encourage and organize the amateurs.

It is hard to find any nits to pick in this book. The kidney-produced protein mentioned in the caption of the next to the last illustration is renin, not resin. The *AIBS Bulletin*, which attempts to cover all the biological sciences, should not be listed under "Herpetology, Ecology, etc." (p. 92). The headquarters of the Entomological Society of America were moved in 1960 from 1530 P St., NW, Washington, D.C., to 4603 Calvert Road, College Park, Md. (p. 95).

This book is not a compilation of science fair projects, but it should be read by every student who wants to devise a worthy exhibit. It will give him incentive and encouragement, and it may win him for science after the fairs are over. From it, older laymen can learn why the pursuit of science is absorbing.

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Molecular Models

Chemistry in Three Dimensions. Louis F. Fieser. Published by the author, 1963 (order from Macalaster Scientific Corp., Cambridge, Mass.). vi + 122 pp. Illus. Paper, $1.50.

Louis Fieser has developed an inexpensive plastic copy of André Dreiding's popular, stainless steel, molecular models. A good idea of the models and of this book is given in an article by Fieser, published in the *Journal of Chemical Education* [**40**, 457 (1963)], in which he states that the book is intended "to promote use of the models in high schools. . . . It presupposes no previous knowledge of chemistry and develops principles of the structure and stereochemistry of organic compounds largely by prompting the student to discover these principles by study of models of his own construction." Although Fieser hopes that "for some readers it may be self-teaching," the abbreviated style will probably make supplementation by a teacher desirable.

This lively volume is primarily addressed to students rather than to the author's colleagues. Purists may object to the chatty, informal style, which involves the use of the first and second persons, direct questions, and the currently condemned [*J. Chem. Educ.* **40**, 561 (1963)] anthropomorphism and teleology of atoms, but the author, who is obviously having fun, should communicate a spirit of excitement to the student. One section leads almost effortlessly to another; by the time the student has digested the 113 pages of text, which consists largely of excellent photographs and drawings of models, structural formulas, and apparatus, he has acquired a broad, if somewhat shallow knowledge of an amazing variety of fundamental topics in organic chemistry—isomerism (optical, geometric, and structural), valence, atomic and molecular weights, homologous series, nomenclature, natural products, polymers, conformation, resonance, and clathrate complexes, to mention only a few.

This is an active book, filled with directions, problems, and experiments, not armchair reading. Representative experiments include the solvent extraction of lycopene from tomato paste and its purification by adsorption chromatography and the isolation of oleic acid from olive oil by preparation of the urea inclusion complex. Smatterings of history and odd facts such as word derivations, occasionally so irrelevant that they almost smack of free association, serve to enliven the text and to exhibit the author's encyclopedic knowledge.

Although it was designed for use with the author's models, the book can be adapted for use with other models. If used without models, it would undoubtedly lose much of its effectiveness, especially in the fairly detailed sections on cycloalkanes and polycyclic systems.

Even though the subject matter is confined to organic chemistry, a fact not indicated by the title, Fieser should have made it clear to students that the carbon atom has no monopoly on stereochemistry. An introduction might have referred to configurations for coordination numbers other than four. In a broader treatment, the student could have used models to convince himself by isomer counting that the configuration of the carbon atom is not square planar but tetrahedral. Asking the student to accept this, the cornerstone upon which both the models and the book are built, merely as an act of faith seems contrary to the do-it-yourself spirit of the book.

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Perturbation Theory

Methods of Quantum Field Theory in Statistical Physics. A. A. Abrikosov, L. P. Gorkov, and I. E. Dzyaloshinski. Translated from the Russian and edited by Richard A. Silverman. Prentice-Hall, Englewood Cliffs, N.J., 1963. xvi + 352 pp. Illus. $16.

This book deals with the use of some methods of quantum field theory in statistical mechanics. The methods under question are essentially the perturbation theory techniques of many particle systems. There are various forms of the perturbation theory in such a context. Fortunately, the book is not just about the methods, as the title may indicate, but about their actual applications to some of the most important problems in statistical physics and many body systems. Throughout the volume, the authors use one particular method, the most convenient one for the purpose at hand, namely the method of Green's functions.

The first chapter begins with an excellent discussion of the general properties of many particle systems at low temperatures based, phenomenologically, on the frequency spectrum of lattice vibrations (phonons) as a function of the wave number. It also includes a simple form of the perturbation theory applicable to weak interactions where a few terms of the perturbation series would give satisfactory results, such as the problems of dilute Bose and Fermi gases. A more sophisticated form of perturbation theory is necessary in cases of stronger interactions where one has to sum up whole sequences of terms. These techniques which use the so-called Feynman diagrams have been very successful in quantum electrodynamics and are discussed (in chapters 2 and 3) for the two cases—temperature $T = 0$ and $T \neq 0$, respectively. Of course, there are some differences in the way the diagrams occur in quantum field theory and in statistical mechanics. In the first case one considers the scattering of particles, and the diagrams give all possible virtual processes that occur in the intermediate states; in the latter case the diagram expansion is used in evaluating the expectation value of an exponential operator, the grand partition function.

In the remaining chapters (more than half of the book) there is a detailed discussion of the application of these methods to the following problems: theory of the Fermi liquid (in-

cluding electron-phonon interactions and the problem of degenerate plasma), systems of interacting bosons, electromagnetic radiation in an absorbing medium (that is, the calculation of the dielectric constant), and the theory of superconductivity (including a derivation of the phenomenological Ginzburg-Landau theory). Although a number of more recent results are not included, the book should be very useful to a large number of physicists.

It is heartening to see how methods used in one branch of physics can be of fundamental importance in another branch as well. The translator of this book, Richard A. Silverman, deserves special credit because the book is not just a translation, but a complete revision in collaboration with the authors.

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Psychology

The Science of Animal Behaviour. P. L. Broadhurst. Penguin Books, Baltimore, Md., 1963, 135 pp. Illus. 95¢.

This fine little book, written especially for the Pelican paperback series in psychology, presents a quite readable, yet scholarly, survey of animal behavior. Virtually every problem of any importance to students of animal behavior is covered, with illustrative experiments frequently given in detail. Still, the language and style are such that any intelligent layman can read and understand the book.

The first and the last of the book's seven chapters are concerned, respectively, with the reasons for studying animal behavior and with its practical uses. In both chapters, it is emphasized that animal behavior is interesting in its own right. On the other hand, certain inferences can be made from animal behavior to human behavior, and it is a valuable adjunct to human psychology. In addition, it has certain practical uses, and in the future, it may have even more. We may see the day when animals are used for routine manufacturing tasks that bore humans but can be done reliably by animals.

Broadhurst distinguishes between ethology as the field study of animal behavior and animal psychology as a laboratory study. The second chapter covers ethology, the third chapter laboratory experiments, each with illustrative descriptions. The advantages and limitations of each approach are given, with a declared bias toward laboratory work. Ethology, nevertheless, is well represented.

The remaining three chapters are divided among the topics of inborn behavior, acquired behavior, and abnormal behavior. Each chapter covers its field well, stating the principal problems, methods, and kinds of results obtained.

The book should find many uses. It is interesting reading for the layman, whether or not he has had any formal training in psychology. It could be used as supplementary reading material or as the basis of a book report in introductory psychology. In a course in comparative psychology, it would be worth using as a supplementary text, for it provides a better overall view of the field than available textbooks. It should even be read by psychologists and biologists outside the field of animal behavior, for in one evening's reading they can get an up-to-date picture of what has been going on in the field.

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Petroleum Engineering

The Fundamentals of Well Log Interpretation. M. R. J. Wyllie. Academic Press, New York, ed. 3, 1963. xvi + 238 pp. Illus. $7.

In the 10 years that have elapsed since publication of the first edition of *The Fundamentals of Electric Log Interpretation,* great advances have been made in the techniques for evaluating petroleum reservoirs through geophysical methods of well logging. In most instances, reasonably accurate estimates can be obtained of the composition, porosity, and thickness of strata in a borehole and of the nature and percentage of the fluids present. The earliest logs were based on certain electrical properties of rocks when penetrated by a borehole that contained drilling mud, and these are still useful; nowadays, however, focused electrical devices and neutron, gamma-ray, and acoustic velocity logs are common and, when employed in proper combination, give much more precise measurement of the parameters sought. The rapid development of these devices has necessitated a second enlargement of the original book and a complete revision of the chapter entitled "A general method of electric log interpretation" (now an inappropriate title because electric logs are only one of the types treated by Wyllie).

The increased size of this edition is due primarily to discussion of devices or methods of interpretation not included in previous editions, notably the proximity, nuclear magnetism, chlorine, cement bond, and still-to-be-perfected acoustic attenuation log and to the determination of porosity and mineral composition in formations of complex lithology.

Despite a few editorial errors that have crept in, this book continues to be the best mixture of clarity, simplicity, authority, and rigor of explanation on a nonspecialist level that I know in its field.

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Mathematics

Foundations of Linear Algebra. A. I. Mal'cev. Translated from the second edition (Moscow, 1956) by Thomas Craig Brown. J. B. Roberts, Ed. Freeman, San Francisco, Calif., 1963. xii + 304 pp. Illus. $7.50.

The first Russian edition of this book was published in 1948 and the second, which differed considerably from the first, in 1956. A number of expository refinements resulted in a saving of space in the 1956 edition, an economy that allowed the author to include a long and important chapter on multilinear forms and tensors and a detailed account of the basic topics in tensor algebra, without altering the actual size of the book.

Here we are concerned primarily with an English translation of the second Russian edition. The translation and editing appear to be of a high quality, and the final product provides American readers with a polished and attractive introduction to the foundations of linear algebra. The titles of the eight chapters briefly indicate the coverage of the volume: "Matrices," "Linear spaces," "Linear transformations," "Pol-