council Letcombe Laboratory, an onerous task frequently not fully appreciated by an unenlightened reader. Torrey and Clarkson have done their work well; the authors have set a high standard which may well be emulated. The readers will be treated in full measure to an important series of timely papers on several pertinent facets of study on roots and root systems.—WILLIAM LOUIS STERN, Department of Botany, University of Maryland, College Park, MD 20742.

Glacial Till - An Interdisciplinary Study

The book contains 22 papers presented at a 2-day conference held in Ontario in February 1975, organized under the auspices of the Royal Society of Canada in association with the geoscience organizations of Canada and with the Commission on Genesis and Lithology of Quaternary Deposits of INQUA. The book is intended to be a complementary volume to a similar symposium held in Ohio in 1969 and published under the title "Till — A Symposium." Comparison of the two volumes suggests that this is a large extent achieved. The current volume emphasizes topics relating to glacial till not adequately covered in the Ohio volume.

The book is divided into four sections:—Geology of tills—six papers; Pedology and tills—four papers; Mineral exploration and till—four papers; and Geotechnical aspects of till—eight papers. Of the 22 papers, 17 included refer largely or wholly to Canadian experiences. Because of the relatively short time between presentation of the papers and publication of the volume, a point for which the editor and publishers are to be congratulated, each paper presents an up-to-date literature review of the topics considered. However, as noted in the preface some inevitable duplication has occurred, but papers have been published without editors cuts to reflect faithfully the views of the various authors.

As noted on p. 50 by J. S. Scott. "... till has, directly or indirectly, a strong effect on such diverse phenomena as soil-forming processes, periglacial processes, modern fluvial and lacustrine sedimentation, marine sedimentation, plant communities, engineering properties of building sites, and human nutrition and settlement." Thus while the Ohio volume concentrated largely on the geological aspects of till, this volume has more fully covered pedological and engineering aspects. It remains to be seen of course, whether additional synopses are organized to cover the ecological and anthropic aspects.

Of particular interest to pedologists are the papers—"Pedological Aspects of Glacial Till" by R. J. Arnould, "Pedological Aspects of Till Deposits in the Province of Quebec" by C. R. De Kimpe, G. A. Bourbeau and R. W. Baril; and "Mineralogy and Topography of Glacial Tills and Their Effects on Soil Formation in Saskatchewan" by D. F. Acton and J. B. Feuermann. Other papers, in particular "Geology of Canadian Tills" by J. S. Scott and "Texture, Mineralogy, and Petrography of North American Tills" by P. F. Karrow, also provide valuable information of use to pedologists.

The title of the book Glacial Till—an Interdisciplinary Approach is volume only serves to highlight the multidisciplinary approach of the various authors. This lack of communication between the various disciplines is evident in the frequent misuse of the term soil, particularly in papers dealing with the geological aspects of glacial till. In fact in a few papers the terms soil and glacial till become synonymous. The quality of many of the figures has also suffered as a result of reduction for publication with much of the fine detail in some figures largely illegible.