

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

ID13

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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 μm .

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

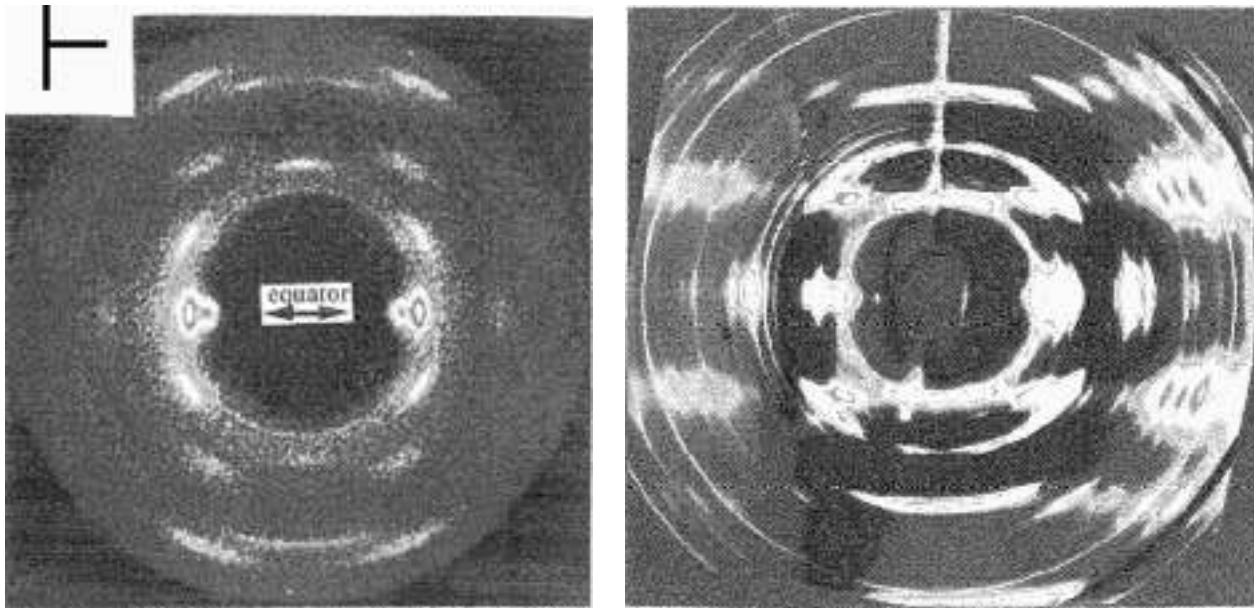


Fig. 1 WAXS pattern of single Nephila fibre with beam normal (left) and parallel to fibre axis