contours). The *possible* axes of compression (shaded contours) and tension (stippled contours) deduced for the 31 grains are also shown in the figure (3c). Maxima for possible glide lines (a) and for axes of compression (C) and tension (T) in figure 3c have orientations close to the glide lines and axes of compression and tension inferred for grains with two sets of L_9 lamellae (fig. 3b). The axes of compression and tension deduced from twinning (C_1 and T_1, fig. 3d) are also subparallel to those inferred from the L_9 lamellae (C_2 and T_2, fig. 3d).

Absence of L_9 lamellae in a grain does not denote absence of {0001} translation, since L_9 lamellae appear only if $\{02\bar{2}1\}$ lamellae were present in the grain prior to gliding on {0001}. The lattice orientation of grains with L_9 lamellae (figs. 4a, b) is not obviously different from that of the other grains (figs. 2a, b); so that many or all of the grains in the rock may well have undergone some degree of translation-gliding on {0001}. Thus the planes defined statistically by the orientation of {0001} could represent statistical slip-planes in the fabric (S_1 and S_2, fig. 3d). Kinematic *a*-axes in these slip-planes would be given by the preferred orientation of the glide directions in individual grains (a).

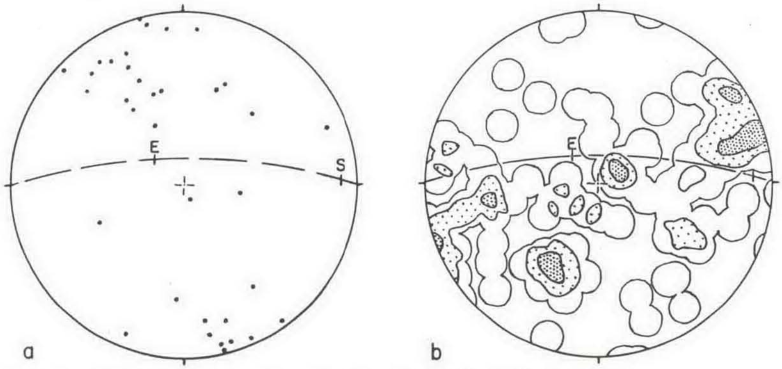

Fig. 4. Additional orientation data for the Loch Ailsh dolomite.
a. [0001]-axes in 35 grains containing L_9 lamellae.
b. *a* crystallographic axes in the same 35 grains. Contours: 1, 3, 5% per 1% area.

The geometry of the dolomite lattice is such that a compression applied subparallel to [0001] will tend to produce twin-gliding simultaneously on two or three of the $\{02\bar{2}1\}$ planes. But if a tensile force is applied normal to [0001] in such a way as to give high resolved shear stress on one $\{02\bar{2}1\}$ plane, the resolved shear stress on the other two $\{02\bar{2}1\}$ planes will be low and twin-gliding will take place on only one set of $\{02\bar{2}1\}$ lamellae. Thus we might expect to find two or three sets of twin lamellae in each grain in rocks which have been deformed by compression, whereas tension should give a fabric in which most grains contain only one set of twin lamellae. The presence of two or three sets of $\{02\bar{2}1\}$ lamellae in the majority of grains in the specimen under consideration indicates that these have been produced by compression. Although grains containing three sets of $\{02\bar{2}1\}$ lamellae are very common, only 20 percent of the grains contain optically recognizable twinned lamellae and the majority of these have only one such set. This feature, which is rather remarkable in view of the considerable post-crystalline deformation of the rock, may perhaps indicate a low temperature of deformation, for twinning has been produced experimentally only at temperatures above 300°C (Higgs and Handin, 1954).

Although the $\{02\bar{2}1\}$ lamellae in some grains are closely spaced, there is no indication, even where optically recognizable twinning is present, that the grains are more than partially twinned. This fact, along with the paucity of optically twinned grains, suggests that twinning was of minor importance during the final stages of deformation. The evidence of the fabric, then, suggests that translation-gliding on $\{0001\}$ was more important than twin-gliding on $\{02\bar{2}1\}$ during the latest stage of the deformation of the rock.

Orienting Mechanism.—This study yields little evidence as to the mechanism by which the strong preferred orientation of [0001] was achieved. It is probable that the intracrystalline structures described and interpreted above reflect only the final stage in the deformation of the rock. To produce such a strong preferred orientation by gliding of the types discussed would require a very high degree of strain, which would result in extreme elongation of the grains. Since the grains are predominantly equant, it is likely that there was a strong preferred orientation before the visible structures were produced. However, the pattern of preferred orientation is so similar to those of dolomite tectonites described by other authors (Fairbairn and Hawkes, 1941; Ladurner, 1953) that there can be little doubt that it was produced by deformation.

In an aggregate of dolomite crystals with random orientation subjected to compression, translation-gliding on $\{0001\}$ would tend to give a concentration of [0001]-axes close to the axis of compression, whereas twin-gliding on $\{02\bar{2}1\}$ would produce the opposite effect—a migration of [0001]-axes from the axis of compression. If these are the only two mechanisms of deformation in dolomite, the final pattern of preferred orientation would depend solely on which of the two types of gliding was produced with the greatest ease. The observed concentration of [0001]-axes could have been brought about by basal translation with minor twinning on $\{02\bar{2}1\}$ under compression directed parallel to the present [0001] concentration, but definite evidence as to the operative mechanism is lacking.

Calculation of Strain from Rotated Lamellae.—Theoretically it should be possible to estimate the post-crystalline strain in a rock from the degree of internal rotation of lamellae as a result of gliding according to a known system. In view of the extensive post-crystalline strain in the present specimen it should be well suited for such consideration (Turner, et al., 1956, p. 1292). The strain, ε, in individual grains is given by the equation:

$$\varepsilon = \frac{S_0 \ (\cot\alpha - \cot\beta)}{\sin\gamma}$$

where α and β are the angles between the rotated lamellae and the glide-