rect conclusion) can be deduced from the assumption that the velocity of fall is directly proportional to the distance of fall (an incorrect assumption). I also find the discussion of Galileo's treatment of inertia quite inadequate. The only passage discussed at length is the famous passage at the beginning of the "Fourth Day" of the *Discorsi,* wherein Galileo describes projectile motion as taking a parabolic path compounded of uniform inertial motion on a horizontal plane and vertical uniform acceleration. The interesting question is this: How do his views in this passage relate to his often expressed doctrine of circular inertial motion? As I have recently pointed out in my *Science of Mechanics in the Middle Ages,* the two apparently different views of inertia are parts of a single concept of inertia, the horizontal plane being used only where the trajectory of motion is very small in relation to the radius of the earth. Or to put it briefly, the nature of the physical problem of projectile motion allows Galileo to take one further step in abstraction that simplifies the treatment of the problem.

The only major disadvantage of this volume is one that stems from the nature of the genre. As a survey, which includes the work of many contributors in limited space, it does not offer sufficient scope for the thorough treatment of any one line of development. But if survey volumes are desirable and play a role in the spread of knowledge, we can agree that this is an excellent example of the type.

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A Philosopher Looks at Science. John G. Kemeny. Van Nostrand, Princeton, N.J., 1959. viii + 273 pp. $4.95.

The philosophy of science is a broad and highly technical field. Kemeny's book is an attempt to survey this field for the "interested layman"—in 263 rather thinly printed pages of text. How much may one expect? It will be enough —more than enough—if the author conveys clearly to the reasonably literate reader some of the basic ideas of the area. The uninitiated reader will indeed get from this book some notion of the difference between factual and formal truth; of the nature of scientific laws and their use in explanation and prediction; of the issues in the mechanism-vitalism controversy; and of several other problems in the philosophy of science.

Unfortunately, Kemeny does not escape paying the price of saying too little about too much. The price is not merely thinness but a certain muddying of the waters. For example, Kemeny explicates the distinction between formal or mathematical truth and factual truth by using as a paradigm formalized, uninterpreted "geometry." In such a system, only the connections between the axioms and theorems are mathematically true, while, since they are uninterpreted, the axioms themselves are neither true nor false. Upon interpretation, by Euclidean or non-Euclidean concepts, the axioms become contingent factual statements. But the symbols of the same system may also be interpreted into arithmetic concepts, like pairs of numbers and equations, and this results, of course, in analytical geometry. In this case, which is not mentioned by the author, the axioms themselves are also necessary, mathematical truths. Should this case occur to the reader (as well it might), he will be puzzled (as well he may be) by Kemeny's flat statement that *all* interpretations of formalized systems are factually true or false. Geometry is a fine illustration for explaining the structure of scientific theories, but it is a confusing one, unless considerable care is used, for explaining the difference between formal and factual truth.

Also, hobby-horse technicalities are sometimes introduced which, for clarity's sake, might better have been suppressed. An otherwise useful discussion of how theories are verified suffers badly from overemphasis on an unexplicated notion of "simplicity" as a criterion for choosing among alternative theories. Though this permits Kemeny to emphasize, rightly, how complex a matter it may sometimes be to confirm any isolated statement, it also leads him to assert on one page that we can always cling to any theory and, on another, that theories may be definitely falsified. This confusion is abetted by an unnecessarily equivocal use of the word *theory.* (Nor is the cause of clarity served by calling the referents of all defined terms "fictions"!) Similarly, the mathematically rather trivial point that a function can always be found to fit any set of data is not relevant to all the grief about determinism. Although Kemeny realizes this, he confusingly clutters up an otherwise elementary exposition by unduly elaborating this point.

Having caviled this much, let me add that Kemeny's book is refreshingly free of nonsense—of either naive overestimation or obscurantist depreciation of the achievements and limits of science. The "interested layman" will certainly profit from this book, and the confusions created are at least of the kind that stimulate rather than inhibit further study.

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The Canal Builders. The story of canal engineers through the ages. Robert Payne. Macmillan, New York, 1959. ix + 278 pp. Illus. $5.

The publishers of this book have provided an attractive format and careful proofreading. The author, who has written biographies of Mao Tse-tung, Albert Schweitzer, General Marshall, Charlie Chaplin, and Heinrich Schliemann, has produced a disappointing book.

Payne treats successively but discursively the canals of ancient Mesopotamia and Egypt, of classical Greece and Italy, of medieval Italy and France, and of 18th- and 19th-century England and the United States. There are chapters on the Panama Canal and the Suez Canal, in that order, and there is a final chapter on Russian canals and the St. Lawrence Seaway.

If any subject extending "through the ages" is to be successfully presented in a single book, the author must pursue his subject unswervingly, making every sentence do its full share in carrying the argument forward. In this book, Payne repeatedly deserts his subject to include all sorts of peripheral and frequently unrelated items that he has noted in his reading.

The canal engineers are often neglected in favor of more colorful or better known people. For example, in the chapter on canals in the United States, DeWitt Clinton and the Erie canal occupy six pages, but no engineer connected with the project is named. In all, eight American canals are described, but only three canal engineers are identified; of these, the one most fully discussed is allotted but two paragraphs.

The editor should share responsibility for the careless, and in places ungrammatical, writing; there are many pages of exasperating trivia that could have been removed by a careful editor. The book suffers from numerous absurdities, overstatements, and sweeping generalizations.

In a preface, canals are credited with