tions are described below may all be referred to as deformation lamellae. They are narrow, sub-planar structures which occupy a part or the complete area of a grain and generally are only found with one orientation in any grain. They are not all structurally similar when seen under the highest magnifications available: some consist entirely of minute brownish inclusions concentrated in planar zones; others cannot be resolved into individual inclusions and apparently have a different refractive index from the host grain; still others, intermediate between these two types, show a slight difference of refractive index and yet appear to consist in part of planes of inclusions (see Ingerson and Tuttle, 1945). Although the lamellae are gently undulating, they may all be measured on the U-stage, like cleavages and twin-lamellae in calcite and dolomite, by tilting them until they are parallel to the axis of the microscope. The maximum error involved is probably of the order of $\pm 2°$.

The above types of lamellae conform to the numerous descriptions in the literature, but it was noted that many of the lamellae have an extinction position which is slightly but markedly different from that of the neighboring part of the host grain. These lamellae are very conspicuous between crossed Nicols, particularly when the grain is close to the extinction position. The differences in the extinction position between lamellae and host grain are generally less than 3° (measured under high magnification on a flat stage) but an angle of 5° was noted in one grain.

Marked differences of optical orientation have been noted in the lamellar structures known as deformation bands (Riley, 1947; Weiss, 1954), but these are generally easy to distinguish from the more common deformation lamellae on the basis of the following criteria (Weiss, 1954):

1) Deformation bands are considerably broader than lamellae.
2) They are bounded by fractures which are not distinctly planar and whose orientation cannot be accurately measured with the U-stage; only the trend of the bands in the section can be measured.

The lamellae are generally, but not invariably, found in grains with marked undulose extinction in zones sub-parallel to the [0001]-axis, either with *continuous* or *discontinuous* change of extinction position ("plastic" and "ruptural" deformation of Hietanen, 1938).

Weiss (1954) found that the traces of deformation bands and deformation lamellae, when they occur in the same grain, are parallel, and he suggested that the two types of structure have the same genetic significance, the bands merely representing a more advanced stage of deformation than the lamellae. The present writers' discovery of small divergences of optic orientation between the material in deformation lamellae and in the parent grain is another point of similarity which supports Weiss' suggestion. The lamellae in which such differences of optic orientation may be observed do appear to be slightly broader than those in which differences are not detectable, but the lamellae are nevertheless well-defined and their orientation can be measured with the same accuracy as that of narrower lamellae. In a few of the grains examined the lamellae broaden into a wedge near the margin of the grain and differences of optic orientation are most readily seen in these wedges. No true deformation bands are present in the rocks.

Description of specimen I.—This specimen (fig. 1a) is a folded quartzite

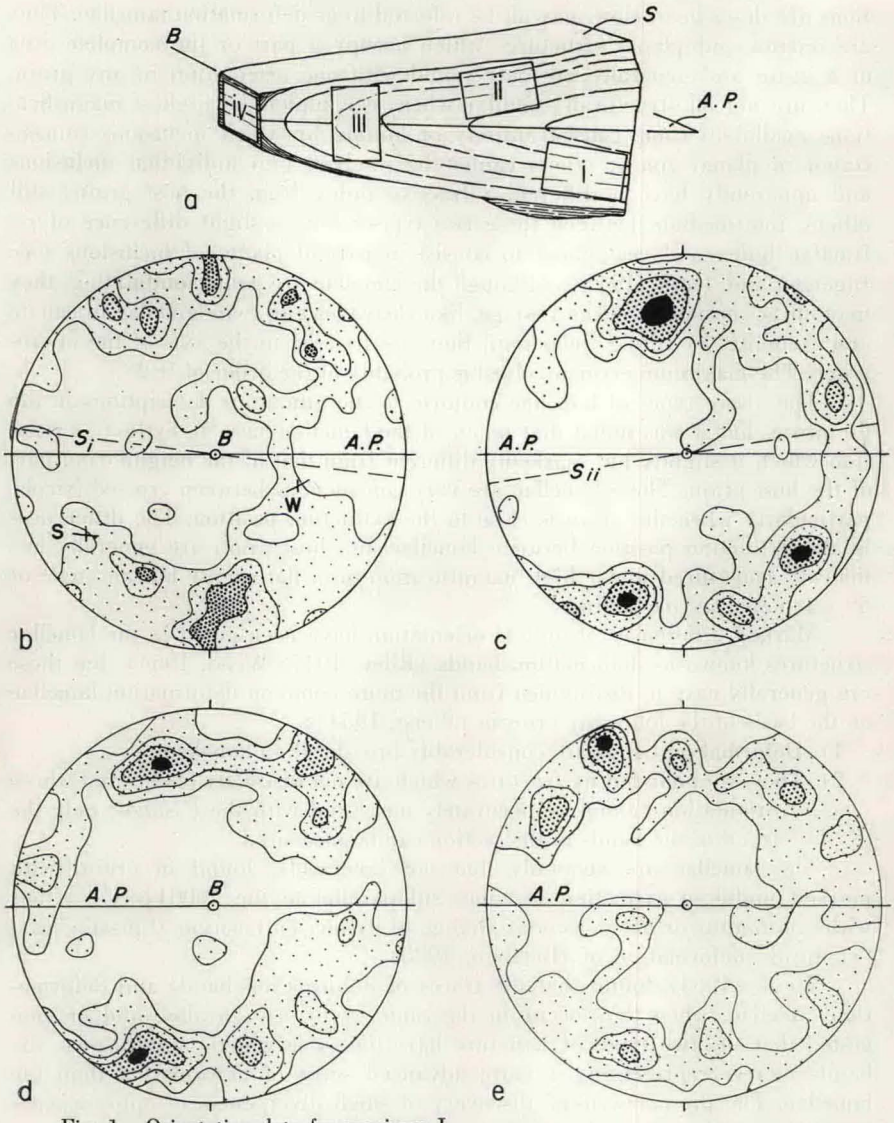

Fig. 1. Orientation data for specimen I.

a. Sketch of specimen I, showing the orientation and position of the thin-sections i, ii, iii and iv. *S* is the bedding-foliation, *B* is the fold-axis and *A.P.* is the axial plane of the fold.

b. [0001]-axes of 206 quartz grains in section i. Countours: 3, 2, 1% per 1% area.

c. [0001]-axes of 203 quartz grains in section ii. Contours: 5, 3, 2, 1% per 1% area.

d. [0001]-axes of 200 quartz grains in section iii. Contours: 5, 3, 2, 1% per 1% area.

e. [0001]-axes of 208 quartz grains in section iv. Contours: 5, 3, 2, 1% per 1% area.

Diagrams from all four sections have the same orientation, shown by south (S) and west (W) directions in diagram b.