The two low angle equatorial reflections in the X-ray diffraction pattern of the M phase.

The M phase samples under discussion are contained in capillary tubes and the incident X-ray beam is perpendicular to the tube axis. We have found that, with reasonably narrow tubes, the sample spontaneously aligns as it flows into the tube - with the director (i. e. the six-fold axis) lying parallel to the axis of the tube - and does not usually require any additional treatment.

The first X-ray diffraction studies of DSCG were undertaken by Jim Nelson (who worked with Norman Hartshorne and Walter McCrone). He used an unaligned sample and (bearing in mind the similarity of some of the M phase optical textures to those formed by conventional amphiphile lyotropic hexagonal 'middle phase' phase), they interpreted the two pairs of sharp low angle _____ reflections in terms of the first two possible low angle reflections from a hexagonal array i.e. 1100 and 1210. Both sets of planes share the common <0001> zone. In the subsequent diffraction patterns from aligned samples, taken by us, (and later by others) both sets of reflections were equatorial --____ apparently confirming this interpretation.

In the sketches below, both the conventional coordinate system for a hexagonal lattice - with four axes (and corresponding Miller indices) and the orthohexagonal system, with three mutually perpendicular axes are used. Note that the orthohexagonal 100 reflection is systematically absent.





