from the social congeniality there and the comfort of his mother's home.

Moseley's leisurely sojourn with his mother to the 1914 British Association meetings in Australia (including two weeks among the flora and fauna of the Canadian Rockies) contrasts sharply with his hurried return to England once war was declared—his frenzied rush to the colors and to his death at Gallipoli. It appears clear that the ultimate blame for Moseley's tragically premature death does not rest with the stupidity of the War Office. Even had the War Office behaved differently, Moseley would not have. His education—reformed, enlightened and relatively liberated as it was—still pressed upon him an antiquated, rigid code of duty that wasted those very prodigious gifts that had been nutured.

The second half of the book is something of a model, comprising virtually all of the known Moseley correspondence. The few omissions consist of non-scientific portions—very rarely entire letters—deemed adequately represented in the included material. The existence of those letters that are not published is acknowledged, and their subject matter is indicated. The correspondence is fully and usefully elaborated and cross-referenced by means of the footnotes. Finally, the book includes a brief "Inventory of Moseleyana," an extremely useful bibliography and an adequate index.

Unhappily, there are more slips (the elevation of Sir George Darwin to Astronomer Royal, typographical errors, displaced footnotes) than should have been allowed to mar this fine book slightly; it is a seemingly effortless, well-proportioned characterization of an important figure and his involvement in an extraordinarily complex scientific milieu. The book is admirable—both for its completeness and usefulness as a source.

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## Group Theory and Chemistry

**D. M. Bishop**
294 pp. Oxford U. P., New York, 1973. $27.25

David M. Bishop, an active quantum chemist, has written an introductory text on group theory and some of its chemical applications. The first half of the book develops the fundamentals of the representation theory of finite groups in a clear and detailed manner of explanation and of proof; point group examples of the various concepts are interspersed in the text. The latter portion of the book concerns applications to the theory of molecular vibrations, and also to molecular-orbital treatments of electronic structure, including Hückel orbital theory of $\pi$-electron systems, hybrid orbitals and ligand-field theory. In essentially all the applications developed in the text only point group symmetry is considered, and the theory and applications stop short of Clebsch–Gordan coefficients and the Wigner–Eckart theorem.

The level and approach of the whole book is intended for undergraduate or first-year graduate chemistry students. As such, Bishop's text is one of a growing number of similar efforts, from which this treatment is distinguished in detail rather than in general plan. Bishop's typically more complete development of the theory, sometimes with a slightly less varied discussion of applications, hence offers another choice of introductory text concerning some chemical aspects of group theory.

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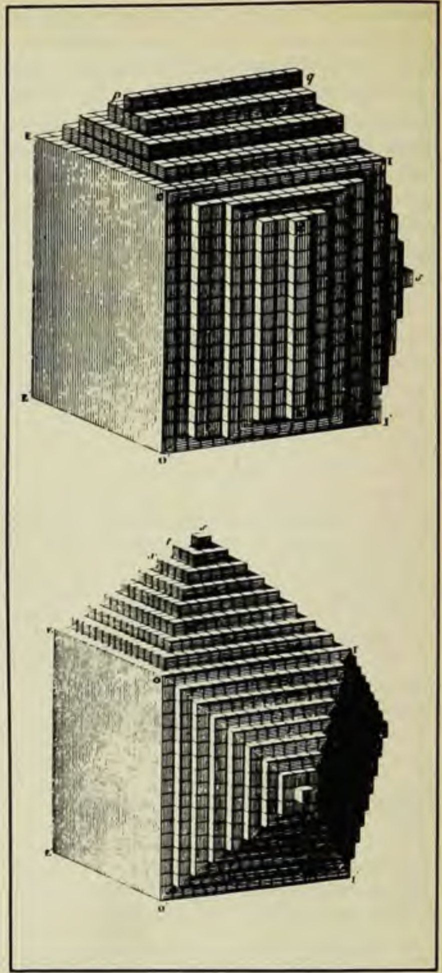
## Solid State Physics

**H. E. Hall**
351 pp. Wiley, New York, 1974. $22.00

Solid-state physics is now one of the major branches of physics, although as the author, H. E. Hall points out, it is no longer a truly frontier subject like high-energy physics or cosmology. The text is purportedly introductory, but that depends on who is reading it, the beginning student or his instructor. According to the author it is designed for the honors student, but judging from the undergraduates I have run into, it may be a little out of reach. This text would be excellent for a first graduate course in solid-state physics.

Its departure from many of the typical treatments is especially noteworthy. Hall uses a quantum-chemical approach at the beginning, with the hydrogen molecule ion as the basis for the covalent bond and crystal binding. He then develops the various types of crystal binding from the covalent bond and he treats semiconductors prior to metals because the free-electron concentration is low enough to justify easily an independent-particle approximation. The inclusion of semiconductor devices appears a bit out of place in a text devoted primarily to fundamentals. Topical coverage is fairly conventional, but there are many novel methods of presentation—we see more chemistry here than in most solid-state texts. Discussions of one-dimensional chains of electrons, magnons and phonons are very well done. The first ten chapters are followed by problem sets, for which detailed solutions are given, certainly a worthwhile consideration.



**Crystal faces** can be developed from elementary cubes as shown in this illustration from René Haüy's *Traité de Cristallographie*, a three-volume treatise that appeared in 1822.

A few minor criticisms—bibliographies would have been better at chapter endings than at the back of the book, and the index is so short as to be useless, a common failing of every British author I have read. Also, the chapter on superconductivity lacks the originality shown in other areas.

An interesting flow diagram showing the relationship of the topics appears inside the front cover. The material probably could have been arranged to avoid the need for such a diagram, but there is method in the author's madness—the first half of the book constitutes a self-consistent introductory course because the second half is optional at his institution. As a result, the treatment is somewhat disconnected: chapters 4 and 9 relating to metals, 5 and 12 to magnetism, and 2, 7 and 8 to lattice vibrations. It is an interesting arrangement, but one cannot help wondering whether or not the author cared if the book will be used anywhere besides Manchester.

The important discussions—Brillouin zones, the quantum machinery and quantized excitations—are excellently and creatively done. The chapter on real metals takes up some difficult topics like the Mott transition and makes them fairly intelligible. The author claims not to be a professional solid-state physicist, but the treatment in this text indicates the usefulness of at least occasionally listening to what an outsider has to say.

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## The Cavendish Laboratory 1874–1974

**J. G. Crowther**
464 pp. Neale Watson Academic, New York, 1974. $35.00 prepaid

In an age when name changes of laboratories are common (Oak Ridge to Holifield, JPL to H. Allen Smith), it is refreshing to note that the Cavendish Laboratory has retained its illustrious name despite a physical shift to the outskirts of Cambridge, England. Indeed, the tradition-conscious British no doubt would be appalled at the suggestion of a name change, because the laboratory (given as a gift to Cambridge University by its chancellor, the Seventh Duke of Devonshire, whose family name was Cavendish and who was related to Henry Cavendish) was for decades the most famous site of physics research and teaching in the world, and continues to be one of the foremost.

J. G. Crowther, a long-time scientific journalist for the *Manchester Guardian* and author of numerous books on British science, has written a "biography" of the Cavendish Laboratory in honor of its centennial. The first director, James Clerk Maxwell, both carried to it his own strong research orientation and established in Cambridge the then-not-universal opportunity for physics students to take experimental laboratory classes.

Lord Rayleigh (director 1879–84) systematized the teaching and concentrated research on electrical phenomena, particularly the determination of physical units. Under his successor, J. J. Thomson (1884–1919), the laboratory expanded in size and numbers and witnessed investigations of great significance: "J. J.'s" own discovery of the electron and work on positive rays, C. T. R. Wilson's development of the cloud chamber, Ernest Rutherford's first examination of radioactivity, W. L. Bragg's analysis of crystals by x-ray diffraction and F. W. Aston's early work on the mass spectrograph. By the time of Thomson's retirement in 1919, it was logical that his own pupil, Rutherford, should carry on this tradition of eminence. Nuclear physics now became the Cavendish's primary research area, investigated by James Chadwick, C. D. Ellis, Patrick Blackett, John Cockcroft, E. T. S. Walton, Mark Oliphant, and others, while physics of different sorts was pursued by Peter Kapitza, Edward V. Appleton, and G. I. Taylor.

Under W. L. Bragg (1938–53) the laboratory then deemphasized nuclear physics (although Otto Frisch did arrive during this period) and encouraged the development of radioastronomy by Martin Ryle and Antony Hewish and the extension of Bragg's own speciality of x-ray diffraction to organic molecules, by Max Perutz, John Kendrew, Dorothy Hodgkin, James Watson, and Francis Crick. Solid-state physics achieved prominence under Nevill Mott (1954–71), the next Cavendish Professor, with Brian Josephson's work being most notable. Since 1971 Brian Pippard has directed the laboratory.

Crowther's volume covers the material one would expect. He discusses the contributions not only of those named above, but of virtually every Cavendish member of at least moderate distinction, often to the point of "losing the laboratory for the scientists." He provides biographical sketches of the more distinguished figures and writes about the construction of laboratory additions, giving floor plans and dimensions of some. Crowther discusses the administration, finances, academic politics surrounding the laboratory's establishment and teaching. But, unfortunately, it does not jell into a unified