

explosion to the field of vegetation and soil history certainly shows this catastrophe in a fascinating soil-forming perspective.

In places the author is distinctly speculative—an admirable trait in a subject that is at times beleaguered by hesitancy and procrastination (*vide* the lack of agreement among soil scientists on systems of soil classification). His explanation of the uneven terrain in the tundra is simple but entirely acceptable, although his declamations on the role of fire in vegetation ecology require more statistical evidence than is provided.

In terms of balance, the text leans very heavily on the side of vegetation. An outstanding account is given of the principal species to be found in the various climatic zones with cogent reasons for their being there. This will make excellent reading for foresters and decorative horticulturists in their pursuit of soil studies. Incidentally, the bracketing of tree names with Latin binomials is not as pedantic as would at first seem. The vegetation maps and tables of climatic climax correlations help to illuminate the script and do credit to the publishers.

When considered as a reference book on soils, its limitations are soon apparent. Pedologically, the author does not appreciate, or fails to stress, that vegetation is only one facet of a single soil-forming factor. Dokuchaev's concept of soil being the product of five soil-forming factors (namely, parent material, organic matter—including vegetation, climate, relief and time) each of equal importance if differing in content and quantity, is universally agreed by soil scientists.

The mechanisms of physical and chemical actions are clearly enough explained for the type of reader referred to in the cover although chemical terms could be used more exactly, and a number of interesting and intriguing statements are made without due qualification, for example, on the formation of raised bogs and on the absence of ice sheet in Asia. Finally, there could have been at least a hint at the agricultural possibilities of the various soils.

Notwithstanding the criticisms, this is a book which had to be written, and it will certainly find a place in recommended if not essential reading for students of many faculties and others interested in botanical geography and its relation to soils.

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ANIMAL BEHAVIOUR

Roots of Behavior

Genetics, Instinct and Socialization in Animal Behavior. Edited by Prof. Eugene L. Bliss. Pp. xi + 339. (New York: Harper and Brothers. A. Hoeber Medical Book, 1962.) 16 dollars.

TITLES of books on behaviour have almost exhausted the possible permutations of a small population of words. We have had the organization, principles, elements, foundations, structural basis of behaviour, the behaviour of organisms. One recent work bore the unadorned title, *Behaviour*. The work under review has found a new word—"Roots". It is a symposium of twenty-three papers by thirty-one authors (S. Altmann, Bruell, Calhoun, Carpenter, Clark, Collias, D. E. Davis, Denenberg, Dethier, Dilger, Fuller, Goy, Harlow, Eckhard Hess, J. Hirsch, Jakway, Lehrman, S. Levine, McClearn, D. A. Rodgers, Rosenblatt, Ross, Sawin, Schneirla, Scott, Shaw, Tobach, Turkewitz, Waller, W. C. Young, Zarrow). Their contributions are grouped under four headings: "Genetics of Behavior", "Instinctual Behavior", "Early Experience", and "Social Behavior". From the groupings it can be inferred that the various roots penetrate into different soils, and indeed some of the roots seem to be the crop as well. The crop is quite definitely spelled -ior and not -iour; it is a pity that no non-American participants were included, since the

views of leading authorities such as Tinbergen, Hinde, Thorpe, Lorenz, and others are represented only indirectly.

Be this as it may, the volume will be a useful addition to many departmental libraries, although it is unlikely that many individuals will think it worth 16 dollars. It is useful because of its breadth—very few of us can keep up with detailed knowledge in all four areas of interest: it contains a number of articles of authority and substance. I suspect the book will be of greater interest to experimental psychologists than ethologists, who will tend already to be familiar with much of it.

It is obviously impossible to give a detailed review of 23 papers. I found the genetics papers by Bruell and by Rodgers and McClearn quite helpful both as general reviews and as accounts of current experimentation. The section on instinctual behaviour is the longest and meatiest. Young's paper on sexual behaviour is a brief but clear and provocative review by one of the pioneers in that area of research; Lehrman follows on from it quite naturally and with a sensible analysis. Harlow's account of his important developmental work with monkeys will be familiar, by now, to many readers, but as always it makes for entertaining reading.

Fuller and Waller's paper on early experience is useful for its analysis of the methodological aspects of the problem and for its discussion of experimental design. Again, many readers will be familiar already with Levine's experiments on infantile stimulation, but some new facts are presented which seem to require a modification of his earlier conclusions. Levine appears to combine, in this paper, a reluctance to speculate with polemics, depending on the facts under review, and one of his main conclusions, that "stimulated animals are more reactive to distinctly noxious situations, but the nonstimulated animal appears to react to a greater variety of environmental changes" (p. 250) seems plausible but is based on very little evidence. Hess and Collias both deal usefully with imprinting and following responses, Collias taking a broader and somewhat more cautious approach than Hess, whose paper is principally concerned with his admirably quantitative research in an area that is apt to be rather anecdotal. His distinction between imprinting and ordinary discrimination learning, however, does not appear to me to be carefully reasoned.

Finally, the section on social behaviour is flimsy, perhaps necessarily so. Only Carpenter's paper combines substance with clarity. His account of the long-term observations of howler monkey populations over thirty years is surely unique, but the analogy between animal groups and homeostatic mechanisms is very rough, and there is a sense of anti-climax by the end of the paper.

The editor admits that "the volume, like any collection of papers by different authors, lacks the evenness of style to be found in a textbook by one author". But there is little evidence of the editor's red pencil having been much exercised. The book often gives the appearance of having been hurried and first-draftish, and sometimes authors are quite unnecessarily ponderous and verbose, for example, ". . . the food hopper [in the diagram] may be identified by its cone-shaped dorsal aspect"—nothing else in the diagram is cone-shaped except the food hopper. "Unfortunately, no measures of disruption of this behavior were made. I say unfortunately because as discussed below, alteration of the duration of this behavior—that is, shortening it—should be the first behavior disrupted." ". . . studies in our laboratory indicate that the behavioral bond between the female and her offspring begins at parturition." In Hess's paper we find, "We make use of the Hess Pecking Preference Apparatus (Hess, 1956)". And so on. But those who can tolerate a bit of fertilizer with the roots will find most of these plants healthy and worth cultivating.

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