cluded here concerns the free oscillations of the earth, which rings rather like a bell, with its characteristic line spectrum, when struck hard (for example, by an earthquake).

Phenomena of the solar photosphere and chromosphere are summarized by G. Righini "for the benefit of nonspecialists." This article is based mainly on A. Unsöld's textbook and an article by C. de Jager, published in *Handbuch der Physik*. R. Lüst's brief article on the corona and solar wind appears to be essentially an expanded abstract of his fine review in *Space Science Reviews* [**1**, No. 3 (1963)]; I suspect this contribution appears here only to provide so-called "completeness."

T. Gold's discussion of interplanetary particles and fields deals with heuristic models. He suggests a variety of physical ideas, along with a number of illustrative sketches, which may be a source of inspiration to theorists more inclined to develop mathematical models. A detailed analysis of a long series of observations of solar cosmic rays, made with the Explorer VII satellite, forms the main substance of a paper by J. A. Van Allen and W. C. Lin. In addition, they discuss some modifications to Störmer theory (which applies to a steady dipole field) that are imposed by the real geomagnetic field.

A long article by R. Jastrow, on planetary atmospheres, will be useful to students entering the field. Its general utility is unhappily marred by the absence of any references to the literature. In the final article, S. Hayakawa treats x-rays and high-energy particles from the moon and planets, detectable (perhaps) by instruments on spacecraft.

As far as the book as a whole is concerned, Rossi is to be congratulated for assembling such outstanding contributors. Still, I am unfavorably impressed by the unevenness of treatment among different articles and by the absence of an index: Almost any of these articles might just as well have been published in a review journal. The main excuse for publishing this particular set of papers together is evidently a traditional or commemorative one, which is fine. But I take the view that, when I pay this kind of price (more than 4 cents per page) for a book, I can reasonably expect something special besides a hard cover.

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Elementary Science Education

Elementary Teacher's Classroom Science Demonstrations and Activities. David E. Hennessy. Prentice-Hall, Englewood Cliffs, N.J., 1964. xii + 308 pp. Illus. $7.95.

Hennessy frankly claims that the purpose of this book is demonstration. The pages are filled with ingenious, practical, and clearly described assemblages of materials. Sources for the latter indicate their ready availability. A Foucault pendulum on a piano stool and a tack oscillating between tin cans charged with rubbed plastic are examples of interesting set-ups. The suggestion that a collecting net can be obtained from the butcher who wraps hind quarters of beef in conveniently shaped cheese cloth is useful. David Moon's illustrations are excellent. Hence, the avowed purpose is admirably achieved.

How much of a contribution the work is to today's ferment in elementary science education is another matter. On this question I feel that the score is negative.

The philosophy underlying the selection of activities is outmoded because the content does not move much beyond Newton. Even space science is related to inertia, action and reaction, and forces. More-modern science thinks of interaction of limited systems as models to describe physical and celestial phenomena. A rocket is pushed, not by Newtonian laws, but by unequal pressure of gases within it.

Living things are introduced by collecting and killing insects, instead of having the children explore the interactions with various environments. The universe is approached by concentrating on the static relation of size and distance in the solar system. Geology is presented with no thought for the tremendous sweep of time and the slow but continuous change inherent in this study.

Not one of the conceptual schemes suggested by Paul Brandwein and other modern science educators is present even implicitly in the book: ideas of energy transformation, the influences of environment and heredity on living organisms, the immensity of change in the universe.

The pedagogy advocated is not the sort that promotes learning by children. The teacher shows and tells. The explanations offered in the sections labeled "Discussion" are often unacceptable as modern scientific thinking: atmospheric pressure tries to fill a partial vacuum (p. 94); bodies attract or repel each other; the suggestion that the Sphinx moth has a long tongue so that it can reach the nectar and help pollinate the flower at the same time (p. 36).

The author does not seem to recognize that children learn best through free exploratory manipulation of materials followed by articulation of their discoveries. Children parallel the procedures of scientists in that they ask questions raised by their own experiences and find answers in many ways.

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History of Technology

Rudolf Diesel: Pioneeer of the Age of Power. W. Robert Nitske and Charles Morrow Wilson. University of Oklahoma Press, Norman, 1965. x + 318 pp. Ilus. $5.95.

The story of Rudolf Diesel and his engine should make a good book if a sympathetic writer who understood the engine would explain its development carefully. The engine has been responsible for the transformation of sectors of our economy, and it is historically interesting as a rare example of the way science is supposed to be applied to engineering—the Diesel engine began as a pure idea. The man Diesel is also an interesting figure, a proud, over-rational neurotic, with chronic headaches and occasional breakdowns, a driven man with a mission to do for the 20th century what James Watt had done for the 19th. In 1893 he published a book in which he set forth the abstract principles of his rational heat engine, as he called it, before he had any hardware at all. He got into deep trouble because the engine did not turn out to be what he said it was, but he was nevertheless able to sell his pure idea to manufacturers for a handsome fortune, which mysteriously disappeared before he had a commercially viable engine. He also undertook to reconstruct society on rational principles, or at least he wrote down the principles in his book *Solidarismus*, but he could find no one to implement these ideas.

That story could stand on its own feet without being glamorized, but the