Museum. The series has been out of print for many years.

Since his retirement from the Museum, Schmitt has revised his 1931 contribution, and we are fortunate to have available his outstanding general book, **Crustaceans** (University of Michigan Press, Ann Arbor, 1965. 204 pp., $1.95), this time published in the Ann Arbor Science Paperback Series.

The book is written in a style particularly suitable for the layman who is interested in biology; it has only a minimal amount of scientific jargon and technical terminology. The biologist will find that the book has a special appeal because it provides a myriad of personal observations by Schmitt, who has spent his life studying crustaceans.

In revising the book, Schmitt deleted certain sections and added others; however, the total effect is not particularly noticeable, except in the two chapters that deal with classification. Rather recent discoveries of new forms of crustaceans have led to the establishment of several new subclasses and the rearrangement of some orders.

My only criticism of this excellent book is that the reprinting of the halftones has not been uniformly successful. In a few instances, reducing the size of the illustrations used in the 1931 book has produced a halftone in which the crustaceans are difficult to see.

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Newton's Dynamical Researches, 1664 to 1684

Continuing a tradition well established by the essays of Rigaud and Ball on the *Principia*, John Herivel, in **Background to Newton's Principia** (Oxford Unversity Press, New York, 1965. 352 pp., $11.20), publishes a series of documents and introduces them with an essay. A good decade of research on the Portsmouth manuscripts by various scholars has made it possible for Herivel to publish, as Rigaud and Ball could not, all of the sources that bear on the development of Newton's dynamics until the composition of the *Principia*. The past few years have witnessed the publication of several Newtonian manuscripts, especially the *Correspondence* and the volume of papers edited by the Halls. Herivel's volume can legitimately take its place beside them. If the goal of publishing the entire record of Newton's dynamics has led to the inclusion of several items already available (some of them through Herivel's earlier work), several manuscripts of the greatest importance are published here for the first time. Newton's first steps in mechanics as recorded in an undergraduate notebook, the treatment of impact and other problems in the *Waste Book*, the lectures *De Motu* from 1684 or 1685—no one concerned with Newton can fail to appreciate the importance of these documents. And no one concerned with Newton can fail to appreciate Herivel's analyses of the technically more difficult papers, such as the vellum manuscript on gravity and centrifugal force, or the treatment of rotation in *The Laws of Motion*.

Some aspects of the work are more difficult to appreciate. When Herivel is not concerned with editing and analyzing individual documents, that is to say when he undertakes to explore in a connected essay the very topic promised in the title, the quality of the volume declines markedly. Indeed I can only say that Herivel's approach to dynamics in the 17th century lacks historical perspective. The very sureness of his grasp of dynamics appears to become an obstacle to historical understanding, and, rather than attempting to comprehend the problems as Newton defined them, he seems to be engaged primarily in showing how Newton arrived at results identical to those still employed. In chapter 5, "The motion of extended bodies," for example, he discusses Newton's early treatment of rotating bodies without a single reference that I could find to the state of understanding of the problem when Newton took it up. Considerable space is devoted to the issue of centrifugal versus centripetal force as though it were a problem wholly internal to dynamics. It appears clear, however, that Newton's shift from the word "centrifugal" to the word "centripetal" involved conceptual developments, not within mechanics proper, but within his philosophy of nature. As long as he thought of nature in terms of the mechanical philosophy in which impact alone could alter a body's motion, the concept of centrifugal endeavor offered the only avenue toward a quantitative treatment of circular motion. Once action at a distance was admitted (an admission Newton had not made as late as his letter to Boyle in 1679) centripetal force became both conceivable and quantifiable. His treatment of motion in general underwent a similar alteration. An early manuscript entitled "The laws of motion" concerned itself entirely with impact, whereas the *Principia* devoted a mere two corollaries to the subject. Herivel's discussion of dynamics contains no recognition whatever of these extradynamical considerations.

Perhaps the discussion is nowhere more disappointing than when Herivel takes up the subject of force. The volume is devoted to the development of Newton's dynamics, and the concept of force was the very heart of his contribution to the science. Herivel does not discuss the concept of force before Newton. He does not seriously examine the difficulties in Newton's concept, difficulties that one might expect to find illuminated by the record of their development. Much of the discussion appears to assume that the concept of force was the common property of the entire 17th century. Thus he says (p. 54) that Descartes supposed the endeavor away from the center in circular motion could have the effect of a force; in his example of a particle in a rotating tube, for example, the particle acquires an increasing outward motion, and how can this possibly occur in the absence of some force? "So that when he returns at the end of Art. 59 to the original case of a stone in a sling it is not surprising to find him employing the term *vis* in reference to centrifugal endeavour." If Herivel means what he appears to mean, I can only say that he should have been surprised.

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Herbs in History

Joseph Wood Krutch's **Herbal** (Putnam's, New York, 1965. 256 pp., $20) is a modern presentation of 100 woodcuts of plants and six of animals taken from Pierandrea Mattioli's *Commentaries on the Six Books of Dioscorides*, first issued in folio format in Prague

in 1563, accompanied by delightful textual material by Krutch. Each plate occupies an odd-numbered page of the quarto volume. On the facing page Krutch briefly describes the general characteristics of the plant, its history, early uses, and something of its supposed medicinal values (as imputed to it by the early herbalists), and gives his own pithy remarks about the imagined medicinal effectiveness of the plant or some of its parts. Brief quotations from the writings of early Greeks to contemporary authors reveal Krutch's deep and intimate knowledge of the literature in several languages.

All of the text, with the exception of certain leading phrases and technical names, is set in italics, the exceptions in Roman type. The margins are generous, the typography clear and pleasing. An unusual feature occupies the end page. It is a comprehensive list that gives details about the design, production, and physical makeup of the book, including the various kinds of type, papers, and binding utilized and the names of individuals and companies that designed and produced it. One need not guess about the kind of type or the special paper of the text pages, introduction, end pages, or jacket.

The common, generic, and family names of the plant illustrated are given below the plate. The common name constitutes the running head on the text-bearing page that faces the plate. At the end of fascicles 1, 2, 3, 4, 7, 8, 11, and 12, a single sheet of orange-colored Strathmore's Artlaid Melon paper has been inserted. Six of these bear woodcuts of Deer, Viper, Hare, Fowl, Beaver, and Bee rather than illustrations of plants.

An inconsequential discrepancy occurs between pages 17 and 113. On page 17 Krutch writes, *"However, on the Orange plate (page 113) the initials WS occur in the lower left corner. . . ."* Page 113 carries a plate showing a branch of an orange tree bearing leaves, flowers, and fruit, and the initials occur on the wings of a petiole, but the paper is the Beckwith Text White Laid rather than the orange paper.

Krutch has done an excellent job of selecting modern common names and in providing the technical family and generic names for the plants depicted. I noted very few typographical errors. On page 36 *Narthecium californicum* appears as "Narthecium califirnicum," but no other slips of this kind were found. On page 239 the family name (Leguminosae) was omitted, although the generic name (*Glycyrrhiza*) is present. A paragraph dealing with the cattail (p. 106) is puzzling in the implications that reeds and rushes are not flowering plants.

The book is a delightful one. The reader need not peruse it by turning consecutively from page to page, but can dip into it at any pair of facing pages, read the astonishing things some of the early herbalists wrote about the plant, and Krutch's comments, appreciating the while the artistry displayed by the facing woodcut. Both in what he writes and in the selection of quotations, Krutch shows a subtle humor that is as amusing in its way as are the outlandish claims made by medieval writers. Yet many of Krutch's remarks provide reliable information: for example, *"Perhaps the* Cruciferae *(Mustards) have not contributed as much to human welfare as Wheat and Maize, but mankind could not well have spared them. In the eighteenth century it was another member of the family called Scurvy Grass* (Cochlearia) *which mitigated the horror of long sea voyages by acting as an effective antiscorbutic"* (p. 110). In contrast Mattioli wrote, *"Garden Cabbages only slightly cooked are good for the stomach, but if they are cooked too long, and especially if cooked with soda or cooked twice, they contract it. . . . They are good for those afflicted with tremblings and those whose eyesight is troubled. Eaten at the end of a meal they remove all the effects of drinking too much wine. . . . With salt they cause carbuncles to burst and keep in hair which is tending to fall* (p. 10).

The introduction (pp. 19 to 34) provides an historical resumé of the beginnings, growth, and decline of herbals, and contains such subheadings as Where nothing grows in vain; The doctrine of signatures; Herbs and astrology; Herbs and modern drugs; Herbals, botany, and gardening; and Herbs in cookery. A brief but useful bibliography includes comments about each of 15 herbals and earlier books, plus the names of seven recent books that deal with "herbs and related subjects." There is a four-page index.

It is a book that will be enjoyed by many, and might well be used as supplementary reading by students who are taking courses in the history of botany or in economic botany. The cover—conventionalized clover leaves arranged in horizontal and vertical lines, interspersed with a clover involucre, a young grass plant, and clusters of small seeds printed in green, brown, and orange on an old ivory paper, and accented by the soft green of Columbia's Bolton Cloth and gold lettering on the spine—presents a very pleasing design.

I agree with one of the publisher's comments: "Whether your interest is in medicine, botany, gardening, or cookery—or in man's relation to Nature—Joseph Wood Krutch's *Herbal* will charm and entertain you with its skillful blend of thorough scholarship, grace, and wit" (from the dust jacket).

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A Yearbook of Botanical Bibliography

Although *Huntia*, edited by G. H. M. Lawrence, director of the Hunt Botanical Library, is published as a yearbook of botanical and horticultural bibliography, its coverage is much broader. Volume 2 (Hunt Botanical Library, Pittsburgh, Pa., 1965. 130 pp. Paper, $7.50; cloth, $8.50) includes papers on the history of biology as well as material concerned with the biography of biologists. Its emphasis, however, remains bibliophilic; a majority of its contributions treat such subjects as printed botanical illustrations and the problems that arise in book collations. The historical papers include "Charles Darwin and the perennial flax—A controversy and its implications" by Herbert C. Baker, "A bibliographic account of L'Heritier's *Stirpes novae*" by Gunther Buchheim, and "Illustrations from Weinmann's *Phytanthoza iconographia* in Iwasaki's *Honzu zufu*" by Richard C. Rudolph.

The last quarter of the volume is devoted to the Library's departmental studies. Included here is a list of the 1964 acquisitions of botanical illustrations, and a very useful index to the Library's collection of some 2500 portraits. This collection is still growing, and its value is obvious: it is especially rich in scarce portraits of early bot-