always represent up-to-date information, but these chapters trace very well the most important facts and are reliable guides into the original literature. A more detailed subject index and an index of authors would be helpful and would improve the book's value as a reference source. Since a sufficiently detailed, modern, and critical review of the biochemical, nutritional, and medical aspects of vitamin B_{12} and vitamin B_{12}-coenzyme is not now available, this part of the book should be supplemented in the next edition.

The small book is at the present moment the best well-balanced introduction to the continuously expanding field of research on vitamin B_{12} and its application. The book also documents how much the author and his associates have contributed since 1948 when vitamin B_{12} was isolated simultaneously in his laboratory and by Karl Folker's group in Rahway.

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Analytical Dynamics

The word treatise in a book title, as in L. A. Pars' **A Treatise on Analytical Dynamics** (Wiley, New York, 1965. 662 pp., $27.50), implies both a broad scope and a relatively high level of treatment. Although no book on dynamics can exhaust the subject, this one covers thoroughly a wide range of fundamental topics, and the treatment is indeed an advanced one. These topics include those that one expects to find in any general treatment of dynamics, that is, Newton's and Lagrange's equations, constraints, Hamilton's principle, rigid body rotations, small oscillations, Hamilton-Jacobi theory, Hamilton's equations, contact transformations, and the principle of least action. Some less-familiar topics are the Gibbs-Appell equations, impulsive motion, the three-body problem, and periodic orbits. A short chapter introduces the dynamics of the special theory of relativity, but merely as a class of problems concerning particles with a peculiar mass variation (the corresponding classical problems, such as rockets, are not treated). Several chapters on stability theory and nonlinear problems, and a discussion of the ergodic theorem, are welcome additions to the above.

As a theoretical physicist, I therefore view the book from a particular frame of reference. Thus I would like some discussion of the foundations of Newtonian and relativistic mechanics (which have been purposely omitted to save space), and some material indicating the power and usefulness of group theory in dynamics (a usefulness greater than that indicated in the author's introduction), and a treatment of its connection with invariance principles and conservation laws. Further, I would prefer a greater use of physical insight in setting up and attacking problems. But the book was not written by, nor primarily intended for, a physicist. The author is an accomplished mathematician, and uses the common language of mathematics in developing the subject for mathematicians, physicists, astronomers, and engineers. His concern for rigor is therefore greater than that exercised by many others writing on the same subject. Although this gives the reader a clear idea of the limits of theory, it also results occasionally in the omission of problems which may be of interest.

The author treats many famous problems as worked examples, often treating them in great detail and from several points of view (this method is perhaps overdone). There are no problems or exercises for the reader.

Comparing this book with a standard work in the field, Whittaker's book of similar title, one notes that the volume by Pars contains about twice as much written material, and that many of the topics mentioned at the end of the first paragraph above are not covered in Whittaker. Figures, eschewed by Lagrange and Whittaker, are used here, adding clarity to the presentation (even more figures might have been helpful, and the addition of titles would further increase their usefulness). Matrix and vector notation and methods increase the clarity and simplicity of the presentation; still greater usage of these tools would have been preferable.

There are some errors, mostly typographical, but considering the size and complexity of the book, they are not excessive, and most can easily be remedied in a later printing. Some terms (such as "kineton") will be unfamiliar to the American reader. Unfortunately, they are not defined in the text, nor found in the index (which could profitably be expanded).

But the deficiencies noted above either arise from the reviewer's viewpoint, or are minor. This is clearly a broad, careful, and sophisticated survey of most of the major areas of classical dynamics, apparently intended as the modern standard for the *mathematical* development of dynamics. These intentions are well met.

The book is large (11.25 by 8 by 2 inches) and heavy (6 lb) but beautifully done. It has obviously been produced with much care by both author and publisher, and it is a pleasure to read. It is not suitable for use as a textbook, owing to its size, cost, and lack of problems, but it should be invaluable as a reference book, and should be in every institutional scientific library. I hope that a smaller and less-expensive edition will be produced so that everyone interested in this field can have his own copy.

Considering the present state of scientific publishing, it is gratifying to find a new book that actually fulfills a need, is painstakingly prepared, and which should have permanent value.

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Developmental Biology Series

Fertilization (Prentice-Hall, Englewood Cliffs, N.J., 1965. 145 pp., $2.95), by C. R. Austin, is the first volume in the Prentice-Hall series, Foundations of Developmental Biology. The series is designed to provide introductory material and to review recent progress in selected fields for students at intermediate and advanced levels.

This volume presents a comprehensive treatment of fertilization, with emphasis on the "cytological, physiological, and behavioral mechanisms concerned with the union of the gametes." The range of organisms includes bacteria and fungi as well as higher plants, sea urchins, and mammals. This comparative approach is used to define those features and principles in fertilization that are common to all organisms. The book is, in part, a product of the summer training program on the physiology of gametes and fertilization, held at the Marine Biological Laboratory (Woods Hole, Mass.), where the author is a member of the staff.

Chapter 1 gives a brief introduction into general cytology. Chapter 2 discusses the genetic and biological significance of fertilization in the propa-