The complete gliding system is now established, the gliding plane is c', the gliding direction is parallel to a_1', and the sense of shear is consistent with the known principal stress directions. The compression and extension axes that would best cause this gliding ($S_o = 0.5$) are in good agreement with the known stresses across the boundaries of the specimen during the experiment (Fig. 35).

Kink Bands. Kink bands are deformation features in crystals (Fig. 36) and in aggregates with pronounced planar anisotropy (Fig. 37). They were first recognized by Orowan[126] in compressed cadmium crystals, and have since become well known in metallurgy.* Current understanding

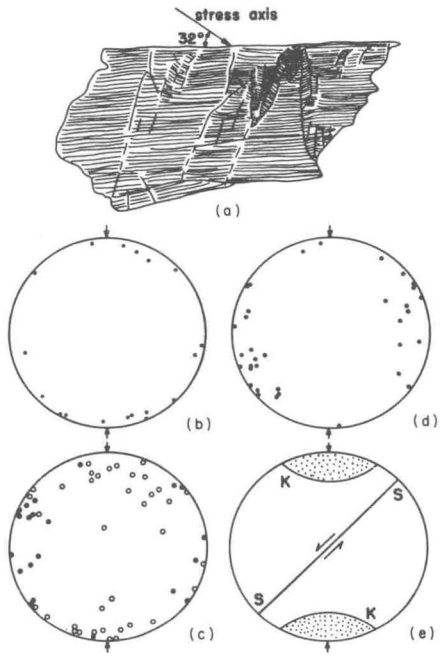

Fig. 36—Kink band development in biotite grains in experimentally deformed Westerly granite (from Griggs, Turner, and Heard, Ref. 43, Fig. 11). (a) Sketch of kink bands in a single grain of deformed biotite. Arrow shows orientation of compression axis. (b) Normals to kink band boundaries in 11 biotite grains. Arrows show axis of compression. (c) Normals to (001) in biotite grains with kink bands (solid circles) and lacking kink bands (open circles). Arrows show axis of compression. (d) Distribution of normals to (001) in 42 biotite grains with kink bands, as measured in 5 thin sections. Arrows show the axis of compression, which is also the common axis of reference for the 5 sections. (e) Relation of macroscopic surfaces of shear (SS), maximum concentration of normals to kink band boundaries in biotite (K), and sense of shear (arrows).

*See Refs. 93, 94, and 127-129.

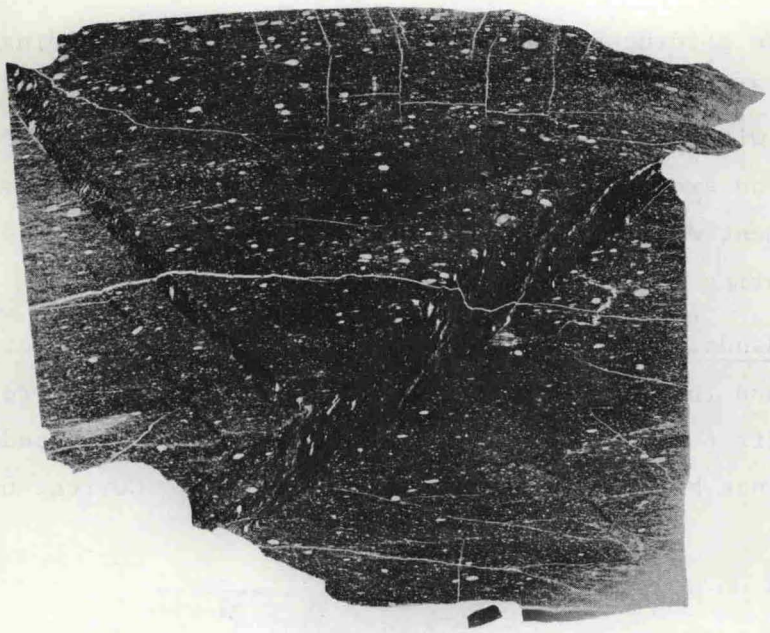

Fig. 37—Photomicrograph of kink bands in an experimentally deformed specimen of slate (from Handin and Borg, Ref. 53). Specimen was shortened 27 per cent under 5-kb confining pressure at 500°C. Slate cleavage (east-west) was initially oriented parallel to σ_1.

of their formation suggests that some kink bands may be dynamically significant petrofabric elements.

Kink bands characteristically form as a result of gliding flow along a set of closely spaced parallel planes. The boundaries of the bands are nearly planar features formed by an abrupt change in attitude of the active gliding plane. Flow is concentrated within the band where the structure is externally rotated with respect to the host about an axis in the gliding plane and normal to the gliding direction.(94) Kink band formation in a single crystal differs from that in an aggregate in that the gliding direction is fixed in the active gliding plane of the crystal but is apparently unrestricted in the s-plane of the aggregate.

Kink banding can result from pure translation gliding in a constrained crystal (e.g., for calcite, see Ref. 95, Plate 3, and Figs. 33(d) and 33(e) of this paper). However, kink bands are best developed in those crystals or aggregates whose active gliding plane is oriented subparallel to the axis of compression (Ref. 126, p. 644; Ref. 127, p. 192)--i.e., initially parallel to the plane of vanishing shear stress.