extended to noncompact groups following the now classical work of Eugene P. Wigner (incidentally, the book contains contributions from this great master). Coleman's article carefully elucidates the present knowledge on this subject.

The second part contains applications of group theory to such "classical" subjects as atomic spectroscopy (by J. R. Judd), solid-state physics (by Stig Flodmark), nuclear structure (by P. Kramer and M. Moshinsky) and to the "modern" subject of SU(3) symmetry of elementary particles by L. O'Raifeartaigh and R. G. Behrends.

The last part, consisting of an article on "De Sitter Space and Positive Energy" by J. O. Phillips and Eugene P. Wigner, is an attempt to elucidate the physical interpretation of the de Sitter group and in particular to understand how the energy's positive nature can be incorporated in this interpretation.

In praising this book I would like to mention specifically an attempt at using uniform notation. This is very essential in any effort to create interest in other fields. In fact, the very reason that books on group theory by theoretical physicists are bound to be much more popular among followers of this discipline is that the language used by mathematicians is not so readily and widely understood. These two books go a long way in bridging such gaps.

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The Collected Works of Count Rumford, Vol. 1: The Nature of Heat

Sanborn C. Brown, *ed.*
507 pp. Harvard U. P., Cambridge, Mass., 1968. $10.00

This is the first volume of a new five-volume edition of the technical papers of Benjamin Thompson (1753–1814), later Count Rumford. It was published under the auspices of the American Academy of Arts and Sciences and paid for in part by Rumford's own legacy to that organization. The work is edited by Sanborn C. Brown, professer at MIT and a life-long student of Rumford's activities.

It is a major improvement over the edition published nearly a century ago, as the new edition reproduces the original papers almost exactly as written with only a minimum of editorial changes made in the interest of clarity. Volume one of the set, titled *The Nature of Heat*, will be of greatest interest to physicists, as it deals with Rumford's basic studies on that subject. The additional four volumes are concerned principally with technical applications, especially those made while Rumford was employed by the Elector of Bavaria as his chief advisor on military applications of science, housing, and what would now be termed "inner-city problems."

Benjamin Thompson had spent his early years in intrigue as a Tory spy against the American colonies in Massachusetts and then in London as personal adviser to Lord George Germain, helping him to suppress the independence movement in the British–North-American colonies. Throughout his highly romantic life, Rumford was a very successful opportunist and, on the personal side, an aggressive and unattractive character.

When he returned from Bavaria to England with his title of Count of the Holy Roman Empire, he was not again accepted by the British sovereign and so was forced to return to scientific pursuits. He was the leading influence in the founding and development of the Royal Institution in London, and was responsible for the employment there of Thomas Young and Humphrey Davy. However, he felt snubbed in London and so transferred his activities to Paris for his final years of political and social climbing. These years were also unsuccessful for although he gained the salons of Paris society by marrying the widow of Lavoisier, he never won Napolean's confidence. Probably as a result of his disappointments in London and Paris, he left his principal legacy to the American Academy of Arts and Sciences in Boston.

The papers recorded in this book were first published during 1798–1805 and report work done in Munich, London and Paris. They expound pioneer contributions to our understanding of the science of heat. A person who could produce work of this caliber amid all his political, military, and social intrigues must have been near to genius. His experiments and their interpretation, on the nature of heat as a mode of motion, its generation by friction, its propagation in

AN EARLY HEAT EXPERIMENT. With this apparatus, Rumford found that an undisturbed vessel of water remains liquid at the bottom when surrounded by a freezing mixture and frozen at the top.

solids and liquids, thermal expansion and radiation, are all illustrated with direct and crucial quantitative experiments made with great skill and constitute an impressive achievement.

Although this edition is most welcome, many physicists will find the 1967 Pergamon Press paperback of selected readings from the works of Rumford (also edited by Brown) to be more useful for their personal libraries. The earlier book is not only considerably more reasonable in price, but also in many ways more attractive for the general reader, not least because Brown's own commentaries on some of Rumford's work are included. However, this new book is an important addition to physics literature, although the subsequent volumes will be of special value not only for their scientific content, but also for the early technical applications of heat that they reveal. These books should have general appeal, although it is probable that interest in Count Rumford diminishes rapidly with the reader's distance from Massachusetts Bay.

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The Game of Science

By Garvin McCain, Erwin Segal
171 pp. Brooks-Cole, Belmont, Calif. 1969.

In the preface Garvin McCain and Erwin M. Segal hope their book will ". . . lead the reader to a broader per-

spective regarding scientific attitudes and a more realistic view of what science is, who scientists are, and what they do." Admitting their approach is informal and opinionated, they hope this approach will lead the reader to see science as a "delightful pastime rather than a grim and dreary way to earn a living."

They classify those who play the game of science as players, operators and bystanders. "Players are the good guys motivated by the intrinsic pleasures of science, rarely interested in discussing administrative positions, playing the game not primarily for knowledge . . . , but simply for the game itself . . . . The operators seem less gifted intellectually than the players, and the motivations and goals of the operators are primarily recognitions and accompanying rewards. . . . Bystanders are those who are not courageous enough to conduct research. . . ." Teachers and writers are considered bystanders.

The book also contains statements such as "physics has something to do with making bombs and the most violent enemies of science across the face of the earth tend to be those for whom the bomb is an object of reverence."

With the aid of such statements, and more generalizations, my overall impression is that it reads like an account from the *Ladies Home Journal*. The flavor of science can not be described by such a book.

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Spectral Properties of Disordered Chains And Lattices

By J. Hori
229 pp. Pergamon, New York, 1969. $10.00

Two significant developments in the study of simplified models of disordered systems occurred with the work of Paul Dean and Robert Borland at the National Physical Laboratory in the UK. Dean showed the existence of zeroes in the spectrum of normal modes of an isotopically disordered chain, and Borland proved a similar result for the energy density of electron states in a one-dimensional model of a liquid. The crash of falling Green functions was clearly audible on both sides of the Atlantic when these results were published.

Work of this sort is fully reviewed here by Jun'ichi Hori, who has himself contributed much to the field. The majority of his book is devoted to the transfer-matrix method and is consequently confined to discussion of one-dimensional systems, although one rather strained chapter does attempt the larger task of considering multidimensional systems. The mathematics is not always simple, and one wishes that the publisher had taken the trouble to help Hori with his English. They could also have speeded the production; the preface is dated August 1966, and no advances since then are reported.

This book will be valuable to the handful of workers in this narrow field who want to learn more of transfer-matrix methods. It would, however, have been just as useful and a little more appropriate as a review article in a journal.

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Linear Operators for Quantum Mechanics

By Thomas F. Jordan
144 pp. Wiley, New York, 1969. Cloth $7.50, paper $4.95

This book may best be described as a handbook on linear transformations in Hilbert space. It is intended to be—and should be—useful as a reference work to accompany graduate courses on quantum theory. The chapters are short, to the point and emphasize those theoretical aspects of quantum mechanics that physics students are likely to want amplified.

The first four chapters are purely mathematical in character, dealing with linear space and the basics of operator theory. The point of view is decidedly theoretical (as opposed to computational), a fact that is underscored by the presence of nothing but theorems on spectral families in the chapter "Diagonalizing Operators." The last three chapters discuss the role of linear operators in nonrelativistic quantum theory. Here we meet mathematical descriptions of density matrices (including Gleason's theorem), uncertainty relations and compatibility, superselection rules, equations of motion and the Galilei group.

Each of these topics is handled with some precision, but in all cases the rigor is reserved for the papers and books cited in footnotes. The mathematically-minded reader will generally find this procedure warranted, except possibly when the statement or proof of a theorem is sensitive to the presence of unbounded operators. In nearly every situation where trouble can arise, the rigorous justification is put off to a reference, and the reader may be left wondering just how valid the whole Hilbert space approach is for things like position and momentum operators. Of course, this problem is not unique to this volume: The whole question of unbounded operators is usually ignored in texts on quantum mechanics. Jordan at least points out that they do exist, and that one has to be careful when applying even the fundamental theorems.

Everyone who teaches a course on quantum mechanics has his preference as to how the mathematical portions should be handled. In my own view, *Linear Operators for Quantum Mechanics* can be useful as a ready reference and as an adjunct to an already reasonably precise textbook. As a matter of taste, I must say that I like the dictionary like character of the book; but I would prefer more than nine problems and more than a single page of bibliography. At any rate, whoever wishes a little grammar book on the mathematics of linear operators, which makes up in relevance what it may not have in depth, is likely to find his request has been filled admirably.

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Elements of Nuclear Physics

By Walter E. Meyerhof
279 pp. McGraw-Hill, New York, 1967. $9.95

Because I have used Walter E. Meyerhof's *Elements of Nuclear Physics* as a supplemental text in a nuclear-physics course, it is a pleasure to recommend it to others. Meyerhof, physics professor at Stanford University, has produced a readable, introductory account on his speciality.

The unifying theme is that of nuclear structure approached through elementary quantum mechanics and the concepts of the shell model. Even the chapters on radioactivity and nuclear