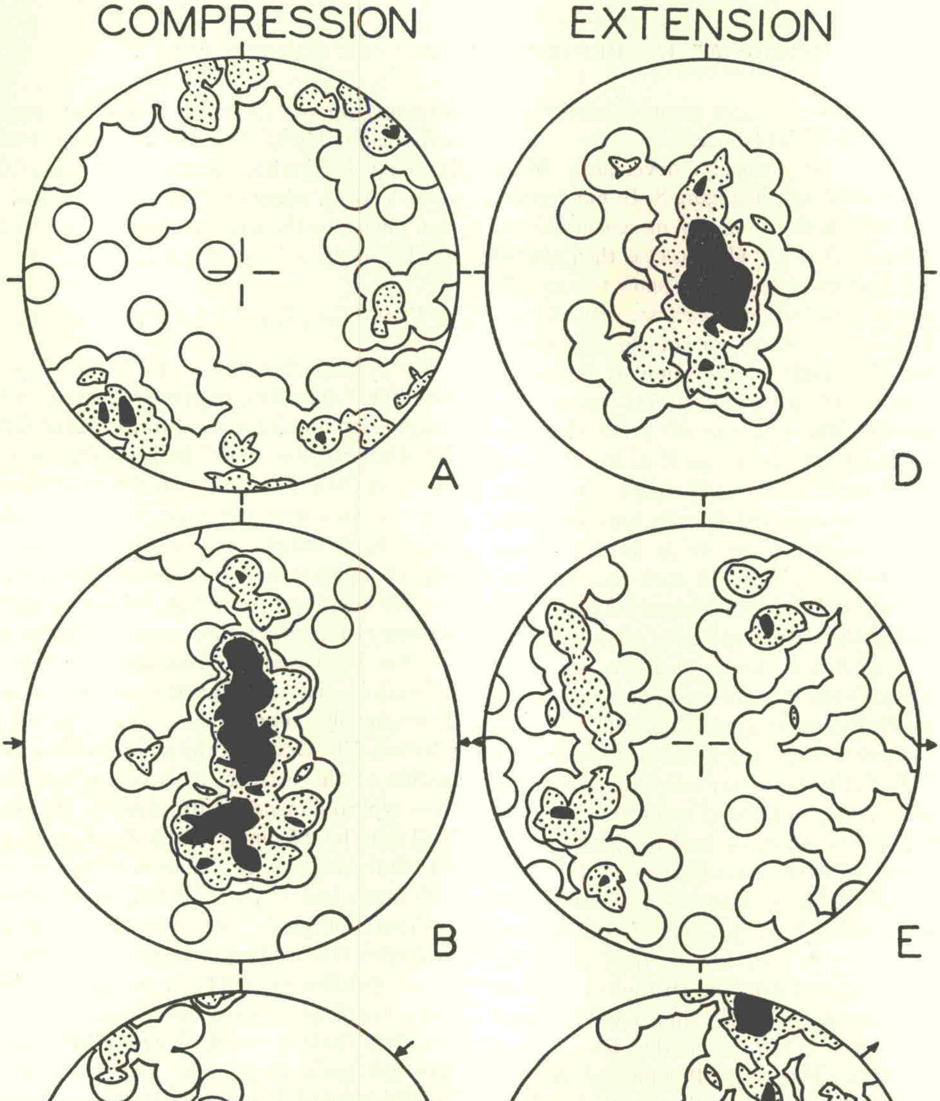

FIGURE 9.—ORIENTATION DIAGRAMS FOR EDGES [e:e'] IN CALCITE OF YULE MARBLE DEFORMED AT 300°C

100 grains per diagram. Contours, 1%, 3%, 6% per 1% area. Trace of original foliation (normal to plane of diagram) is N-S. Plane of diagrams is T plane of marble block.

A. Specimen 365, *T* cylinder, shortened (normal to plane of diagram) by 20%; 102 edges. B. Specimen 295, *1* cylinder, shortened (E-W) by 19%; 66 edges. C. Specimen 272, *d* cylinder, shortened (NE-SW) by 19%; 64 edges. D. Specimen 358, *T* cylinder, elongated (normal to plane of diagram) by 20%; 95 edges. E. Specimen 289, *1* cylinder, elongated (E-W) by 18%; 100 edges. F. Specimen 274, *d* cylinder, elongated (NE-SW) by 20%; 94 edges.

lattice has therefore been recorded rather than [0001] of the initial lattice.

Diagrams for strongly developed $\{01\bar{1}2\}$ lamellae are shown in Figure 8. In most grains one set of lamellae is clearly more conspicuous than the other two, and this set is then plotted on the diagram. A few grains show two equally developed sets, both of which are then plotted, while in a few others no lamellae are strong enough to be included. The number of lamellae plotted for 100 measured grains ranges from 86 to 120. The majority of $\{01\bar{1}2\}$ lamellae plotted in diagrams A and E of Figure 8 are optically recognizable as products of twinning. This is to be expected since in both cases the specimen was oriented so as to favor twin gliding in most grains. In each case the pattern consists of a ring maximum (or cleft girdle of small radius) surrounding the axis of compression or extension. These diagrams are to be contrasted with B and D of Figure 8, in which the plotted lamellae are not optically recognizable as twins. They may be termed nontwinned sets of $\{01\bar{1}2\}$ lamellae; and their poles give either a strong maximum coinciding with the axis of compression, or a sharp girdle in the plane normal to the axis of extension. Diagrams C[4] and F of Figure 8 represent a mixture of twinned and nontwinned sets of lamellae and in some respects combine the qualities of the other two types of diagram. Distinction between $\{01\bar{1}2\}$ lamellae of the twinned and the nontwinned types in natural marble fabrics obviously may be important. Preliminary work on natural marbles by F. J. Turner, D. B. McIntyre, and L. Weiss confirms this conclusion.

Preferred orientation of edges $[e:e']$ between the two strongest sets of $\{01\bar{1}2\}$ lamellae shown by most grains is illustrated in Figure 9. The diagrams almost duplicate those for marble deformed at 150°C (Part IV, Fig. 10, p. 1400). Insofar as is permitted by the orientation of the grain lattices, edges $[e:e']$ are concentrated at high angles to the axis of compression or subparallel to the axis of extension.

[4] The exact position of the axis of compression in diagram C is not certain since the specimen shows some degree of bending and is deformed by a combination of axial compression plus diagonal shear. The compression axis possibly is as much as 10° nearer the E-W diameter of the diagram than is shown by the arrow.

Fabric of Highly Strained Marble

The general character of the fabric of specimen 400 (*1* cylinder), shortened 37 per cent by compression applied normal to the initial foliation during a slow run of 48 hours duration, is shown in Plate 5. In this experiment deformation was a compound type involving radial flattening in the plane normal to the compression axis, plus shear along a diagonal zone SS. Outside the shear zone the individual grains become elongated at right angles to the compression. But within the shear zone they become reduced in size, very greatly elongated, and dimensionally aligned in a new *s*-plane or foliation, EE. Grains in the almost undeformed marble at the extreme ends of the specimen have typical dimensions (0.5 mm. by 0.3 mm.) to (1 mm. by 0.5 mm.). In the shear zone typical dimensions range between (0.2 mm. by 0.05 mm.) and (1 mm. by 0.25 mm.). Other evidences of strain are strongly undulatory extinction (the extinction bands being approximately parallel to $\{10\bar{1}1\}$ of the grain lattice) and conspicuous dark nontwinned $\{01\bar{1}2\}$ lamellae. There is usually one prominent set of these per grain, though the other two may be feebly developed. In many grains the lamellae are confined to one local area within the grain in question. In some grains $\{01\bar{1}2\}$ lamellae are bent as they cross successive extinction bands; but within any band the lamellae maintain a normal orientation in the lattice. As is to be expected from the orientation of the specimen, only a minor proportion of grains show recognizable twinning on $\{01\bar{1}2\}$; but in these twinning is highly complex.

Results of petrofabric analyses are shown in

Plate 5.—PHOTOMICROGRAPHS OF HIGHLY DEFORMED YULE MARBLE

Specimen 400 (*1* cylinder) shortened 37% normal to foliation at 300°C. (duration of run, 48 hours). Initial foliation is E–W, normal to plane of photograph. SS = shear zone. EE = mean direction of elongation of grains.

A. *2* section of complete cylinder. B. Enlargement of central part of shear zone of A.