The Many Faces of Science: An Introduction to Scientists, Values and Society. Leslie Stevenson and Henry Byerly. Westview Press, 5500, Central Avenue, Boulder, Colorado 80301-2847, USA. 257 pp. Price: US $18.95. Hard bound US $55.

The sociologist Paul Feyerabend's scathing dismissal of science – 'What's so great about it?' – is countered in this mildly diverting but otherwise forgettable book by two professional philosophers. Although it is not specifically intended to be an apology for science, the book does have a superficially feel-good flavour that scientists afflicted by self-doubts about their calling might take some comfort in. The lay reader is unlikely to be similarly soothed, but he or she will probably come away from the book with a number of morsels of information that could confound dinner companions, or win quizz competitions. It is interesting to read, for instance, that Count Rumford (he of cannon-boring fame) was a sort of Yankee upstart with a taste in rich widows who has given us, among other things, the sofa bed and the drip coffee-maker. Aficionados of trivia may enjoy learning that Niels Bohr, an early and important contributor to quantum mechanics, came to the attention of the US Secret Service when he worked on the atomic bomb project and was code-named Nicholas Baker. But they might also echo T. S. Eliot's doleful enquiry: After such knowledge, what forgiveness? because, in the end, Stevenson's and Byerly's book does not really rise much above the level of a compendium of facts and anecdotes, some amusing, some bland. There is a marked reluctance to confront issues (despite the promise of the title), and much care to be evenhanded in all things, whether from pusillanimity or from political correctness is not clear. The book is also marred by some inaccuracies, and the occasional howler. For instance, as evidence of Isaac Newton's willingness to take pains, the authors point to his calculation, to 55 decimal places (!) – of the area under a curve by series expansion. What must surely be meant is his use of 55 terms in the expansion. Einstein's 1905 paper on Brownian motion is said to have supplied the definitive arguments for the physical existence of molecules, an observation unlikely to have received a ringing endorsement even from Einstein himself. And chemists will be nonplussed to set Gibbs phase rule described as a method to determine the concentrations of various substances so as to get a desired mixture in which the components are in equilibrium and do not separate out.

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Symmetry Orbits. Hugo F. Verheyen. Birkhäuser Boston, 675 Massachusetts Avenue, Cambridge, MA 02139, USA. 1996. 236 pp. Price: DM138.

Texts on symmetry in the structure of objects used to be terse, abstract writings on a course of pure mathematics, even a few decades ago. The classic texts by Weyl and Hammermesh were beyond the reach of most physical scientists. There were hardly any illustrations. With the success of symmetry-based applications of quantum mechanics in understanding molecular structure and features of spectroscopy, a range of texts have appeared varying in their audience level from an expert to a pedestrian. With greater access to computer graphics, more attractive illustrations were now expected.

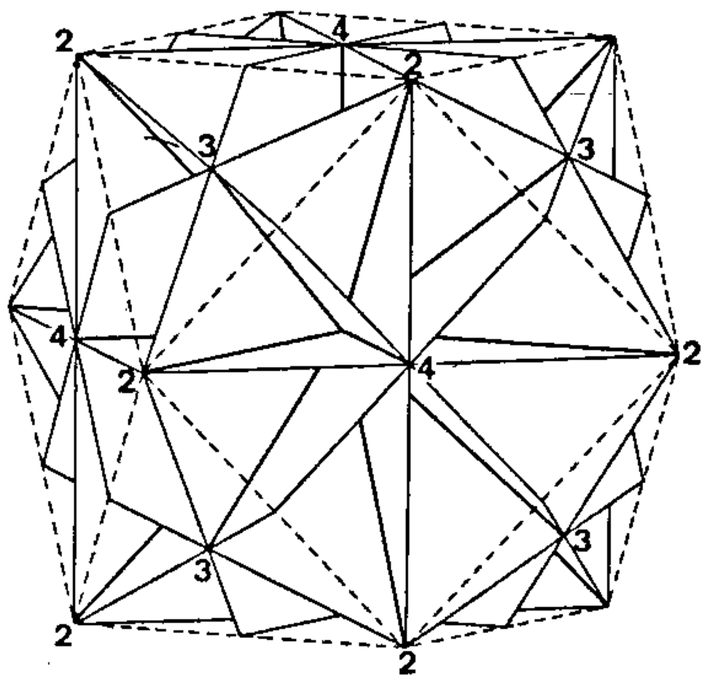

Figure 1. The symmetry operation of the complete octahedral group ($S_4 \times I$ or O_h; order 48; E, I, 23 rotations, 9 reflections, 14 rotating inversions). Each operation is shown in terms of equivalent number of reflections in an imaginary cube. A rotation, for instance, is a product of 2 reflections.

It is in this aspect, namely the quality of illustrations, that the book *Symmetry Orbits* by Hugo F. Verheyen, comes out on top. It utilizes photographs of models, black and white computer graphics with excellent shading, as well as line drawings to help the reader in experiencing symmetry groups. The pictures are highly attractive and naturally demand attention. Unfortunately, having nearly 200 illustrations in a 234-page book imposes constraints on what else can be included in the text. There is an extensive classification of isometries and later, polyhedra, but in a language less familiar to a physical scientist. There are, perhaps for good reasons, no attempts to develop a theoretical framework to understand structural properties of objects like molecules. It seems that the author is more interested in involving the reader in the beauty and complexity of geometry than in discussing applications that follow from the occurrence of symmetry. To take an example, after reading this book, you can marvel at the beautiful design in the making of a fullerene molecule, that the molecular world indulges in; but to understand the role of symmetry in determining what internal modes will be accessible for interaction with the surroundings, one has to look for further texts.

Thus, the book is really meant for those who have a mathematician's interest in group theory. Thus, tetrahedral is A_4 and octahedral is S_4. Of course, this does not reduce the value of the work, but it does limit the audience significantly. Unfortunately, the absence of an alphabetic index or a glossary makes it even more difficult for one more used to the Schoenflies symbols. The book is divided into two parts; the first with three chapters is titled 'Realization of Symmetry Groups' and the second with four chapters is called 'Compounds of Cubes'. Most of the text is on defining the terms and classifying various possibilities. The classification of the finite compounds of cubes is done in a very compact and yet exhaustive manner. The positions in an orientation with rotational freedom are worked out in detail and the angles are given to decimals of seconds.

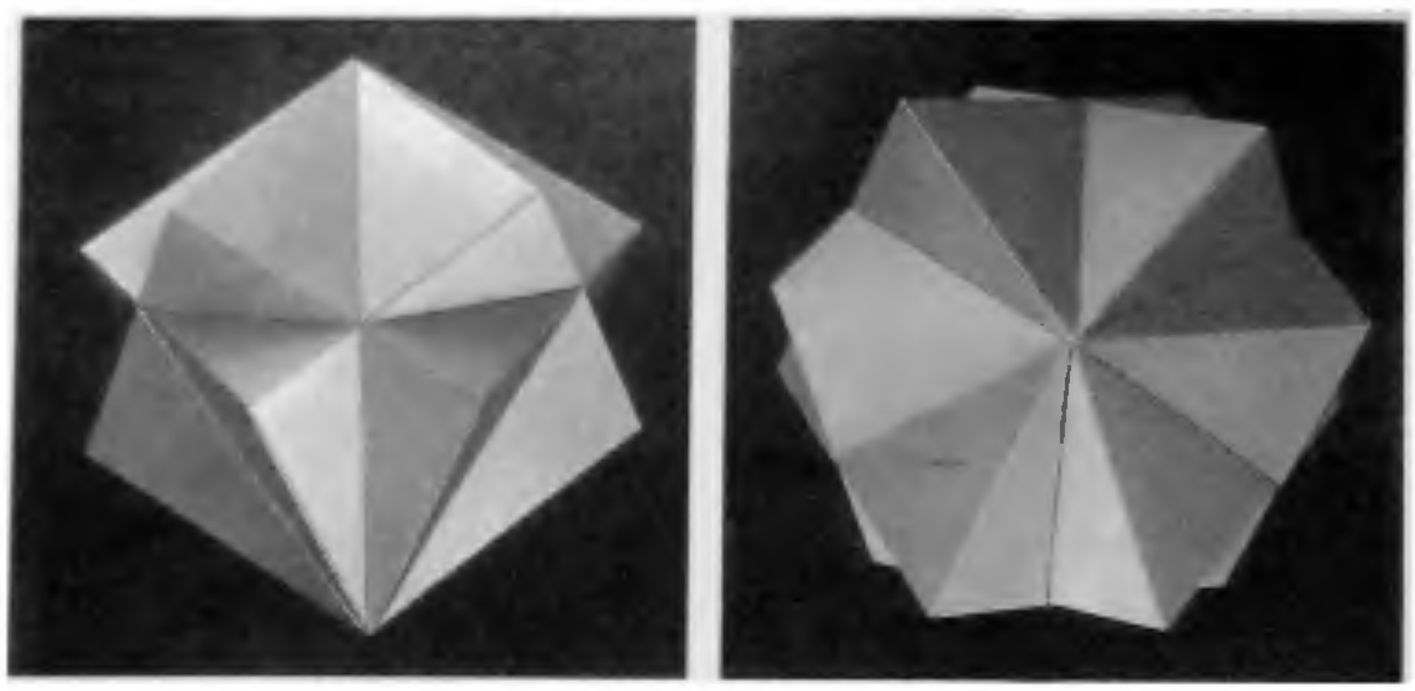

Figure 2 ***a, b.*** Two positions of a $D_3 \times I$ group in its $C_3 \times I$ orientation, shown together as images of one another rotated through an angle of 22°14'19".52. ***a,*** general view; ***b,*** along a threefold axis. A large number of such compounds (regular polyhedra with common centre) are introduced in the book for the first time.

ously. In chapter 7, titled 'Assembling Models', instructions are given on how to design 3-D models from cardboard pieces like a jigsaw puzzle. This is similar to constructing the Brillouin zones of a crystalline structure with the Miller planes clearly marked. This can indeed be a lot of fun.

There are a few things that should excite lovers of geometry. For instance, the photograph of a 2.3 metres high ball and stick model of platonic solids, that the author had made inspired by an old Dutch book written by H. Naber. The author's cat eventually brought this piece of art and mastery to extinction. A personal memoir of history leading to the publication of the book, in the appendix, is an interesting reading.

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Another perspective can come from artists or people who love activities like origami. In other words, the group theoretic insight can also mean for those gifted in art, a rational outlook towards structured or not so structured design. To put it lightly, it could be interesting material for adults, who take toys seri-

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Genetics and Evolution of Aquatic Organisms. A. R. Beanmont ed. Chapman and Hall, Cheriton House, North Way, Andover, Hampshire SP10 5BE, UK. 1994. 539 pp. Price: not known.

Genetics – survey, inventories and experimentation – of aquatic organisms is rather a slow starter. Emphasis in the early 70s used to be on the measurement of genetic variations; its relationship to environmental variability; its maintenance by selection and its use in taxonomy. However with the emerging field of biotechnology, the technical advances in the study of genetics and the increasing dominance of neutral theory as the explanation for genetic variation at both the protein and DNA level, a major shift is discernible.

Out of 44 contributions under segregated titles, 24 relate to marine species, 10 to limnetic domain and the remaining 8 to aquatic environment in general. Large abundance with patchy distribution is a hallmark of aquatic organisms, more specifically the marine species. However, the paradox is that most species do not have enough genetic variations. Consequently, the intraspecific genetic diversities having discrepancies of very high magnitude, between abundance and population size still remain unexplained.

Another unanswered question relates to large temporal variations, particularly in marine biota. In spite of high gene flow, genetic differentiation on spatial scale requires differential survival of genotype after recruitment from planktonic larval stock. Of course, the large variance in reproductive process is mediated by hydrographic regimes. Thus there is a strong and direct linkage between population genetics and environment. Further, the large variance in reproductive process also affects population structure because of temporal and spatial variations in the genetic composition of the recruiting larvae. So far, the impact of DNA technology in population genetics is less than projected.

Talking about the evolution, several sets of biochemical databases (allozyme, immunological and DNA – RNA hybridization) have been applied to collate phylogenetic relationship among aquatic species. In terms of tools, the advent of polymerase chain reaction (PCR) technique has generated large amount of information on DNA, especially in finfishes. The population genetics studies on a wide range of agametic clones provide information on the evolutionary consequences of the basic differences between agametic clones in terms of genetic variability and extent of ecological differentiation. In this context, an unanswered question in chromosome genetics is 'do marine species frequently exhibit greater number of chromosomes than freshwater species?'

Genetic research complimentary to pollution monitoring programmes is becoming indispensable. Pollution-mediated mutations directly cause damage to the DNA molecule within the individual cell nucleus, resulting in gene mutation or chromosomal aberrations, though not much is on record about chromosomal aberrations. Another discernible influence of pollution is through selective pressure on the genetic structure of the population by modifying the environment. Heterozygote genotypes, because of their less energy demanding maintenance have better chances of survival in stressful environment.

Aquaculture has tremendous scope for genetic research, especially the quantitative genetics; chromosome ploidy manipulation; allozyme genetic and transgenic organisms. An important