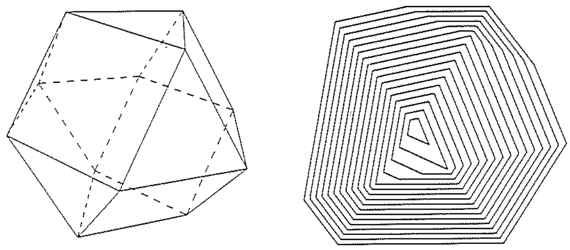
19.4-02 THE USE OF COMPUTER GRAPHICS IN THE TEACHING OF CRYSTAL MORPHOLOGY. By I. O. Angell and Moreton Moore. Royal Holloway College, University of London, Egham, Surrey, TW20 0EX, England.

The interactive graphics terminal offers new possibilities in crystal morphology teaching. A student may select a point group, a representative (hkl) plane (or planes) and distances from the origin. The solid thus generated is drawn by computer and displayed either in clinographic projection or as a perspective view from any desired viewpoint. Rear edges may be chosen to be shown with dashed lines or omitted. Such solids may be rotated to emphasize their three-dimensional character, or stereo-pairs may be drawn. If required, sections may also be taken through the solid, or through a series of concentric nested solids in order to show growth sector boundaries.



Cuboctahedron and an off-centre (321) section.

19.4-03 USE OF STEREOGRAPHIC PROJECTIONS IN THE INTERPRETATION OF X-RAY DIFFRACTION DATA. By M.J.Mendelssohn & H.J.Milledge, Crystallography Unit, Geology Department, University College London, Gower Street, London WC1E 6BT, England.

Graphical representations of reflexion conditions on stereographic projections are not only more comprehensive than representations on cylindrical films or on flat plates, but are also produced more quickly and simply by computer (or manually, as part of a student exercise), because they involve only the construction of true circles whose centres and radii can readily be determined.

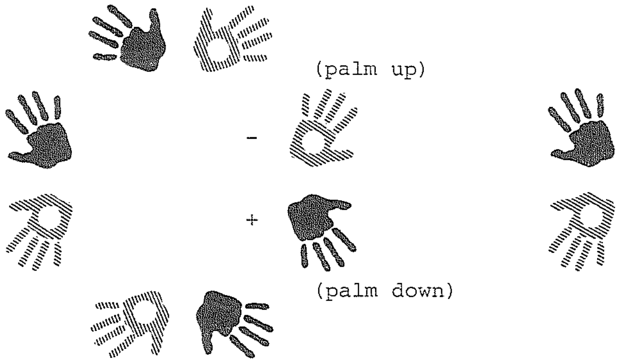
Ways in which the output from a computer program which was designed to simulate divergent-beam photographs of crystals of any symmetry in any orientation has been modified to provide indexing information for Laue, oscillation, rotation, Weissenberg and powder diffraction patterns will be demonstrated.

Although this program is mainly used either in connexion with the processing of data from a computer-controlled scanning microdensitometer, or to provide VDU output in conjunction with real-time diffraction patterns obtained when using a low-light television comparator system, it has proved very convenient for preparing demonstration material and simulated diffraction patterns for use where it is not practicable for all students to obtain original diffraction patterns for themselves.

The close connexion between the stereographic projection and the reciprocal lattice can also be used to provide a link between morphology and crystal structure, and some examples of the use of this approach will be given.

19.4-04 PATTERNS FOR TEACHING 3-DIMENSIONAL SPACE GROUP SYMMETRY. By W.M. Meier, Institute of Crystallography and Petrography, ETH, 8092 Zurich, Switzerland.

Prints by Escher have become classics in the teaching of plane groups. Other periodic patterns (including a variety of decorating and gift-wrapping paper) are also useful for demonstrating 2-dimensional space group symmetries and provide stimulating student exercises. These popular teaching aids have been extended by us to include patterns representing 3-dimensional space groups. Suitable elements used for such patterns are hands or feet as illustrated below by a small portion of a worksheet. A sizeable series of such patterns (specially designed to serve as worksheets) have been prepared and a collection will be on display. Based on classroom experience, such patterns are better suited than crystal structure models for teaching students how to recognize a space group and how to tackle related questions (different settings etc).



19.4-05 PLANAR SYMMETRY IN PERIODIC DESIGNS. Maureen M. Julian and Anna Mary VanBuren, Department of Chemistry, Hollins College, VA 24020, U.S.A.

The study of two-dimensional planar groups is important in the understanding of surface chemistry, as a manageable educational aid to understand the synthesis of symmetry, both two and three dimensions, and as a purely aesthetic treat. This work was inspired by M.C. Escher's ingenious use of interlocking characters to fill two dimensional space (Caroline H. MacGillavry. Fantasy & Symmetry, The Periodic Drawing of M.C. Escher (1976), Harry N. Abrams, Inc., N.Y.). Escher, an artist, never completed designs for all seventeen of the planar groups. The goal of this project is to complete plates for all of the seventeen space filling possibilities. The artistic and mathematical demands are intermeshed. A suitable motif is selected cunningly designed so that the generated and inserted symmetry elements all appear equally plausible. These are carefully drafted onto an appropriate grid. A contrasting "negative" space is generated which must be filled with an appropriate complementary interlocking design.