

experimental as well as theoretical developments may bring to it.

In summary the main difference between the book published in America and the one from Germany is that whereas the one, in the context of current research, raises ideas to debate, the second one, in the historical aftermath, lays them to rest.

* * *

Daniel C. Mattis is on the staff of Yeshiva University and is visiting professor at Yale University. He is the author of The Theory of Magnetism: an Introduction to the Study of Coöperative Phenomena and other works.

Popular crystallography

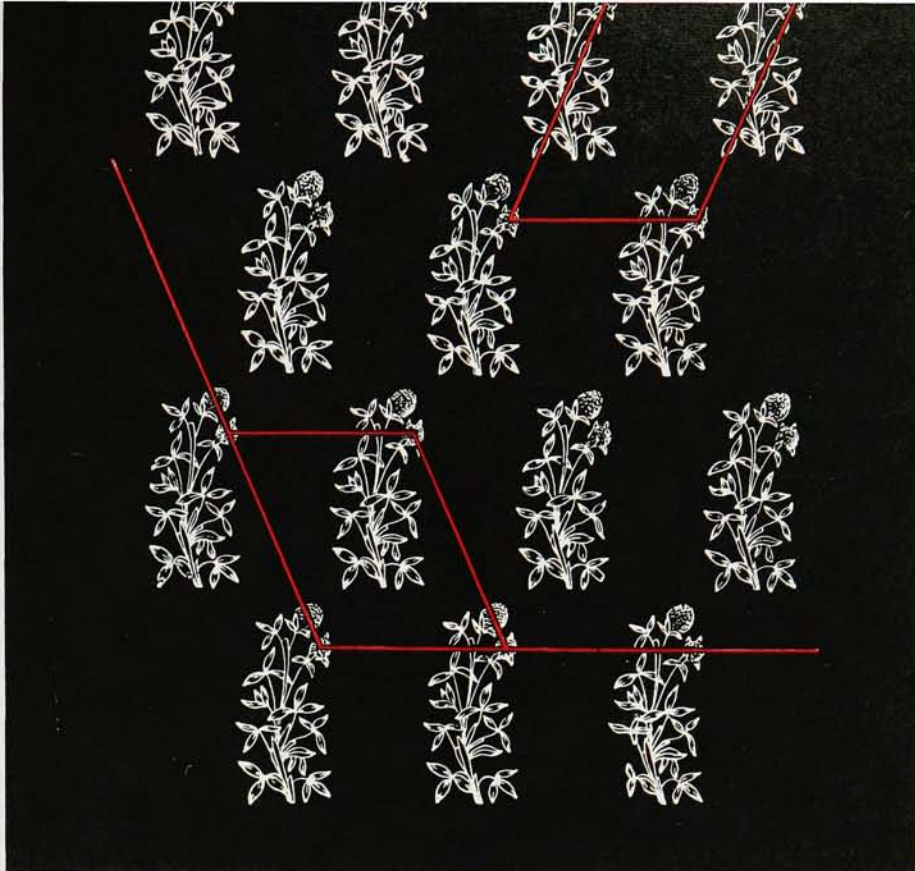
ORDER AND DISORDER IN THE WORLD OF ATOMS. By A. I. Kitaigorodskiy. 135 pp. Trans. from Russian. Springer-Verlag, New York, 1967. Paper \$2.80

by Lawrence Sklar

This brief, profusely illustrated paperback is Volume 3 of Springer-Verlag's series, "The Heidelberg Science Library." Completely nonmathematical and nontechnical, the book is a popular exposition of a number of topics in the theory of matter and is easily accessible to any interested lay reader.

The largest part of the book is devoted to "order," that is, to the crystalline nature of matter. Order is very generally characterized in terms of symmetry, but the author quickly eschews generalities and proceeds to more specific matters such as close-packed versus nonclose-packed arrays of atoms, etc. After a brief treatment of perfect crystalline order, we are introduced to a number of aspects of matter in which the perfect order is disturbed or modified. Liquid crystals and gas crystals are discussed. The concept of "dislocation" is introduced and the various types are lucidly described. The roles of dislocations in the theory of strength of materials and in the theory of crystal growth are discussed. After a treatment of such problems as the nature of alloys and of the problems of order in the realms of magnetic materials and of large organic molecules, the author concludes with a brief general discussion of the "conflict" between order and disorder in nature.

"Disorder" receives a more perfunctory treatment at the author's hands, being little more specifically characterized than by some suggestive but



WALLPAPER PATTERN illustrates some aspects of crystal lattice structure. (From *Order and Disorder in the World of Atoms*.)

quite undetailed remarks about homogeneity and isotropy. Only in the last section of the book are the notions of probability and disorder connected, and even here too briefly to be very illuminating to the naive reader. Nothing is said of the role of "disorder" in such theories as statistical mechanics, and little is done to clarify for the reader such basic questions as the distinction between laws and initial conditions in determining the ordered or disordered nature of a substance. A statement such as this (page 128):

"We must conclude that we are confronted with a law of nature in the form of a compromise between two opposing tendencies, that is, between a tendency towards order (achievement of a stable equilibrium), on the one hand, and a tendency toward disorder (achievement of the most probable distribution characteristic of particles in thermal motion), on the other,"

deserves more in the way of theoretical exposition (rather than merely displaying examples) than the author provides. This is especially true as such assertions may easily mislead the lay reader for whom the book is intended. (Just what "law" is the "law of nature"

to which the statement refers? Is it *really* a law at all?)

But as a first introduction to that part of the theory of matter that treats crystals, their defects, their modifications and their transitions, the book is highly satisfactory. In particular, the numerous and appropriate diagrams and illustrations are extremely useful in giving the reader new to this branch of science an intuitive grasp of the nature of crystalline arrays and their defects.

* * *

The reviewer is assistant professor of the philosophy of science at Princeton University.

Energy transformation: physics and technology

DIRECT ENERGY CONVERSION. G. W. Sutton, ed. 342 pp. McGraw-Hill, New York, 1966. \$14.50

by R. Bruce Lindsay

The transformation of energy from one form to another and its transfer from place to place are at the basis of our modern industrial civilization; economy and flexibility in these processes