

as such, Wardlaw treats us to some fascinating facts about plants; how they develop from embryos and apices and how they react to experimental treatments. The basic thesis is that plants (and animals too) are reaction systems in which growth-controlling substances react together with nutrients, etc., to determine the course of development in a genetically determined milieu. Wardlaw sensibly abandons the idea of specific organ-forming substances in favour of balances of endogenous chemicals involved in controlling the synthesis of nucleic acids and such like. The genetic milieu is brought in because different plants react differently even to the same experimental treatments. It is true that a faint element of mysticism may be discerned in places, but the book mainly reports and interprets facts critically.

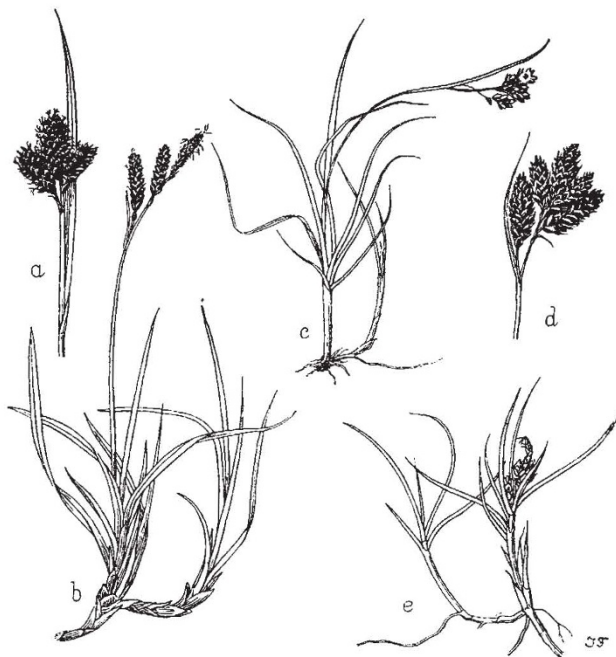
Most readers will look at the seven or eight chapters mainly concerned with shoots for an authoritative account of the modern work on plant morphogenesis, and they will find excellent reviews covering most of the recent physiological ideas in this field. The problems are stated especially clearly in the discussion of the relation of chemical experiments to bud and leaf formation. Morphological problems are presented which will be new to many readers, for example, the work on the orientation of leaf primordia in buds, tendrils initiation and symmetry in flowers. One assumption, namely, that incipient vascular tissue does conduct substances to and from an apex better than the surrounding ground tissue and therefore has an important role in development, is made without much evidence. Similarly the view that the summits of shoot apices develop more slowly than the flanks of the meristem is also accepted rather uncritically. The only valid evidence for this would be measurements of rates of mitosis and these are not yet available. In fact the book may be criticized by some for its general lack of quantitative data: there are no tables of figures and only two graphs in hundreds of diagrams. Clearly numbers do not appeal to Wardlaw and perhaps this is why he regards roots, about which there are far more quantitative data available, as "troublesome". I do not think it is proper to criticize an author for not writing some others book for, although I am sure the future of morphogenesis, like other branches of biology, lies in quantification, a monograph like this should reflect the interests of the author and its success should depend on how many people the author interests in his subject.

On these grounds I am sure this is a good monograph. For me it is Wardlaw's best book. There are flashes of humour and some sly, and perhaps undeserved, thrusts at

some of his colleagues and all these help to make the book readable. There are a few mistakes including one that reverses the sense (page 258). The names of biologists are occasionally spelt wrongly and at least one reference is omitted from the bibliography. The index is rather meagre for a book that surveys such vast ideas.

F. A. L. CLOWES

PLANTS IN GREENLAND



Five species of sedge. *a*, *Carex norvegica*; *b*, *C. bigelowii*; *c*, *C. bicolor*; *d*, *C. atrata*, and *e*, *C. subspathacea*. From *The Flora of Greenland* by Tyge W. Böcher, Kjeld Holmen and Knud Jakobsen, which has been translated into English by T. T. Elkington and M. C. Lewis (P. Haase and Son, £5). The second edition of *Grønlands Flora* has been published in both Danish and English in response to requests for a complete English translation of the book. It is a slightly modified version of the first edition—several new species are included and several critical groups have been revised.

Applied Science

SPOILING THE SEAS

Pollution and Marine Ecology

Edited by Theodore A. Olson and Frederick F. Burgess. Pp. xvi+364. (New York and London: Interscience Publishers, a Division of John Wiley and Sons, 1967.) 96s

THE pollution of natural waters, either by accident or design, by the materials and products of man's activities inevitably carries with it potential hazards. Pollution may be destructive of the amenities of rivers and coastlines as places for relaxation, sport and recreation; it may endanger health; be detrimental to economically important inshore fisheries; and it may radically change the character of the communities of plants and animals exposed to the contaminating materials.

In areas of industrial development some measure of pollution of rivers, estuaries and coastal waters is unavoid-

able. The question at issue is: to what extent can the needs of industry and economic development be met without seriously and unnecessarily encroaching on other essential requirements of amenity, fisheries preservation and the conservation of natural floras and faunas? But before we can hope to answer this question we need to know much more than we do about the nature, extent and effects of the many kinds of pollutant substances that are continuously or from time to time discharged into rivers and inshore coastal waters. We need to know, for example, the kinds of materials that are being discharged, in what quantity and where, how far and in what directions they are carried, how long they last without change by bacterial action or other agencies, and what effects they have on waters and on the organisms that live within them during their passage. These essential elements of information, though fairly well documented for some river