

**Experiment title:**Diffraction and Small-Angle Scattering on Single Spider  
Fibres**Experiment  
number:  
SC293****Beamline:**

ID13

**Date of experiment:**

from: 2.5.97

to:5.5.97

**Date of report:**

30.8.97

**Shifts:****Local contact(s):**

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**Report:**

The experimental period has been used only for WAXS experiments. These were performed using a MAR image plate system installed at the IDI 3 goniometer. The energy was 15 keV for a beam size of 30  $\mu\text{m}$ .

Single fibres were investigated at 110 K in transmission geometry with the beam direction either normal ( $\perp$ ) or parallel ( $\parallel$ ) to the fibre axis. Individual fibres were fixed on metallic O-rings which were placed on a goniometer head. The fibres were optically prealigned and then transferred to the ID13 K-goniometer.

Silk fibres from about 15 different spiders -distributed over the phylogenetic groups- were examined[1]. At the present stage of analysis, diffraction patterns were observed for 9 different samples. Unfortunately the most archaic and often thinnest spider samples did not show sufficiently strong scattering patterns. This is linked to the Detector Quantum Efficiency of the MAR-IP detector which is rather low at weak intensities. It is hoped that a cooled CCD camera with converter screen will improve this situation in future studies.

Quite unexpectedly -for several orb spinning spiders like Nephila- a high crystalline order was found when the incoming beam direction was parallel to the fibre axis while powder rings would have been expected for the case of a fibre diffraction pattern. This is shown in Fig.1 for a Nephila sample and suggest that the fibre contained crystallites with a strong texture along the fibre axis.

It is hoped that the quality of the data will allow to develop improved models for the fibre structure. Data analysis is presently continuing.

**References**

- [1] C.L. Craig in Silk Polymers, ACS Symp. Series 544 (1994)  
[2] A. Bram et al., J. Appl. Cryst., (1997). 30, 390 - 392

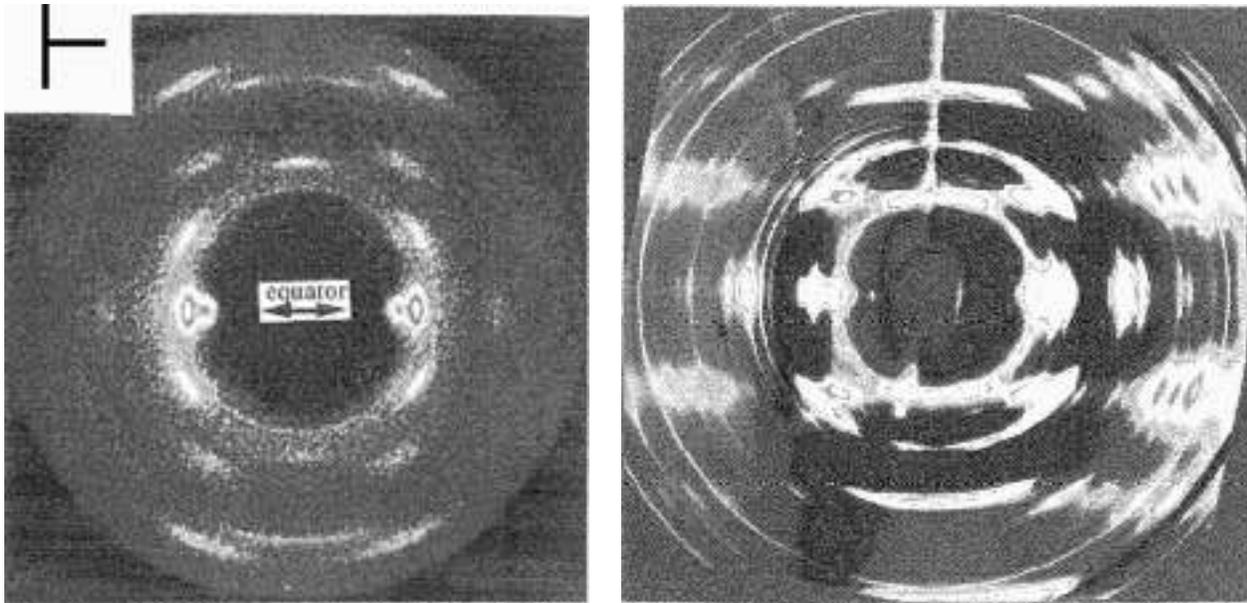


Fig. 1 WAXS pattern of single Nephila fibre with beam normal (left) and parallel to fibre axis