

accounts deal primarily with the fluid mechanical aspects of liquids. There are highly informative sections on viscosity, viscoelasticity, surface tension, the reaction of fluids to bulk stress, and the properties of liquid crystals. These sections include summaries of experimental research and applications of fluid mechanics in industry and engineering.

It is a little difficult to estimate the preparation required of a student who is to use this book. Concepts such as the partition function and thermodynamic entropy are introduced in language which implies that the student may not be familiar with them. However, the presentation of this material is so sketchy that some background or parallel reading seems necessary. In addition, the text includes brief treatments of relatively advanced theoretical material, notably the Kirkwood integral equation approach to the pair

correlation function and the Mayer cluster expansion.

In summary, this book seeks to fill a real need in introductory chemistry and physics courses. Trevena has compiled a great deal of knowledge and has put it in a form which undergraduates can approach. However, the book's brevity detracts from its effectiveness, and if it is used in a course, it will most likely require substantial parallel reading and lecture material.

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Method and Appraisal in the Physical Sciences: The Critical Background to Modern Science, 1800-1905. Edited by Colin Howson. 344 pp. Cambridge U. P., Cambridge, England, 1976. Price: \$24.50. (Reviewed by James L. Park.)

Just as physicists find little intellectual satisfaction in raw data unaccompanied by a theoretical model, serious historians cannot be content merely to chronicle events without probing for trends. In short, history, to be interesting, must be constructed, or at least reconstructed, by reason. However, since different historiographical methods will generally yield different such rational reconstructions, there is, for example, apparently no such thing as *the* history of physics. There are instead alternative histories engendered by perceiving the factual episodes in the evolution of physics through differing philosophical lenses. This anthology, edited by Colin Howson, is devoted to one particular historiographical approach to the reconstruction of the history of science, a framework called "the methodology of scientific research programmes."

This methodology, originated by the late Imre Lakatos and explained abstractly by him in the first chapter, emphasizes competition between clusters of theories called "research programmes." Such a program is bound together by a common metaphysical viewpoint, the "hard core," and by a set of research guidelines called the "positive heuristic." According to Lakatos, the internal history of physics is best understood by identifying such programs in competition and observing that one program gradually "progresses" as its opponent "degenerates."

Obviously, this view is in stark contrast to the romantic vignettes of "history" commonly seen in science textbooks, where legendary tales are retold of fantastic inductivist leaps from alleged crucial experiments to revolutionary theoretical insights. More importantly, the Lakatos methodology, when studied in depth, proves to be also at variance with such established philosophies as conventionalism and Popperian falsificationism that have served in the past as formats for rational reconstruction of scientific history. Thus case studies in the history of physics based upon the methodology of scientific research programs should and, indeed, do offer genuinely fresh perspectives.

Howson's *Method and Appraisal in the Physical Sciences* contains five such historical studies, each by a different author. Each investigator uses the Lakatos methodology to reconstruct the historical developments surrounding a famous controversy and its associated scientific revolution. Included are chapters covering the historic confrontations between kinetic theory and thermodynamics, between wave optics and Newtonian corpuscular optics, and between the Einstein and Lorentz programs in electrodynamics. There are also two chapters on chemical history: one on the competing oxygen and phlogiston programs; the other on Avogadro's role in the growth of atomism. All five of these historical reconstructions are excellently prepared and make stimulating reading even for a scientist who has previously studied other detailed accounts of these same epochs in history.

Despite its multiple authorship, the volume exhibits an unusual coherence, as each historical study adheres quite faithfully to the Lakatos methodology set forth in the first chapter. Each contribution is preceded by its own table of contents and in accordance with scholarly custom in the social sciences, there are over a thousand footnotes, many of the lengthy discursive variety. Moreover, it is particularly noteworthy that, in a remarkable effort to deliver a fair presentation of the Lakatos approach, Howson included as the final chapter a rather caviling essay by a philosopher unsympathetic to the methodology of scientific research programs.

While physicists uninterested in philosophy might find certain technical discussions of historiographical method to be somewhat tedious, I believe that almost any physicist would find the new Lakatosian rational reconstructions in the five historical chapters to be very enjoyable and provocative, and perhaps even suggestive of a useful frame of reference for reflections upon the frontier issues in contemporary physics.

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