mental function, is true only if x is restricted to a finite region. Minor unimportant errors of this kind are easily spotted and corrected by an attentive reader. However, there is one serious error of omission. The student of this book has no way of knowing that the theory of distributions was created as a systematic mathematical discipline by Лоран Шварц, that without the contributions of this important mathematician chapter 39 of *Differential Equations of Mathematical Physics* would never have been written.

Scripta Technica and H. J. Eagle, the translation editor, are to be congratulated for providing a competent, readable translation.

One final remark. The price of $21, for a book that undergraduate and beginning graduate students should own, is sinful. I feel strongly that, if necessary, the governments of the Western nations should translate and publish such books so that students can purchase them at a reasonable price. Perhaps then the American student could buy this translation for the same price that his Russian colleague pays for the Russian original.

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British Rocky Shores

The Ecology of Rocky Shores. J. R. Lewis. English Universities Press, London, 1964. xii + 323 pp. Illus. 42s.

Popularized by the Prince Regent and romanticized by Gosse, the seashore is now the accepted place for summer recreation. It is also an area of great scientific interest, challenging to the ecologist and instructive to the student. Unfortunately, so far as these narrow margins between sea and land are concerned, the pursuit of pleasure and the pursuit of knowledge are not entirely compatible. In these overpopulated islands those parts of the coast that are still free of pollution are now in danger of being ruined for the naturalist by urbanization and the unintentional but constant interference that takes place during the summer months. Lewis's excellent work on British rocky shores is therefore most timely. It affords a detailed description of the marine life of the unspoiled rocky shore, dealing mainly with the northwest of Scotland and the west of Ireland, areas that are not fully accessible by the popular motor car.

Lewis, though himself a zoologist, follows the good tradition of marine biology in treating both animals and plants as equally important and interesting members of the intertidal communities. The introductory section describes two contrasting British shores, one sheltered from, and the other exposed to, wave action. He thus emphasizes not only the well-known pattern of vertical zonation but also the equally important influence of the force of the waves. It is regrettable that he introduces yet another system of names for the major littoral zones but, since his system is no more than a renaming of the widely applicable system of the late T. A. Stevenson, it need not cause confusion. There follows a discussion of the factors influencing zonation—namely tidal rise and fall, wave action, topography, and climate—and a consideration of the factors influencing geographical distribution.

In the main descriptive sections, Lewis classifies the shores of the open coast under three headings: those of moderate exposure dominated by barnacles; those of greater exposure dominated by mussels; and sheltered shores dominated by brown algae. Further chapters deal with specialized habitats such as rock pools, crevices, very sheltered lochs, and rapids. In the final section the author attempts to analyze the causes and foundations of the patterns of distribution of intertidal organisms; a stimulating feature of this section is his presentation of unsolved problems.

The book is beautifully illustrated throughout with original diagrams and photographs, and it contains much new information in addition to the valuable bibliographies at the end of each section. Both the author and the publisher are to be congratulated for bringing such a full and delightful book within the range of the students' means. Yet Lewis's enthusiasm and single-mindedness have led to the one major criticism that might be leveled against the work: the subject matter is treated in such minute detail, and in places with some unnecessary repetition, that the nonspecialist should be advised to dip into it, and not to attempt to read it from cover to cover. Had there been a little more discussion of zonation in terms of behavior, physiology, and life cycles, the book would have been more generally useful and certainly more readable. For the specialist, it provides a full and well documented account of the present knowledge of the biology of British shores, and deserves a place in the libraries of all universities and schools that encourage the study of ecology.

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Hormone Action

The Biochemical Aspects of Hormone Action. A symposium held at St. Louis, Missouri, in 1962. Albert B. Eisenstein, Ed. Little, Brown, Boston, Mass., 1964. xvi + 240 pp. Illus. $8.50.

This volume contains ten essays that were read at a symposium held at the Jewish Hospital, St. Louis, Missouri, late in 1962. Each essay is substantively a review of some phase of the essayists own work with enough interweaving of ideas and hypotheses, provided in part by comments of the audience, to make the volume as a whole pleasurable and stimulating to read. Since the essayists include H. Rasmussen, C. R. Park, C. H. Li, I. L. Schwartz, A. Leaf, E. W. Sutherland, P. Talalay, G. M. Tomkins, and O. Hechter, the sampling of thought in the area of hormone action is wide for so small a volume.

Vasopressin is particularly well covered by Schwartz, Rasmussen, Marc-Aurele, and Christman, who describe in detail experiments on the sulfhydryl-disulfide interchange reaction with rat kidney and toad bladder, and by Leaf, who reviews the effects of vasopressin on sodium transport and membrane permeability. Also of special value is the essay in which Park and his colleagues review a substantial part of the work of the Nashville group on the effects of insulin on transport in heart muscle and include a description of techniques as well as a clear exposition of their views.

Hechter, Emberland, and Yoshinaga provide a useful compilation and discussion of the various effects of insulin on isolated, rat diaphragm muscle, a description of their attempts to demonstrate insulin modification of spatial relationships of the proteins of dia-

phragm muscle, and some provocative thoughts concerning the action of hormones on the cell as a whole. Other subjects covered are the action of parathyroid hormone on mitochondrial metabolism, melanotrophic and lipolytic activities of various synthetic peptides, the action of thyroid hormones in vitro, the cellular location of adenyl cyclase, the mechanism of action of steroid hormones, and the regulation of biological function mediated by changes in protein structure.

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Botany

Pollen Physiology and Fertilization. A symposium held at the University of Nijmegen, Netherlands, in August 1963. H. F. Linskens, Ed. North-Holland, Amsterdam, 1964. xii + 257 pp. Illus. $11.20.

In this volume papers contributed by 37 authors are arranged in seven sections: Physiology of the Embryo Sac; Biochemistry of Pollen Wall Formation; Metabolism of Pollen Tubes; Boron and Pollen Tube Growth; Chemotropism of Pollen Tubes; Controlled Fertilization; and The Incompatibility Barrier. Within so wide a range of topics, the individual papers vary in their valid contribution to the expressed purpose of the symposium —to focus attention on "those fundamental processes in higher plants leading to formation of the zygote."

The following papers are representative of the collection. J. Heslop-Harrison has provided a provocative account of detailed observations on pollen development in *Cannabis* and *Silene*. The synthesis of callose in pollen mother cells of *Cucurbita* is briefly described, primarily in the form of a model based on electron microscopy by W. Eschrich. L. Waterkeyn's detailed report on the incidence of callose in the microsporocyte, microspore, and pollen grain of *Pinus* represents a continuation of long-term studies carried on at the Institut J. B. Carnoy. In describing pore formation in pollen of *Poa*, J. R. Rowley includes a thought-provoking discussion of the still-controversial matters of exine formation and function. E. A. Britikov, N. A. Musatova, S. V. Vladimirtseva, and M. A. Protsenko suggest, on the basis of an extensive exploration of approximately 200 species of seed plants, that the unusually high proline content of pollen relates, in part, to active protein synthesis after pollination. According to J. Tupý, exogenous proline does not stimulate the growth of pollen tubes in short-term cultures. E. Hrabetová and J. Tupý found that raffinose is the best substrate for pollen tube cultures of long duration. The relation of boron to pollen tube growth continues to be a topic of research interest. I. K. Vasil points out that the general deficiency of boron in pollen is counterbalanced by comparatively high levels of boron in stigmatic and stylar tissues. P. Fähnrich found that five different homologues of boron were ineffective stimulants for germinating pollen. R. G. Stanley and F. A. Loewus concluded, on the basis of their observations on germinating pollen of *Pyrus*, that boron plays a definite role in pectin synthesis.

Small populations of pollen grains rarely germinate well in vitro, but J. L. Brewbaker and B. H. Kwack provide evidence which indicates that calcium overcomes this population effect. Their use of the expressions "pollen elongation" and "pollen growth," with reference to growth of pollen *tubes*, seems inappropriate in terms of ontogeny of the pollen grain. W. G. Rosen calls attention to the contradictory nature of much of the literature on chemotropism in pollen tubes. M. M. A. Sassens presents a photographic record of the generative *cell* of *Petunia* pollen.

P. Maheshwari and K. Kanta describe the control of fertilization in four species in the *Papaveraceae*, and in two Solanaceous species, through use of intraovarian pollination as well as test-tube fertilization. I. M. Polyakov stresses the multistage nature of the fertilization process. In analyzing the successive steps involved in fertilization, the designation of one step as *gamogenesis* appears unfortunate because the term is applied to the phase that is typified by fusion, rather than by generation, of gametic elements. According to M. Kroh, two enzyme systems, cutinase and pectinase, are operative in the initial penetration of pollen tubes into the walls of stigmatic papillae in the *Cruciferae*. It is suggested that, in self-incompatible crucifers, formation of activator-enzyme complex is inhibited by the stigma. By removing anthers in *Petunia*, H. F. Linskens uncovered evidence of a growth principle responsible for normal maturation of the female organs. Figures 5 through 8 in this paper are somewhat difficult to interpret owing to their skimpy explanatory legends. According to A. Hecht, inactivation of incompatibility substance in stigmas and styles of *Oenothera* is a temperature-dependent chemical process. M. Hagman applied disc electrophoresis and serological reactions in a pilot observation of pollen and style relationships in three species of *Betula*.

There is no summarizing chapter, although helpful portions of the recorded discussions are included. Many of the papers provide up-to-date, critical citations to the literature. There are occasional typographical errors, and "species" is applied (p. 194) where agronomic variety is obviously involved. The expression "tubes of immature pollen" (p. 236), without further description, appears to be a non sequitur. Use of the term *microspore* (p. 121) as a synonym for pollen grain is unfortunate. The pollen grain released from the mature anther is, of course, the two- or three-celled gametophyte.

The volume has been attractively produced with admirable promptness.

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New Books

General

Alluvial and Palynological Reconstruction of Environments, Navajo Reservoir District (Anthropology Paper No. 13). James Schoenwetter and Frank W. Eddy, with a section by Eleanor Jane Nettle. Museum of New Mexico Press, Santa Fe, 1964. 155 pp. Illus. Paper, $3. A report on field studies performed during parts of 1958, 1961, 1962, and 1963 as part of a program to investigate and study materials relative to the prehistoric occupation of the area that is now being flooded by Lake Navajo.

American Aspects. D. W. Brogan. Harper and Row, New York, 1964. 207 pp. $4.

Animal Communication. Hubert Frings and Mable Frings. Blaisdell (Ginn), New York, 1964. 216 pp. Illus. Paper, $2.50.

Anthropological Papers. Nos. 68–74 (*Bull. Bur. Amer. Ethnol. No. 191*). Frank H. H. Roberts, Jr., Ed. Smithsonian Institution, Washington, D.C., 1964 (order from Superintendent of Documents, Washington, D.C.). 431 pp.

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