Film Review

Symmetry. An animated film and accompanying booklet. *Film design and direction:* Philip Stapp. *Physics:* Judith Bregman (Polytechnic Institute of Brooklyn), Richard Davisson (University of Washington), Alan Holden (Bell Telephone Laboratories). *Music:* Gene Forrell. *Production:* Sturgis-Grant Productions, Inc. *Booklet:* designed by Sutter & Wartik, Inc. 1967. *Distribution:* Contemporary Films, Inc., 267 West 25th street, New York, N.Y., 10001, U.S.A. Sale, $125.00; Rental, $12.50.

This film was conceived, as an aid in teaching geometric symmetry, by three physicists who recognize that symmetry finds applications at various levels and in many fields. The scientists asked the artists to help, and the project was supported by the National Science Foundation.

There is no doubt that the physicists have succeeded brilliantly in teaching symmetry to their artists, both the moviemaker and the musician. As an old professor I wish I could believe that I have done as well in my own teaching! Perhaps the two artists were unusually responsive to the esthetic appeal of symmetry. At any rate their film, from the point of view of their understanding of the subject matter, deserves an *A*. What they have done with their newly acquired scientific knowledge, from the point of view of artistic creation, can be gathered from the appraisal of a sophisticated New York critic* who called this animated color work 'a fast, sparkling beauty'.

I saw the film twice, once at the ACA meeting in Atlanta, where it was viewed by professional crystallographers, and again when I showed it to a group of graduate students in chemistry and geology, who were asked to submit their comments in writing. I also heard echoes of the reactions of the fifth-graders at our local elementary school, where the film was projected in their science class. Everybody enjoyed the picture: artistically it reaches old and young, whether already versed in symmetry, barely initiated to it, or completely ignorant of it. So far, so good. But what about pedagogic value? Does the film *teach* symmetry? It does no talking; it has no legends. The eleven-year-olds were stimulated and intrigued by it, and they asked many questions. Some full-fledged crystallographers, who presumably needed no symmetry teaching, admitted that they could not follow all the symmetry sequences. Graduate students, who had taken my course last semester, thought the film would have been helpful to them at the time. Some of the others, who had never had any course in crystallography, complained that the film had not taught them any symmetry! Their negative reaction is easily explained: symmetry is a vast subject, and a ten-minute short is an awfully short short! Nobody should expect to acquire a working knowledge of symmetry by watching this film only once. The film should be projected several times, the showings alternating with perusals of the booklet, which is very well done and conveys a *minimum minimorum* of symmetry concepts in 700 words and 31 labelled sketches.

As we never get tired of watching classical ballet, we can enjoy repeated performances of this film. Some of the high lights are unforgettable: the lost battle of the pentagons, the formation of the capital letters, the futile attempts of R to acquire symmetry by itself and its sensible decision to co-exist with Я in perfect mirror harmony.

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* Howard Thompson in *The New York Times*, 21 January 1967.

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (A.J.C.Wilson, Department of Physics, The University of Birmingham, Birmingham 15, England). As far as practicable books will be reviewed in a country different from that of publication.

Reports on progress in physics, Volume XXIX. Parts I and II, Edited by A.C. STICKLAND. Pp. iv+756. London: The Institute of Physics and The Physical Society, 1966.

The present volume, which is the first of this series published in two parts, contains a total of 15 review articles. A substantial fraction of these deals with subjects of interest to crystallographers and other workers on solids. Part I starts out with a review of high-temperature creep and fracture in metals and alloys. It is followed by two theoretical articles, namely one by I.M.Lifshitz and A.M.Kosevich (translated by D.Michelson) on the dynamics of crystal lattices containing defects, and by R.Kubo on the fluctuation-dissipation theorem. In the first of these two contributions the emphasis is on the general theory rather than on applications; the coverage includes planar defects and a brief discussion of dislocations. Kubo's presentation is very lucid, and can be recommended even to a learner. The paper on spin waves in ferromagnets by T.G.Phillips and H.M.Rosenberg – after a brief theoretical introduction – discusses in some detail the variety of techniques that permit the experimental study of spin waves in metals and insulators. Part I concludes with a review of the microscopic transport phenomena in liquids (excluding electronic transport) which can be particularly recommended for its attempt to discuss in a clear fashion the interrelation between theoretical concepts and the various types of measurements relating to the transport properties of liquids.

Part II contains an authoritative review of the theory of type II superconductors by B.B.Goodman, and a paper on covalent bonding and magnetic properties of transition metal ions by J.Owen and J.H.M.Thornley. The latter article emphasizes in particular the impact that modern experimental techniques such as electron spin resonance and neutron diffraction have had on the development of covalent bonding models for octahedrally coordinated ions with unfilled *d* shells.

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