originated that stimulated the development of integration theory." Isn't that much of what history is all about?

Classical and Modern Integration Theories starts with Cauchy and goes on through Riemann to the early stages of measure theory. Here there is an outstanding formulation of the differences and connections between the several measure theories. After a good presentation of Lebesgue's integral measure theory, Pesin continues on to outline the theories of Denjoy, Perron, and Daniell.

The English edition of *Classical and Modern Integration Theory* sets four aims for itself. It succeeds in only two. As a book for a student already knowledgeable in Lebesgue's theory who wishes to see where and how it connects up with Riemann integration it is excellent; it would also be useful as a refresher for a former student who has not looked at the topic for a long time. Unfortunately, it does not succeed as a text for a novice; there are too many barriers. The book has some crucial misprints; the notation is often special and nonintuitive. True, there is a glossary of terms, but not all necessary items are included. In fact, the selection of terms is baffling; for example, continuity is defined, but absolute continuity is not. Finally, the two indexes specially prepared for the English edition are, admittedly, only partial. In sum, we have a right to expect a better job both of bookmaking and of history.

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Operations on the Heart

The History of Cardiac Surgery, 1896–1955. STEPHEN L. JOHNSON. Johns Hopkins Press, Baltimore, Md., 1970. xviii, 202 pp., illus. $9.50.

The Scalpel and the Heart. ROBERT G. RICHARDSON. Scribner, New York, 1970. x, 326 pp. + plates. $8.95.

Since the time of the ancients the heart has been accorded a place of predominance as well as mystery. At one time or another it was thought to be the seat of life, the source of vital spirits, the site of heat production in the body, and the repository of sentiments such as love. As recently as the presidential campaign of 1964 Americans were urged to vote with their hearts, not their minds. No wonder then that when heart transplantation became a reality in South Africa in late 1967 the world's imagination was immediately captured. These two books will explain much of the work that led up to our current phase of cardiac surgery, and they complement one another nicely.

Johnson, a member of the biomedical engineering faculty at the Johns Hopkins Medical School, has carefully shown the slow progress of the story, beginning with the successful suture of cardiac wounds in the 1890's, to the open-heart surgery of the 1950's. The value of his book lies in his approach to the story and in the superb illustrations so necessary to a nonsurgical reader. Much of this all too brief book is devoted to the necessary developments in physiology that were prerequisites to successful thoracic and cardiac surgery. The sections on electrocardiography, cardiac resuscitation, and cardiac catheterization, and the final chapter devoted to the heart-lung machine are particularly noteworthy. The inclusion of numerous drawings and diagrams makes for much easier comprehension of both problems and solutions. Johnson, moreover, brings to life a few of the contributors to the story, although he makes no attempt to assess their general work.

Robert Richardson, a London surgeon who is now a writer and editor, has the pleasing facility for making the complex technical and scientific problems more understandable to the nonspecialist. In this, his second book in the history of surgery, he describes the events surrounding the surgery of the heart and major thoracic blood vessels, as well as some of the physiological developments in anesthesia, hypothermia, and open-heart surgery also discussed by Johnson. Richardson's is the more elegantly written book, and it has a wider audience in mind. For all its information, however, it is less broad in historical perspective than *The History of Cardiac Surgery*. Richardson supplies a wealth of detail for the many advances made since 1955, when Johnson ends his story. Richardson's book supplies only a few references at the end whereas Johnson's book is fully documented. It is to Richardson's credit that he utilizes the important, but generally neglected, book by V. P. Demikhov, *Experimental Transplantation of Vital Organs*, published in Russia in 1960 and translated into English in 1962. The Russian contributions to cardiac surgery are extensive, and they must be taken into consideration.

Richardson's book is exciting reading, yet it suffers from severe defects. It is inadequately illustrated (especially when compared to Johnson's book), and it really is an extensive review of the literature without bringing to life the principal characters.

Surgery, especially cardiac surgery, has so captured public interest that these books should find a ready audience. Yet the question remains why the quality of the history of surgery as a whole has not improved much since the time of Gurlt, Fischer, and Billings, all writing more than 70 years ago. One problem has been, as Richard Meade noted recently in his *Introduction to the History of General Surgery*, that we have focused too much attention on the surgeons, to the neglect of the operations they performed. These two books do much to swing the balance the other way. Still, we are left with a feeling, especially from Richardson's book, that we are reading a catalog of operations, their dates, successes, complications, and failures, all piled on one after another. Do we not have to look for the development of cardiac surgery within the history of general surgery and within the history of 20th-century medicine as a whole? Do surgeons only operate or devise ingenious equipment to enable them to operate more safely or in more complicated situations? Do they not have some guiding principles, some philosophy, some thoughts about solving scientific and technical problems? Stereotypes aside, I think the answer is an unqualified yes; yet no one seems able to come to grips with these aspects of the history and development of surgery. Perhaps it is foolish to expect either a surgeon or a historian working alone to accomplish the difficult task of synthesis. A joint effort may be the solution.

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Food in the Sea

Marine Food Chains. Proceedings of a symposium, Aarhus, Denmark, July 1968. J. H. STEELE, Ed. University of California Press, Berkeley, 1970. viii, 552 pp., illus. $13.50.

The advent of the computer has begun to make the prediction of events taking place in our biosphere a practical reality. Yet simulation of the environment cannot proceed without basic