We were allocated 9 shifts to carry out two studies of the cornea. The first study was to radially scan from cornea to sclera at 45 degree angles (8 scans) and the second was to examine strips of cornea edge-on to study collagen orientation as a function of depth within the cornea. Our continuing aim is to build up a three-dimensional model of collagen orientation to understand how the change of curvature is maintained at the limbus, where the cornea and sclera join.

Our through-thickness study was carried out on strips from the centre and periphery of three human corneas, traversing from posterior to anterior in 25 micron intervals. The data showed very clearly the difference between the lamella organisation in the anterior and posterior stroma. In addition, the nature of these differences seemed to depend on the area in the cornea from which the strips were taken.

Our radial scans were only partially successful. This was because we had planned to carry out the experiments using a small angle camera but, because our samples were very hydrated, we had to switch to a wide angle camera, which gave stronger diffraction patterns. However, on analysing the data, we found that the signal/noise ratio was still too low with the 5 micron beam used. Nevertheless, we have proved the feasibility of using wide-angle diffraction for the analysis and intend to repeat it using a 20 micron beam. This is still ten times better resolution than we have been able to achieve at the Daresbury synchrotron.