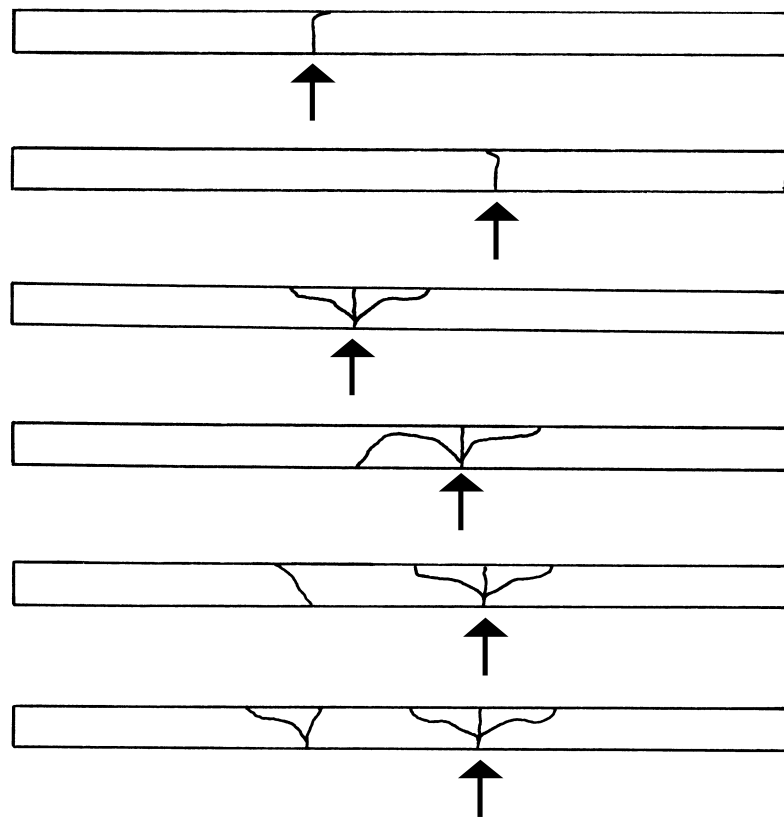


From George Quinn

INTERPRETATION OF FRACTURE PATTERNS-

A3.1 Figs. A3.1 and A3.2 show side views of rods fractured in four-point flexure. In general, the breakage patterns are similar to those observed for rectangular beams broken in flexure. Primary and secondary breaks can be distinguished without too much difficulty. Figs. A3.3 - and A3.4 show normal and abnormal (secondary) fracture surfaces in glass rods. Fig. A3.5 shows an overall view of a properly tested specimen and how the compression (cantilever curl) can be used to confirm the orientation of the test specimen in the fixtures. See also Ref 5. for additional guidance on interpretation of fracture patterns.



A3.1 Fracture patterns in rods broken in four-point flexure. Primary fractures (arrows) usually run at right angles to the specimen long axis and also have small or large cantilever (compression) curls on the compression side. Secondary breaks often are slightly non perpendicular to the specimen axis and are caused by reverberations in the specimen. Occasional breakages at or near a loading point are not a problem.

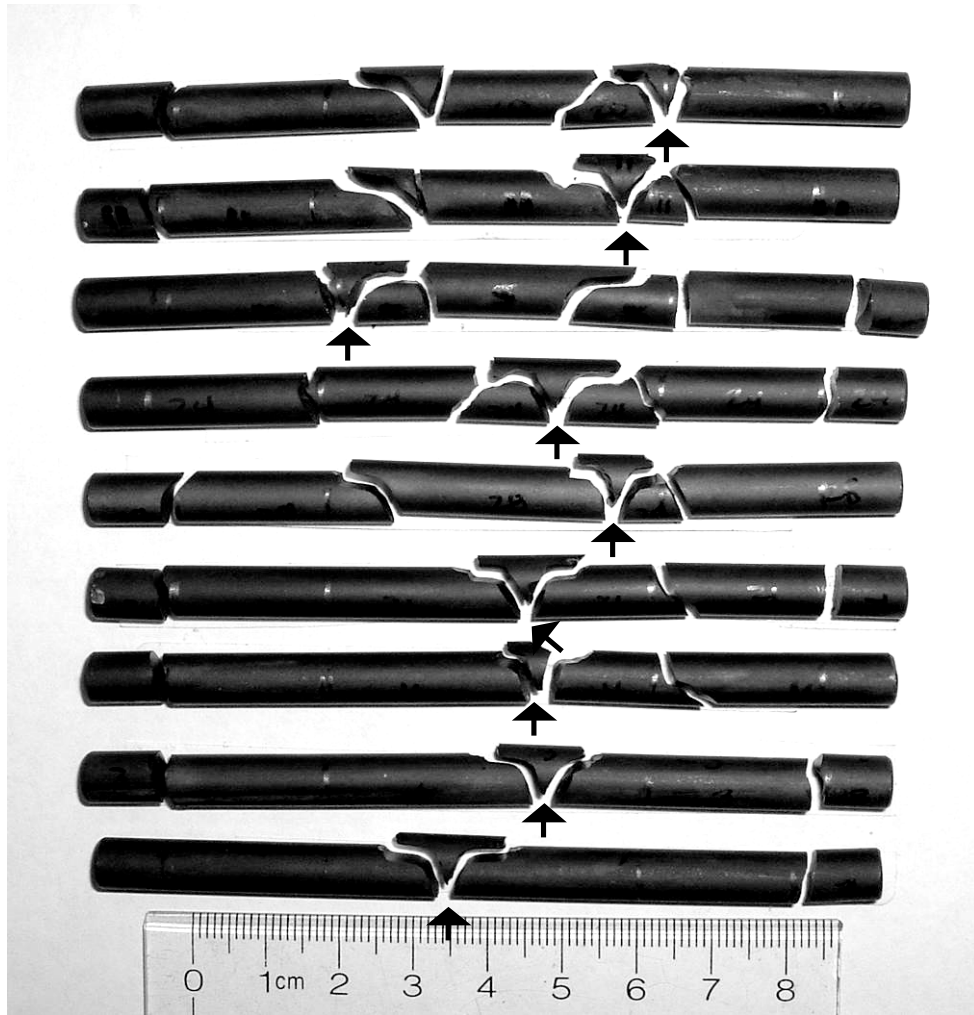


FIG A3.2 Fracture patterns in rods broken in four-point flexure. The arrows mark the primary fracture origins.

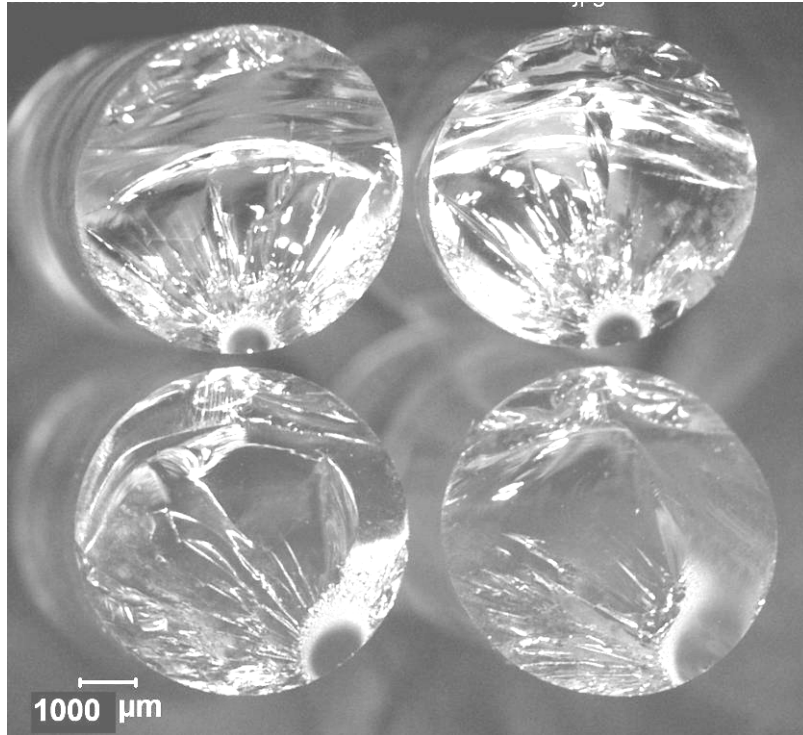
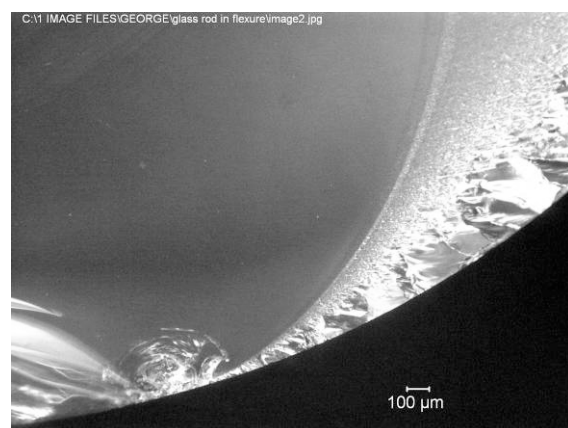
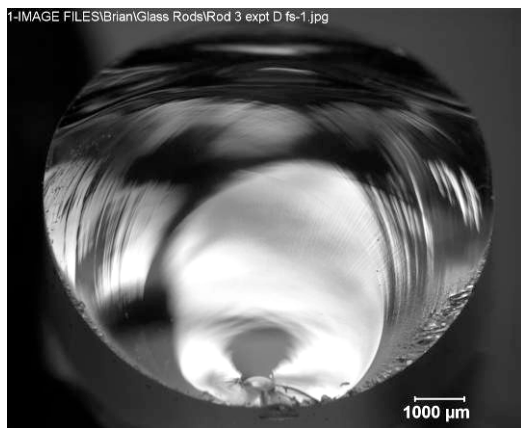
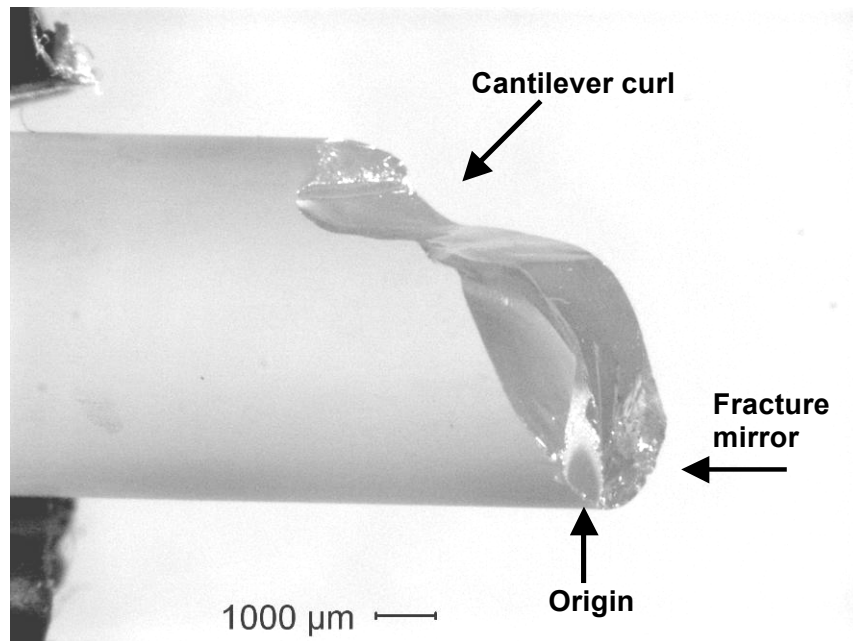


FIG. A3.3 Normal fracture surfaces in glass rods. Each rod has a fracture mirror. The maximum tensile stress is at bottom center in each case. Origins are not always at the location with maximum tensile stress. Some origins are part way up the sides. Some of the mirrors are elongated due to the stress gradient.



**FIG A3.4 Examples of abnormal (secondary) fracture surface in glass rods.
Reverberations of elastic waves after primary fracture has occurred can create such
secondary fractures.**



A3.5 Overall view of a glass rod fractured in flexure. The cantilever curl (also known as a compression curl) identifies the portion of the test piece that was in compression. It may be used to confirm the test specimen orientation in the fixtures after fracture. Notice that the origin and the fracture mirror were not at bottom center and were part way up the side of the rod. This is a normal and perfectly acceptable result.