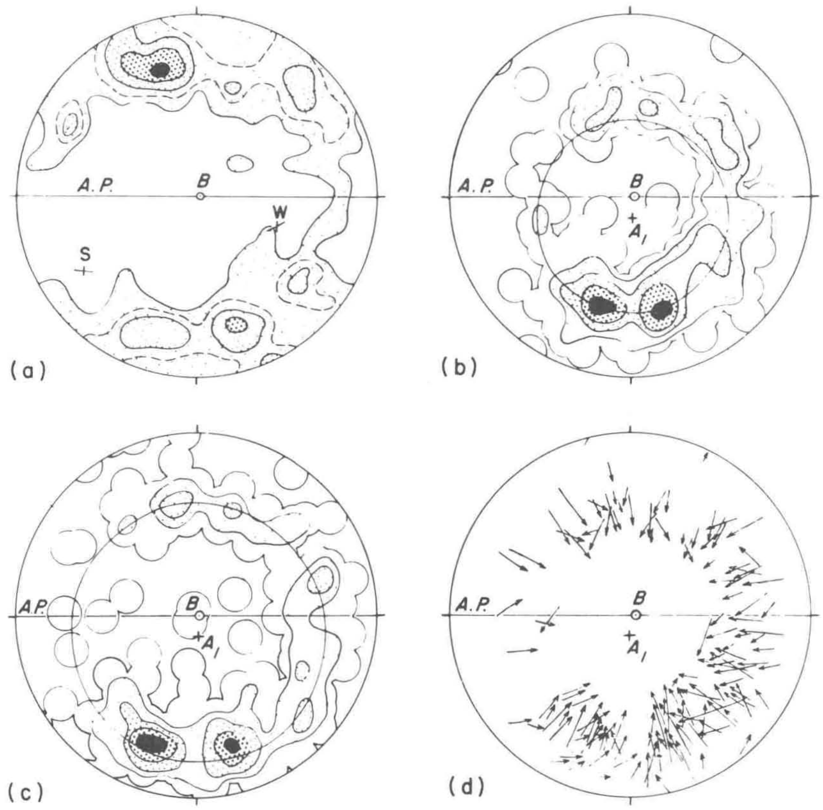

Fig. 46—Orientation diagrams for c_V and deformation lamellae in quartz of Specimen I, a quartzite from the Orocopia Mountains in southern California (from Christie and Raleigh, Ref. 140, Fig. 2). (a) 817 quartz c_V; contours at 1, 1.5, 2, 3, and 4 per cent per 1 per cent area. (b) Normals to deformation lamellae in 195 grains (195 sets of lamellae); contours at 1, 1.5, 3, 5, and 8 per cent per 1 per cent area. (c) c_V in same 195 grains containing deformation lamellae; contours at 0.5, 1.5, 3, 5, and 7 per cent per 1 per cent area. (d) Normals to deformation lamellae (point of arrow) and c_V (end of arrow) in a representative number of grains from each section. B is the first generation fold axis and A.P. is the axial plane of the first generation fold. A_1 is the axis of the small circle defined by the normals of the lamellae and c_V in grains containing lamellae. All four diagrams have the same orientation, shown by south (S) and west (W) directions in (a), and are plotted in lower hemisphere equal-area projection.

which produced the lamellae. This is consistent with the stress-field during the second deformation, as inferred from macroscopic folds and conjugate shear-surfaces. It is worth noting that in these specimens the radius of the small-circles of poles of lamellae are 44°, 45°, and 52°, a fact inconsistent with the claim that the lamellae in any sample should be inclined, on the average, at less than 45° to σ_1. The rocks have moderate preferred orientations of quartz dating from the first deformation and this anisotropy appears to affect the orientation of the lamellae.

Carter, Christie, and Griggs [Ref. 146] find no support in their experimental work for the hypothesis that the lamellae are consistently inclined at less than 45° to σ_1. In sand samples deformed in a simple squeezer the lamellae are inclined at angles from 0° to 85° to the compression axis and in quartzite samples at angles from 15° to 85° to the compression axis [Ref. 146, Fig. 10]; in both types of samples most lamellae are inclined at slightly <u>more</u> <u>or</u> <u>less</u> than 45° to the compression axis. In some of their samples the poles of the lamellae lie consistently closer to the compression axis than the c-axes of the grains in which they occur [Ref. 146, Figs. 7 and 9] and it is suggested that this criterion might be used to distinguish between σ_1 and σ_3 in fabrics consisting of two planes of lamellae. Carter *et al*. also suggest that a study of the rotations in kink bands and undulatory zones might resolve the ambiguity, since lamellae are better developed in more deformed zones and the c-axes in such zones are rotated towards σ_1.*

Clearly, a unique resolution to the dynamic interpretation of quartz deformation lamellae is not as yet established. Support for the experimental findings of Christie, Griggs, and Carter can be found in the field studies of Christie and Raleigh,(140) Riley,(141) and Hara.(151) While exceptions to their findings and support for the acute bisector equals σ_1 hypothesis can be found in the work of Hansen and Borg (Ref. 120, Fig. 5(d)) and in Naha,(149) it is the writer's opinion that a unique solution will be forthcoming from a study of the sense of shear along the lamellae** in slightly and moderately deformed

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*The preceding two paragraphs were written by Dr. J. M. Christie at the request of the author.

**See Ref. 146, p. 10-89 n.