DISCUSSION

A PETROFABRIC ANALYSIS OF A FOLD

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In a recent paper Ball (1960) has presented the petrofabric analysis of a polygenetic fold. He concludes that a situation of shear followed by flexure has given rise to the final fold form. But it appears that his conclusion is not in perfect harmony with the data presented in the paper. For example, after partial unrolling, the patterns in the sectors 1 and 5 (Ball, fig. 7b) have not become identical as they should have been if the earlier form was entirely due to shear. Furthermore, the author suggests that in the fold core (sectors 2, 3, and 4) axial plane shearing has “sharpened the quartz fabric”. If this be the case, for an extremely stress-sensitive mineral like quartz the present fabrics should be explained as solely due to this shear and should be homogeneous within this field (as they indeed are in the sectors 2, 3, 4, fig. 6b). So it is unlikely that the quartz fabrics in the sectors 2, 3, and 4 are inherited from the initial shearing pre-dating the final flexure and therefore should not be unrollable. Under these circumstances the identity of the fabric in the three sectors after partial unrolling must be explained as fortuitous.

What appears to be a more rational explanation of the features observed is given below. It is suggested that the fold form is due to flexure with concomitant shearing on the axial plane near the hinge. The symmetrical relationship of the quartz fabrics in sectors 1 and 5 probably indicates that the fabric evolved simultaneously with the main flexuring and is due to slip on the S_x plane consequent on flexuring. The direction-sense of slip on the two limbs is reversed and the patterns in the two limbs should be identical, but one is the mirror image of the other. Near the hinge the quartz fabric is due to axial plane slip and is homogeneous within this small field.

An alternative explanation may be that the fold is entirely flexural without any slip on the axial plane. The fabric patterns near the fold hinge represent the initial anisotropy of the quartz orientation prior to folding. Their preservation in the fold core is due to the fact that flexural slip is at a minimum near the hinge.

The above suggestions should be tested by more fabric analyses on the limbs and by dating the quartz with respect to deformation from petrographic evidences.

REFERENCE