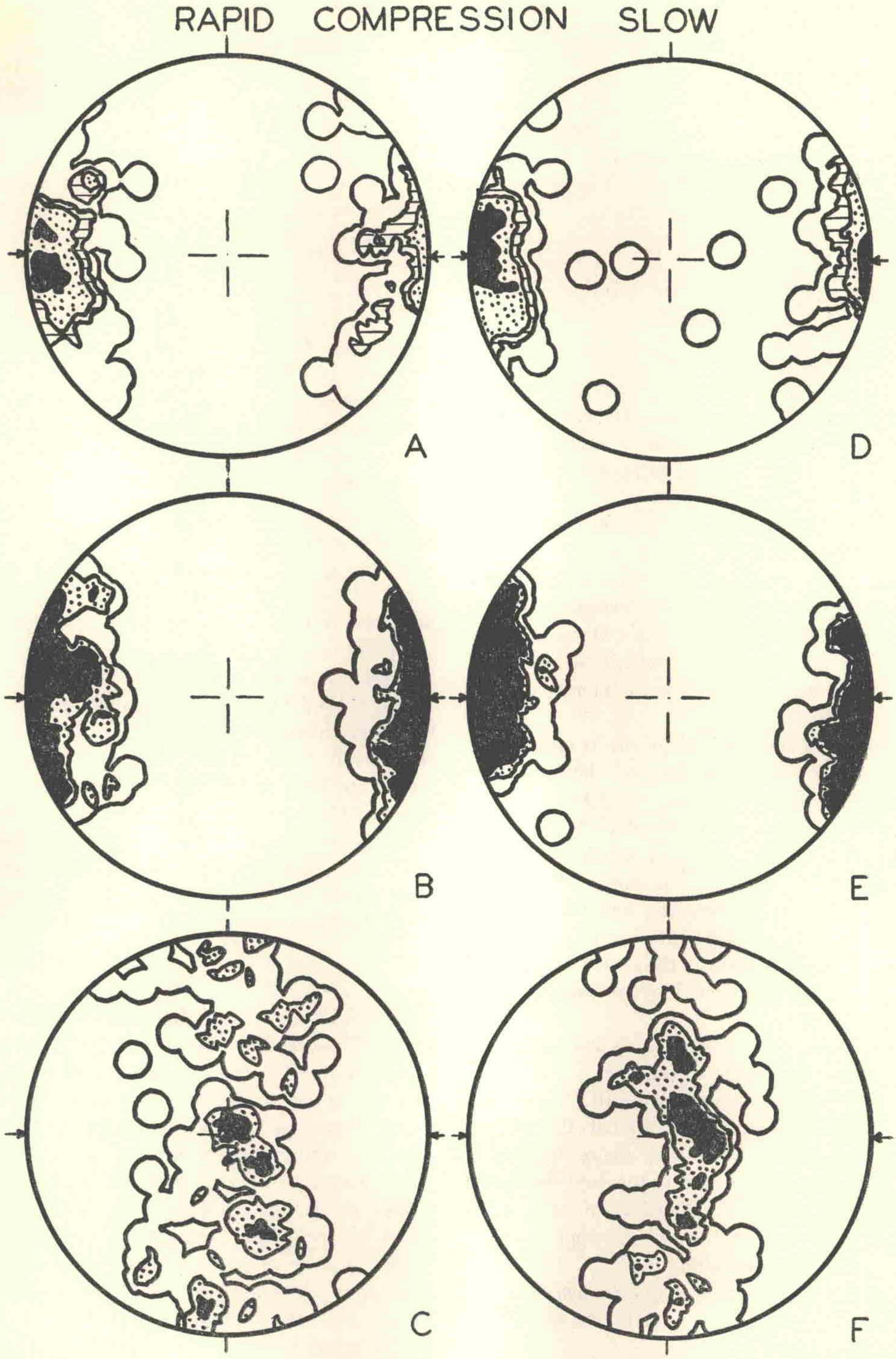

FIGURE 13.—COMPARISON OF FABRICS OF MARBLES DEFORMED RAPIDLY AND SLOWLY AT 150°C IN WATER

Compression of *3* cylinders, shortened (E-W) by 19%. 255 (A, B, C), duration of experiment 14 minutes. 260 (C, D, E), duration of experiment, 7 hours.

A, D. *c* axes in 100 grains; contours, 1, 3, 5, 10%, per 1% area.

B, E. Best-developed {01$\bar{1}$2} lamellae in 100 grains; contours, 1, 3, 4%, per 1% area; maximum concentration in each, 10%.

D, F. Edges [e:e] in 100 grains; contours, 1, 3, 6%, per 1% area.

Within the limits imposed by this restriction, the diagrams of Figure 10 are alike in that maxima consistently develop as far as possible from the axis of compression (Fig. 10, A, B), or as close as possible to the axis of extension (Fig. 10, C, D, E).

Influence of Temperature, Water, Time on Deformed Fabric

Temperature.—We now have a quantity of data relating to deformation, respectively at room temperature (*cf.* Part III) and at 150°C under otherwise identical conditions. The trends of fabric evolution appear to be the same in the two cases. Some of these trends were rather imperfectly established in our earlier work (Part III), since optical measurements were hindered by the inhomogeneously strained condition of many grains in marble deformed at room temperature. However, these same trends are clearly recognizable and have been confirmed beyond doubt in material deformed at 150°C.

Figure 11 summarizes the effects of deformation, involving elongation or shortening by about 20 per cent, upon the fabric of Yule marble. The axis of applied stress is normal to the plane of the diagrams which show ideal locations of respective maxima for *c* axes, prominent $\{01\bar{1}2\}$ lamellae, and edges of the type [*e*:*e*] for six different orientations of applied stress in relation to the same initial fabric.

(1) In fabrics affected by ***compression*** (Fig. 11, A, C, E):

- (a) *c* axes tend to become aligned subparallel to the axis of shortening;
- (b) the most conspicuous $\{01\bar{1}2\}$ lamellae in each grain tend to cut the axis of shortening at as high angles as possible
- (c) edges [*e*:*e*] between the best-developed sets of $\{01\bar{1}2\}$ lamellae of each grain tend to cut the axis of shortening at angles approaching 90°.

(2) In fabrics affected by ***extension*** (Fig. 11, B, D, F) the fabric tends to change in the opposite direction:

- (a) *c* axes tend to concentrate at high angles to the axis of elongation;
- (b) the most conspicuous $\{01\bar{1}2\}$ lamellae develop as nearly parallel to the axis of elongation as is permitted by orientation of the crystal lattices;
- (c) edges [*e*:*e*] tend to be as nearly parallel to the axis of elongation as is possible.

We conclude that the main mechanism of deformation, as reflected in the deformed fabrics, is the same at 150°C as at room temperature. The chief difference is the more obviously distorted condition of many grains in low-temperature fabrics, and the generally sharper definition of preferred-orientation patterns in high-temperature fabrics of Yule marble.

Water.—In several cases deformation experiments were duplicated at 150°C, respectively, in the presence and in the absence of water. Corresponding fabrics resulting from one such pair of experiments are illustrated in Figure 12. The two fabrics are virtually identical; and it may be concluded that for marble rapidly deformed at 150°C water has little or no effect upon the resultant fabric.

Time.—Two sets of diagrams in Figure 13 (A, B, C, and D, E, F respectively) illustrate the nearly identical nature of fabrics resulting respectively from rapid and from slower deformation, both in presence of water. In the one case (255, Fig. 13, A, B, C) the duration of the experiment was 14 minutes; in the other (260, Fig. 13, C, D, E) it was 7 hours. The more slowly deformed fabric seems to be somewhat the more sharply defined of the two.

Conclusion

The lower strength of Yule marble observed at 150°C as compared to that at room temperature, and the more uniform texture suggest that a significant step has been made in approaching the effects of natural environmental conditions. Contrary to expectation, temperature, time, and presence of water—factors subject to wide variation within the limits of geological environments—have had little influence on the patterns of preferred orientation developed in calcite marble deformed under the conditions of our experiments. This suggests that the fabrics recorded in this paper and in Part III may have greater geological significance and may prove of greater use in interpreting fabrics of some natural marbles than was at first anticipated.