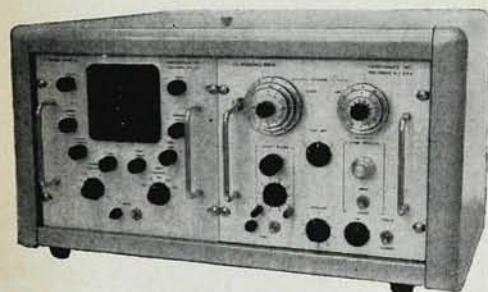


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* * *

J. Gillis is a member of the Department of Applied Mathematics at the Weizmann Institute of Science in Rehovoth, Israel.

Physics and philosophy

BEYOND THE EDGE OF CERTAINTY. Essays in Contemporary Science and Philosophy. Robert G. Colodny, ed. 287 pp. Prentice-Hall, Englewood Cliffs, N. J., 1965. \$8.75.

by R. B. Lindsay

For the past five years the University of Pittsburgh has arranged, as part of its instructional program, an annual series of visiting lectures on topics in the philosophy of science. The present volume is the second to result from this program. It contains contributions by eight well known philosophers of science in addition to an explanatory introduction by the editor.

All the articles relate to physics in some fashion and most of them rather specifically. Thus, to take them in order, N. R. Hanson (Yale) discusses the logical status of Newton's first law of motion and does not have much trouble in showing that the status is very shaky indeed. Brian Ellis (University of Melbourne) examines the origin and nature of all three of Newton's laws and comes up with some interesting and striking observations. He considers that Newton's debt to Galileo in this business has been much exaggerated and is inclined to believe that the line runs more definitely from Descartes to Newton, largely due to the former's interest in collision phenomena and the conservation of momentum. Ellis calls attention to the way in which Newton phrased the second law, which has been in large measure misinterpreted by his commentators. Ellis believes that when Newton wrote "Mutationem motus proportionalem esse vi motrici impressae . . ." he really meant it, and that the proper English translation is "The change of motion is proportional to the impressed motive force. . . ." In order to fit this to the usual presentation in elementary (and other) physics texts, the

first two words are commonly rendered "rate of change." It is clear that a good deal of speculation can be erected on the basis of this difference in interpretation, and Ellis makes the most of it. He does not indeed mention what C. Truesdell called attention to some years ago, that nowhere in the *Principia* does Newton use the second law as a differential equation of motion whose solution by integration can lead to the representation of actual motions of particles. Ellis goes on to examine the laws for their empirical content and reaches the conclusion that they are primarily conceptual in nature, certainly not arbitrary but just as certainly conventional.

Hilary Putnam (MIT) takes a look at some philosophical problems posed by quantum mechanics, and in particular compares the de Broglie-Schrödinger interpretation of the quantum-mechanical wave function with that of the Copenhagen school. He concludes that both interpretations are logically unsatisfactory, but unfortunately provides none of his own.

The somewhat esoteric contribution of David Hawkins (University of Colorado) on "The Thermodynamics of Purpose" explores teleological interpretations of natural phenomena. The reviewer has found his paper hard to understand, but the author seems to be saying that human experience both on the physical and biological sides seems to exhibit ends which are attained or in process of attainment not primarily through the commonly understood cause-effect routine, but rather through operations describable in statistical thermodynamic terms.

Philip Morrison (formerly of Cornell, now of MIT) provides a clear and elegant factual account of "The Physics of the Large," in which he discusses the tools physics has devised for studying the properties of the accessible universe, as well as the results of this study with respect to estimates of age, size, temperature and distribution of matter.

In the longest chapter of the book the philosopher Paul K. Feyerabend (University of California) pays his respects to "Problems of Empiricism." He is definitely against this philosophi-

cal doctrine, considering it both incomplete and fraught with undesirable assumptions. The argument is heavily philosophical in the conventional sense, but the physicist will be interested in the physical illustrations which form part of the historical survey given by the author.

The final article by Nicholas Rescher (University of Pittsburgh) is devoted to a discussion of "The Ethical Dimension of Scientific Research." This takes up such questions as the ethical problems involved in the financial support of research (i.e. who gets the money and why), in the standards of proof (the natural human desire to push one's own preconceived ideas), in the dissemination of research findings (who decides what should be published and when), in the allocation of credit and priority, etc., etc. These are nagging and everpresent problems, whose solutions are in practice admittedly more or less unsatisfactory compromises; it is worthwhile from time to time, however, to face up to them frankly. The author does so in vigorous fashion.

The title of the collection is well chosen, for the matters treated are those in which it is difficult if not impossible to reach definite conclusions accepted by all scientists, since they depend to such an extent on taste and preference. The book, however, should make interesting reading for the philosophically inclined physicist.

* * *

R. Bruce Lindsay, who is Hazard Professor of Physics at Brown University, writes frequently on philosophy of science.

BOOKS RECEIVED

PHYSICS OF FLUIDS

The Mechanical Foundations of Elasticity and Fluid Dynamics. By C. Truesdell. 218 pp. Gordon and Breach, New York, 1966. \$7.50.

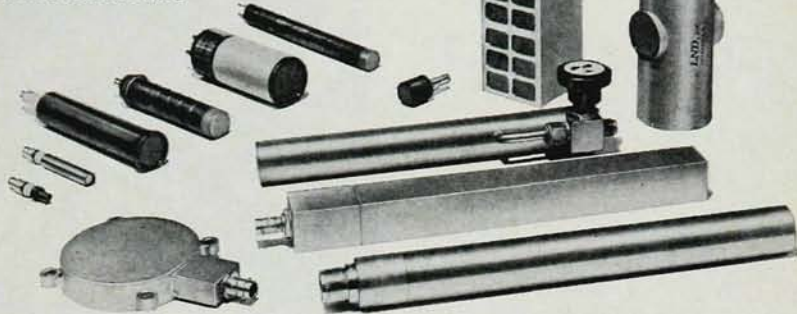
Liquid Mixing and Processing. By F. A. Holland and F. S. Chapman. 319 pp. Reinhold, New York, 1966. \$15.00.

Radiation Gas Dynamics. Shih-I Pai. 229 pp. Springer-Verlag, New York, 1966. \$12.80.

Viscometric Flows of Non-Newtonian Fluids. Theory and Experiment. By B. D.

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