



Experiment title: In-situ Topographic and High Resolution Diffractometry studies in protein crystals.	Experiment number: LS-1264
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Report:

Growth sectors have been recently recognized as the main feature controlling the mosaic spread and topographic images of tetragonal lysozyme crystals. The reasons for this fact and their potential consequences for protein crystallography are explored in this contribution.

First, the geometrical aspects of the growth sector misalignments were investigated by collecting rocking curves, topographs (including section topographs) and topograph series from oriented crystals. Then, a theoretical model accounting for these features is introduced.

The surprising result of lysozyme crystals being composed by just a few mosaic blocks being almost perfect (3-10 arc seconds width) single crystal fragments open new possibilities for diffraction techniques. On one side, section topography can be used to look for contrast other than orientation contrast in topographs (which is the optimum situation to study single defects) and, on the other hand oscillation data sets can be collected from single mosaic blocks, so the feasibility of direct phase measurement techniques is enhanced. For the moment, no single defect images has been observed in section topographs though features resembling Pendellösung fringes are observed.

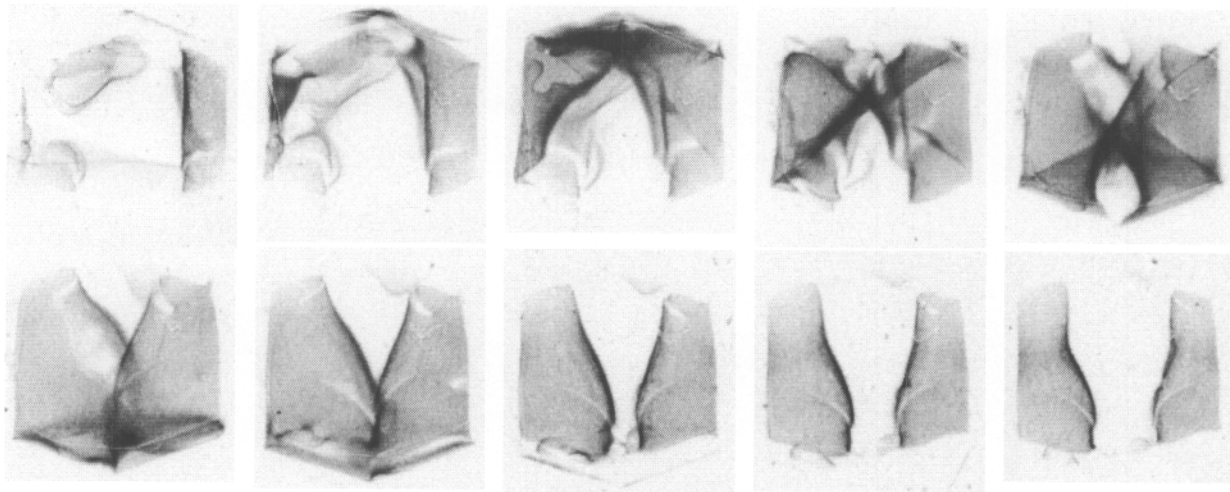


Fig. 1. Series of topographs collected from a tetragonal lysozyme crystal rotating around the c axis. The misorientation of the two prismatic and the two pyramidal sectors can be clearly observed and measured.

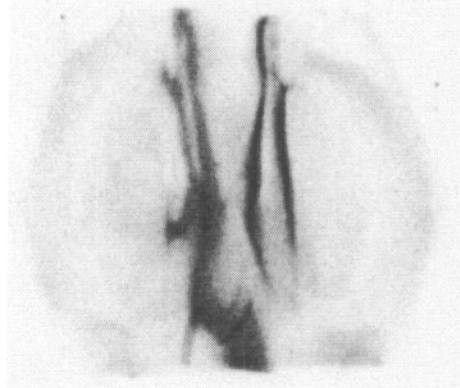


Fig 2. Section topographs from tetragonal lysozyme crystals. A section topograph across the crystal nucleus (left) showing the intersector boundaries for two opposed prismatic sectors (the image is superimposed to a normal topograph to show the position of the section). Section topograph showing Pendellösung-like fringes.