0·50 [3]. This is to be compared with a value of 0·637 to be expected for a projection which is centrosymmetrical[4].

Electron densities were calculated at units of $a/30$ and $b/60$, using Patterson–Tunell strips. Successive F syntheses refined slowly. The seventh synthesis with seventy terms based on intensities estimated by eye is shown in the accompanying diagram.

The approximate x- and y-co-ordinates based on this synthesis are given in the table.

APPROXIMATE x- AND y-CO-ORDINATES

	x	y
C_1	0·256	0·505
C_2	0·224	0·742
C_3	0·271	0·666
C_4	0·212	0·588
C_5	0·091	0·601
C_6	0·045	0·680
N_1	0·107	0·752
N_2	0·377	0·490
N_3	0·422	0·410
O	0·200	0·445

Integrated intensity data are being used in refinement of the (001) projection and the determination of the z-co-ordinates. A full account of this work will appear at a later date.

I wish to thank E. K. Squibb and Sons for the sample of crystalline 'Nydrazid' used in this study, and Dr. Wayne Chen, who performed most of the numerical work.

L. H. JENSEN

Department of Anatomy,
School of Medicine,
University of Washington,
Seattle, Washington.
Aug. 6.

[1] Wilson, A. J. C., *Nature*, **150**, 152 (1942).
[2] Zachariasen, W. H., *Acta Crystall.*, **5**, 68 (1952).
[3] Howells, E. R., Phillips, D. C., and Rogers, R., *Acta Crystall.*, **3**, 210 (1950).
[4] Wilson, A. J. C., *Research*, **2**, 246 (1949).

A Dislocation Model for the Study of Boundary Phenomena and Deformation in Metals

IN an earlier communication[1], an account was given of an experimental examination of the behaviour of the crystal boundaries in aluminium and its alloys at temperatures near the melting point. In an extension of this work, some consideration was given to the results obtained by Achter and Smoluchowski[2] in their studies of the structure and properties of grain boundaries, and it was thought desirable to construct a dislocation model for a study of grain-boundary phenomena. It was hoped that this model would also prove of use in a related investigation of the mode of deformation of the crystals of a polycrystalline mass under a rapidly applied force.

The bubble model devised by Bragg[3], in which the atoms in a metal are represented by bubbles, is somewhat fragile and unsuited to withstand the rapid application of a force of any magnitude. In a search for a more robust method of construction of an atomic model, it was found that, if several hundred steel rods of suitable diameter ($\frac{1}{16}$–$\frac{1}{8}$ in.) and length are piled together longitudinally in a container, with the cut ends of the rods at one end of the container in the same vertical plane, the resulting pattern of the cut ends of the rods is similar to that of the bubbles in the bubble model. Fig. 1 shows that the rod model provides a useful schematic illustration of the atomic arrangement in a polycrystalline metal. The regions of atomic disorder at a crystal boundary are well defined. Single dislocations and lines of dislocation within the crystals are also apparent, one such line being shown on a larger scale in Fig. 2.

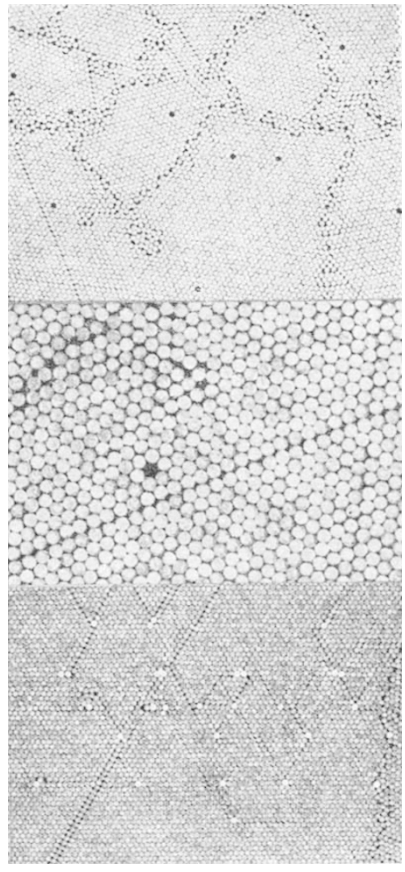

Fig. 1

Fig. 2

Fig. 3

Fig. 1. Atomic arrangement in a polycrystalline metal as represented by the rod model

Fig. 2. Single dislocations and line of dislocation in a crystal illustrated by the rod model (magnification greater than that of Fig. 1)

Fig. 3. Effect of introduction of atoms of larger size than average (white spots) into an atomic structure as represented by rod model

The rod model is robust and well suited for demonstration purposes. The effect of introducing atoms of large diameter into an atomic structure may be simulated by introducing rods of larger diameter than the average into the container (Fig. 3). If the container is made suitably flexible by hinging the sides or making them of more flexible material, the rod model may be used for observing the effect on a polycrystalline structure of the rapid application of loads of appreciable magnitude.

W. I. PUMPHREY

Research Department,
Murex Welding Processes, Ltd.,
Waltham Cross, Herts.
Aug. 1.

[1] Pumphrey, W. I., and Lyons, J. V., *Nature*, **163**, 960 (1949).
[2] Achter, M. R., and Smoluchowski, R., *J. App. Phys.*, **22**, 1260 (1951).
[3] Bragg, W. L., *J. Sci. Instr.*, **19**, 148 (1942).