view of contemporary events. His attempts to place Gauss in historical context are helpful though rather self-conscious—he frequently points out how it would be unfair to judge Gauss's behavior by the norms of later periods.

His book will probably interest mathematicians more than physicists. It gives a detailed account of Gauss's contributions to number theory, which Gauss in effect established as a separate field of mathematics. His treatment of Gauss's contributions to physical science, however, is sketchy and fails to place them adequately in their 19th-century environment.

Nonetheless, Gauss's work should be of interest to nonmathematicians. He developed the theoretical basis for several important areas of science: analysis of data and determination of astronomical orbits (method of least squares), distribution of errors or random variations (exponential "law of errors"—the bell-shaped curve), geodesy (differential geometry, theory of surfaces), geomagnetism (measurement in absolute units), and potential theory. He was one of the first to work out the principles of non-Euclidean geometry, even though he refrained from publishing his results. With Wilhelm Weber he developed the electromagnetic telegraph. Bühler, however, treats these contributions to physical science as isolated incidents in Gauss's life; he fails to integrate them into a comprehensive account of 19th-century physics.

Thanks to those who devoted years of meticulous work to collecting and editing the writings of Gauss and other giants, the raw material is now available to probe the development of science and to describe this growth to both popular and scientific audiences. Bühler's book is a good example of the latter, even if it will not be of great value to most physicists.

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## book notes

**Exploratorium Cookbook II: A Construction Manual for Exploratorium Exhibits**
R. Hipschman
Exploratorium, San Francisco, 1980. $40.00

With this volume, the Exploratorium, the museum of science in San Francisco, has added 52 "recipes" for its exhibits to the 84 published in a first volume. Each recipe contains a description of how the exhibit works and details of how it can be constructed. The exhibits are designed for high-school and college students and adults. The cookbook is also expected to stimulate teachers to come up with other ideas for exhibits and demonstrations. Most exhibits described here illustrate phenomena of light and visual perception, heat and temperature, electricity and magnetism, mechanics, and physics of sound. —DG

**Physiological Optics**
Y. Le Grand, S. G. El Hage
338 pp. Springer-Verlag, Heidelberg, 1980. $46.00

This is a translation of Volume I of Yves LeGrand's three-volume work *Optique Physiologique*, published in 1945. While the two later volumes were translated some time ago—Volume II as *Light, Colour and Vision* in 1957 and Volume III as *Form and Space Vision* in 1966—this is the first English version of *La dioptrique de l'oeil et sa correction*. The translation is based upon the revised, 1958, edition of the French, but it has been updated by LeGrand and Sami El Hage.

Intended for those concerned with the correction of refractive errors of the eye and related problems, this volume adopts the point of view of the physicist and optometrist. A brief introduction and review of geometrical optics (occasionally with novel and elegant derivations) provide a general background for the rest of the volume. Le Grand next considers the single eye at rest: the nature of the image, accommodation, defects of accommodation, and corneal astigmatism. In practice, of course, the eye moves in the head and, therefore, in relation to corrective lenses worn outside the eye. Corrective lenses also affect the combined functioning of the two eyes. The book examines both of these topics at considerable length. A final group of chapters discusses methods of examination and the tools of the opthalmologist's trade.

The book treats a great amount of detail—including such topics as continuous-gradient bifocals, bichrome tests for visual acuity, the photometry of Purkinje's images, and the theory and method of retinoscopy. The style is somewhat terse and mathematical. The book may serve well as a reference and handbook, but there are very few references to any material published since the early 1970s. A small set of problems (with solutions) may be useful if the book is used as a text. —TVF