troduced as a function of two variables. Definitions and theorems are precisely stated, but no special knowledge of sets or logic is needed. Vectors are not treated as extensively, nor are they subsequently used as extensively, as in many other current texts. The standard physical applications are included, and there is an adequate supply of exercises with answers to the odd numbered exercises. Figures, for the most part, are good, except in the chapter on multiple integration. Here a good figure is admittedly difficult to produce but is desirable.

The text appears quite suitable for the majority of students. The entire book evidences careful attention to detail by authors and publisher, and there are very few of the printing errors usually found in a first printing.

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History of Medicine

Andreas Vesalius of Brussels, 1514–1564. C. D. O'Malley. University of California Press, Berkeley, 1964. xvi + 480 pp. Illus. $10.

In the introduction to *Illustrations from the Works of Andreas Vesalius*, edited by J. E. de C. Saunders and C. D. O'Malley, O'Malley set the task for the biographer of the important Renaissance anatomist—"The great achievement of Vesalius has led to strenuous efforts by historians to uncover and understand the forces responsible for the sudden emergence of the modern observational method of science in the midst of the Renaissance cult of antiquity. For this reason every aspect of his life and personality has been examined with the utmost care." In this biographical volume, *Andreas Vesalius of Brussels*, O'Malley has collected the harvest of several generations of detailed historical investigations, and he presents a remarkably lucid, yet convincingly documented study of the work and life of one of the figures who brought modern science into being.

It has been more than 70 years since a biographer attempted a study of Vesalius, and during the intervening period scholars have made available much new evidence concerning the early and late years of his life as well as contemporary accounts of his practice of anatomical dissections; the printing history of each of Vesalius' works has been detailed, and controversy has raged over the credit for the impressive anatomical plates in the *De humani corporis fabrica*. These and many other "Vesalian problems" have been scrutinized by the biographer and laid before the reader in this new biography, which is published to coincide with the 400th anniversary of the death of Andreas Vesalius.

The question which we really want answered, and to which O'Malley devotes the first half of his analysis, concerns the novelty in Vesalius' work and how this innovation came about. Vesalius' own words are used to describe the old approach—"' . . . that detestable procedure by which usually some conduct the dissection of the human body and others present the account of its parts, the latter like jackdaws aloft in their high chair, with egregious arrogance croaking things they have never investigated but merely committed to memory from the books of others, or read what has already been described ' " (p. 50). This image of the professor sitting at his lecturn, at a considerable distance from the cadaver, while an unlettered barber surgeon wielded the scalpel is in marked contrast to the picture that leaps at the reader from the title page of the *Fabrica* of Vesalius (and which is reproduced in part on the cover of O'Malley's biography)—in that illustration Vesalius stands at the dissecting table, his own hands on a body with the abdomen laid open. The key to the Vesalian achievement is found, not so much in the numerous corrections made in the anatomical descriptions of Galen and the other ancients, but in what Vesalius considered the *re*construction of the anatomical practices of the golden age of Alexandria—"' . . . I, with Galen, have encouraged the candidates of medicine in every way to undertake dissection with their own hands' " (p. 323).

O'Malley, in charting the steps taken by Vesalius, begins with the medical student who relied, as did all his contemporaries, on the anatomical knowledge of Galen, but who slowly came to realize, through his own dissections, that Galen, "the prince of physicians," had never dissected a human body and had constructed his human anatomy on the basis of analogy to animal structures. In the course of correcting this fundamental error, Vesalius made clear the necessity of relying upon human sources for human anatomy and incidentally set off a wave of body snatching and grave robbing among the medical students (p. 113). As a means of illustration, Vesalius took the first step in establishing comparative anatomy by reconstructing "two skeletons, an ape and a human, the latter 'articulated from the bones of the French priest.' " (p. 100).

Although Vesalius substituted accurate anatomical descriptions for Galen's erroneous ones and instituted a new pedagogy that involved direct observation in the place of slavish adherence to the Galenic texts, O'Malley correctly notes that the Galenic physiology remained virtually untouched (p. 167). It is this factor that causes my one criticism of an otherwise outstanding volume; the early chapters are structured so that the reader comes to expect the total overthrow of the Galenic approach to the study of the human organism, but, as the author clearly demonstrates, Vesalius provided only one lever, which alone was not sufficient to topple the Galenic system as a whole. Vesalius, in the tradition of both Aristotle and Galen, preserved a teleological approach to the living organism, albeit structure became the dominant feature (see pp. 150 and 151).

The final half of the narrative is taken up with a detailed reconstruction of Vesalius' life after the publication of the *Fabrica* (1543), the year in which he gave up his teaching post at Padua. No one will claim that these years of imperial medical service were characterized by anything like the creativity exhibited by the youthful Vesalius in the few years prior to the publication of his great anatomical volume.

O'Malley provides one other great service to those interested in the development of the sciences during the Renaissance. Not only is his text filled with quotation of relevant passages, he has included more than 100 pages of translated texts, letters, and documents bearing on the scientific method as well as on the life of Vesalius. Of particular interest is the series of instructions or "dissection procedures" which make it quite clear that Vesalius intended his readers to follow his example as well as his word.

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