to all concerned, for the volume furnishes a unique glimpse into the scientific thoughts, prejudices, and fancies of a provocative and versatile botanist.

This is a book completely without graphs or tables, but studded with many simple sketches of plants showing morphological and growth responses to surgery, chemical treatments, and environmental stimuli. The absence of "hard" data makes some of the conclusions difficult or impossible to accept, but does increase the readability and charm of the author's message. Thimann has wisely protected the reader against some of the unwarranted conclusions by carefully placed and worded footnotes (*Dostál:* In the phloem as a whole, the flow of organic substances can take place in opposite directions at the same time. *Thimann footnote:* Probably not the case in individual sieve tubes). Yet other dubious points have been permitted to remain unchallenged, and some misinformation is therefore bound to be communicated. This is not overly serious, for the main effect of this work will certainly be to stimulate productive adventures into plant morphogenesis, even if such adventures disprove some of Dostál's cherished ideas.

Dostál is a convinced Michurinist, or at least writes like one. In this post-Stalin era, such views come as a bit of a shock. Thimann handles them gently, almost paternalistically. When Dostál writes, "There is no reason to doubt that during transplantation [that is, grafting] the transformation of both partners is so deep that not only do they themselves show new characteristics in their individual lives, but even their seeds may be affected and transmit new characteristics," Thimann responds with this footnote: "Most Western workers think there is grave reason." Period and end of transmission. What else, in fact, could Thimann have done? Summarized all of modern genetics? It simply wasn't worth doing. If you do read this book, I am sure you will agree that part of its value lies in its delineation of the thinking of a productive biologist, perhaps representative of many of his colleagues, whose basic assumptions and articles of faith are sometimes very different from our own.

Anyone who has enjoyed the late Edmund Sinnott's *Plant Morphogenesis* is bound to want to read Dostál, both for contrast and for supplementation. For those who have little background in this field, I would suggest that they read Dostál and, as an antidote to at least parts of his treatment, Sinnott or a similar work.

We need more intercultural experiences of this kind. I hope Thimann's initiative will be followed.

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On Reading Sign

Tracks. E. A. R. ENNION and N. TINBERGEN. Oxford University Press, New York, 1967. 63 pp., illus. $4.25.

We have a number of books illustrating animal tracks—by Brunner, Mason, Murie, Seton, and others—drawn in flat black and white or photographed from plaster casts. Here is a different treatment—superb photographs of fresh tracks, in sand or mud or snow, sparkling in the early morning sun and nicely accentuated by contrasting shadows.

This little gem is itself a good example of serendipity; the materials were gathered as opportunity afforded in the course of other investigations. Both authors are well-known British naturalists, and their subjects are familiar members of the English fauna. The remarkable photographs, by Tinbergen, are delightfully supplemented by Ennion's lively drawings, sometimes superimposed over the photograph of the tracks, showing the animals in the act of making their telltale sign. The pictures constitute the text, and the brief legends aid in interpreting the action.

Like the detectives of fiction, outdoorsmen and naturalists are given to reconstructing past activities from the fragmentary evidence that remains. A deep footprint here, a few feather marks there, some scratches in the sand or an unusually long gait recorded in the snow may be all that is left to record a scene from some wildlife drama. Across these pages move snakes and toads, herons and goshawks, hedgehogs, badgers, polecats, and sandfleas. A woodmouse hastens over the ripple marks on a sandy shore. A cormorant, striding across the mud, pauses to stretch its wings to dry. A weevil, toiling up a steep slope, is thwarted as the dew evaporates and the sand collapses. An oystercatcher, foraging along the strand, takes off at right angles as the wind shifts. A fox, having caught and partly devoured a rabbit, caches the remains and covers them with grasses. A pair of shelduck escort their nine ducklings from the dunes to the safety of an estuary. Foxes apparently were particularly apt subjects. The final pages show the spoor of vast herds of wildebeeste and zebra on the Serengeti plains.

This small book, attractively produced, represents the ultimate in nature interpretation, in "reading sign" of past

A natterjack (*Bufo calamita*) traverses a sand dune. [From *Tracks*]

action. It teaches an awareness of the many details imprinted all over the countryside, and helps us read the stories they can tell.

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Chronicles of Marine Research

Danske Ekspeditioner pa Verdenshavene. Danish Expeditions on the Seven Seas. TORBEN WOLFF. Rhodos, Copenhagen, 1967. 336 pp., illus. $21.

The Danes have contributed to our knowledge of life in the seas of the world out of all proportion to their population and material resources. The politicians, the navy, the nobility, and the industrial tycoons have all contributed both interest and funds to the support of expeditions to all the seas of the world over a period of 200 years. Such names as Forskål (a Swede who did not return from the first Danish scientific expedition) and Steenstrup (who studied the alternation of generations) are memorialized in the names of animals; C. G. J. Petersen and Johannes Schmidt are names synonymous with marine biology; and the oceanographer relies upon Copenhagen sea water as his ultimate standard for determining salinity. As for our own times, everyone concerned with the study of the sea has heard of Anton Bruun and Gunnar Thorson, as well as of the author of the volume under review, who is well known as a member of the *Galathea* expedition and present representative of the long and distinguished line of Danish crustacean specialists. The Danes have just reason to be proud of this long and excellent record of marine research, which began with the times of Linnaeus and continues to this day.

Now this story, from the first expedition to Arabia in the naval ship *Grønland* to the recent expeditions in the Indian and Atlantic oceans, is told by Wolff in a volume as imposing as one of the older expedition reports.

It is part of the tradition of Danish science that its work should be made accessible to the world in languages other than Danish. This seems to have been started with the publication of the *Ingolf Reports* in the 1890's, although Wolff does not make any further comment on the matter. I have always understood that H. J. Hansen, who was probably the most irascible of all carcinologists, had a great deal to do with this. This book, of course, follows the tradition: the upper half of the page is Danish, the lower English. The book is obviously a labor of love on the part of the author as well as the printers, and there is much valuable information about the organization and conduct of the numerous Danish expeditions to the seas of the world. Now and then one would wish for a bit more information about the personalities of the people involved, and certainly more about the Danish studies in their own seas; Petersen is sadly slighted in this regard. Another oversight, perhaps natural, is that it is seldom mentioned that success in this field is the result of willingness to undertake long, hard hours of drudgery studying the material and preparing the results.

There are several sorts of illustrations in the book: photographs of ships, people, and places, reproductions of original black-and-white drawings of organisms, diagrams of gear and field procedures and track charts, and color plates. Most of the color plates are reproductions originally made for old reports in the glorious days of lithography, and several have been made directly from paintings in museum collections. It is heartening to see that faithful reproduction of this kind of illustration is still possible, even with a screen separation process.

This book is not only a picture book for the library table; it is a significant contribution to the history of marine biology, and will be consulted as a primary reference. Perhaps the review copy at hand was roughly handled in transit, but it does appear that for such an expensive book with such heavy paper the binding was perhaps not adequately reinforced.

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Great Waters. A Voyage of Natural History to Study Whales, Plankton and the Waters of the Southern Ocean. ALISTER HARDY. Harper and Row, New York, 1967. 542 pp., illus. $10.95.

This is a book full of pleasure for practicing oceanographers and for others concerned with the matter of oceanography. It recounts the 1925-to-1927 voyage of the British Royal Research Ship *Discovery* "to study the Antarctic seas and all within them that might have a bearing on the lives of the great whales which there formed the object of so rich a fishery." The investigations begun on this voyage were part of the British contribution to the great international flowering of oceanography that took place in the two decades before World War II. The author was chief zoologist on *Discovery*, and the backbone of this account is the journal he kept during the voyage. The book also includes much material from other sources to round out the story of the Antarctic ecosystem which supports the whales that have been so heavily hunted. Hardy, who is renowned as a specialist in plankton, is exceptionally well qualified to explain its great importance, and he does so clearly. He puts into perspective the studies based on this and later voyages, giving a good general résumé of most of the contents of the first 34 volumes of the *Discovery Reports*, and, more important, makes them coherent for even the nonspecialist. For the younger oceanographers, accustomed to electronic and acoustic aids in their fieldwork, the book gives the feeling of the days when, for example, the diurnal vertical migration of plankton was being confirmed by the new closing tow nets. The large picture of productivity in this immensely fertile ocean is clearly drawn, and shows the complexity and also the simplicity, as in the very short food-chain leading to the great whales. The small planktonic animals are not merely numbers in tables and charts but are also described as animals with their own, various ways of life.

Sir Alister communicates his appreciation of the impressive beauty of the sea and the rugged coasts both in words and in his watercolors. It is too bad that expense prevented the inclusion of more of these sensitive paintings in this abundantly illustrated book. The publishers have produced a good-looking volume, but have served the author and his readers ill in the plethora of distracting and careless misprints, not only in scientific names but also in names of people and places and in common English words.

Among the pleasures of *Great Waters* are the occasional personal glimpses of scientists known to many of us by their work, and to some of us personally. The author himself is revealed from