

Ellery Hale held the "reigns" of the *Astrophysical Journal* in the 1920s and 1930s (actually, he gave up the managing editorship in 1905, when he resigned from the University of Chicago faculty after founding Mount Wilson Solar Observatory). And there are several omissions from the book's list of astronomers who did solar system research in the years between 1920 and 1960, notably William H. Wright, who between 1924 and 1929, published at least a dozen contributions to planetary photography with color filters, for which he received the George Darwin Medal of the Royal Astronomical Society in 1928.

Nevertheless, given these reservations, *Solar System Astronomy in America* is an interesting history of science, well worth reading by astronomers, physicists and planetary scientists. And if it stimulates more Earth scientists to broaden their perspectives to the whole Solar System, so much the better.

DONALD E. OSTERBROCK

*Lick Observatory
University of California, Santa Cruz*

Driving Force: The Natural Magic of Magnets

James D. Livingston
Harvard U. P., Cambridge, Mass.,
1996. 311 pp. \$24.95 hc
ISBN 0-674-21644-X

Any book that has jacket blurbs from D. Allan Bromley, Leon Lederman (with pun) and Dave Barry has got to be worth investigating. For those who maintain a collection of books in the style of David Feldman's *When Did Wild Poodles Roam the Earth?* (Harper Collins, 1992) or David Macaulay's *The Way Things Work* (Houghton Mifflin, 1988), this is another one for the shelf. Likewise, if you talk about science to young people in the schools, James Livingston's *Driving Force* can provide stories and ideas for any level from preschool to university.

Livingston's presentation is mostly at the technical level of an amateur scientist or committed high school student, but the author doesn't shy away from increasing the complexity when necessary to develop the topic. The history of magnets and magnetism from earliest times to the present day is covered, with a good part devoted to modern applications. Superconducting magnets are discussed at length, including a section on magnetic-resonance imaging systems that not only covers the magnets but introduces just enough of the physics of nuclear magnetic resonance to give the nonspecialist an understanding of the images.

Livingston has devoted much of his career to magnetism, first at General Electric as a physicist in the materials department and more recently as a senior lecturer in materials science at MIT. He also tells a good story. While not a master of the pun, he demonstrates that he is a serious practitioner, with comments such as his caption to an "animal magnetism" cartoon from *The New Yorker* magazine showing a cow with attached fish and the suggestion that the cow ate a cow magnet and the fish is a steelhead trout. Much worse is the discussion of earphones for teens and the suggestion that they can turn up the volume "until it Hz."

Bad puns and a few cartoons aside, the book is mostly a serious and comprehensive discussion of the field, carefully crafted for the nonspecialist. Livingston clearly has given a great deal of thought to ways best to present the mysteries of magnetism to the widest possible audience. He accomplishes this by presenting "ten facts about the force." The first five describe interactions between magnets, the last five the interaction of charged particles with magnetic fields. From this basis, he proceeds to develop the universe of magnetic applications. Most of these are very practical, and with them he shows the ubiquity of magnets in the modern world. Typical is the illustration showing the number and types of magnets to be found in an automobile.

The history of magnetism is always interesting, especially when told with emphasis on the personalities involved. Typical here is the story of the battle between Thomas Edison and George Westinghouse over direct versus alternating current for the national power grid, complete with electrocutions of various mammals and the first electric chair (cleverly arranged by dc proponents to be ac Westinghouse equipment). Going further into the past, Livingston's presentation of Franz Anton Mesmer as a leading figure in the development of magnetism is right on. He recounts one of my favorite stories of the investigation of Mesmer's activities by a committee consisting of Antoine Lavoisier, Benjamin Franklin and Joseph Guillotin, appointed by France's Louis XVI. Consider facing that group at your next progress review!

While the animal magnetism adventures of Mesmer provide a fascinating and humorous view of magnetism in the 18th century, the description of modern charlatans and their greed-driven promotion of magnetic cures for cancer is a sad story. Along those lines, I wish the author had taken a stronger stand on the potential negative health effects of extremely-low-frequency magnetic fields. His treatment leaves a lot

of room for unnecessary concern, even though he does ultimately describe the available data as "unconvincing."

In summary, I highly recommend the book, both for enjoyable reading and as a valuable source of information on the history of magnetism.

FREDERICK R. FICKETT

*National Institute
of Standards and Technology
Boulder, Colorado*

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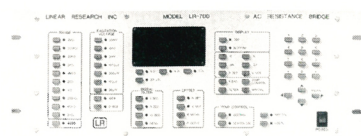
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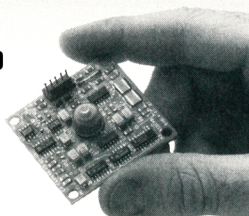
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