at variable angles toward the north, and the slickensides on the surfaces plunge to slightly west of north.

DISCUSSION OF THE MOVEMENTS

The rocks in the zone of dislocation generally show comparatively little evidence of deformation. Only along the thrusts and the faults is there appreciable cataclastic breakdown of gneisses and sediments, and mylonitic rocks comparable with those along the Moine thrust are developed only above the Assynt (Glencoul) thrust. It is probable that movement in the sedimentary rocks took place chiefly by slip on the bedding surfaces, whereas the minor thrusts and faults originated in the massive gneisses and igneous rocks, and in those sediments in which the bedding planes were not suitably oriented with respect to the stress system for bedding slip to take place.

The large-scale folding in the nappes is generally open and simple in style, as is commonly found in competent sediments such as the Cambrian quartzites and the Torridonian sandstones. The folds are noncylindroidal and, though many are asymmetrical, they are seldom overturned or recumbent. In kinematic terms, the folding denotes shortening within the nappes in a direction normal to the fold axes, probably while the nappes were being transported along the major thrusts.

Folding about southeast-plunging axes (β_{se}) is not common in the lower nappe, and the majority of the folds with this orientation are situated within a short vertical distance of the sole (at Loch Assynt, Stronechrubie, and Knockan). The proximity of these structures to the sole suggests that they were produced by drag on the thrust. The axial planes of all the folds are inclined to the northeast, indicating a consistent sense of rotation between Loch Assynt and Knockan Crag, and if the folds were produced by movement on the thrust, as seems likely, they indicate that the sense of movement of the lower nappe along the sole was from northeast to southwest.

The widespread folding about southeast-trending axes in the upper nappe, particularly in the vicinity of Ben Uidhe, is evidence of a considerable degree of shortening of the nappe in a northeasterly direction. This may have been produced by transport of the nappe along the Assynt thrust in the same direction. But at the only locality (Loch Glencoul) where the thrust is well exposed, the small-scale folds in the mylonitic rock trend north-south and are overturned toward the west, indicating transport to the west along the thrust. Folding about north-trending axes elsewhere in the zone of dislocation, however, was contemporaneous with movement on the Ben More thrust, which displaces, and therefore postdates, the Assynt thrust. Thus it is probable that the north-trending folds above the Assynt (Glencoul) thrust at Loch Glencoul were produced by late-stage movement and do not reflect the main movements on the thrust.

The north-trending folds (β_n) in the zone of dislocation were produced during a later phase of deformation than the southeasterly folds, discussed above. They indicate shortening of the thrust masses in an east-west direction, and the asymmetry of the folds and the displacement on the Ben More thrust and related reverse faults denote slight transport of the overlying rocks toward the west. The

orientation of the small-scale folds in the mylonitic rocks along the Assynt (Glencoul) thrust show that it was also active during this phase of deformation, although it was already in existence before the movement began. It is not necessary to postulate a large downfold of the Assynt thrust to the west of the main outcrop to account for the existence of the klippen at a lower structural level in the region of Beinn an Fhuarain, Ledbeg, and Cromalt. The great thickness of gneiss and quartzites on the ridge of Braebag and Creag Liath was produced by reverse faulting and folding during the later phase of deformation, that is, after the upper nappe was emplaced. The cumulative effect of the small displacements on the Ben More thrust and the plexus of eastward-dipping reverse faults is to raise the level of the Assynt thrust progressively from west to east.

Thus in the zone of dislocation, as in the Moine thrust zone, there is evidence of at least two separate phases of deformation. During the earlier phase there was shortening of the nappes in a southwesterly direction, probably associated with transport of the nappes in this sense on the major thrusts. This was followed by movement in a westerly direction, during which the nappes were broken by a series of eastward-dipping reverse faults, the most important of which is the Ben More thrust. The third set of fold axes (β_e), plunging to the east, may date from the earlier phase of deformation, or from a separate one whose age relationship to the other two is unknown.

MICROSCOPIC FABRICS

Grain Orientation in Dolomite Rocks

INTRODUCTION

Crystalline dolomite and marble are of widespread occurrence in the Assynt region, particularly in the vicinity of the plutonic masses of Loch Borolan and Cnoc na Sroine. The dolomitic limestones have locally undergone the progressive changes known as "dedolomitization"; the resulting marbles consist of calcite, brucite (probably after periclase), white mica, and forsterite or serpentine. These thermally metamorphosed marbles show considerable evidence of later deformation, which is generally considered to be a result of the thrust movements (Teall, in Peach *et al.*, 1907; Read *et al.*, 1926). Thus many of the Assynt marbles are polymetamorphic in character, having suffered successively (1) thermal metamorphism during the emplacement of the syenitic masses, and (2) dynamic metamorphism during the post-Cambrian movements.

The crystalline dolomites described below occupy a small area to the north of Loch Ailsh. The localities of the analyzed specimens (M13, M14, M15, M17, M18) are shown on the map in figure 15. This is the only area in the Assynt region where carbonate rocks are in contact with the quartzose mylonitic rocks along the Moine thrust, and it is here that the fabric of the carbonate rocks might be expected to bear the most pronounced imprint of the thrust movements.

As the rocks in the Loch Ailsh area are cut by a large number of minor thrusts and shear zones, it is impossible to determine the relationship between the crystalline dolomites and the plutonic igneous rocks that outcrop nearby. Hence it cannot be demonstrated from field evidence whether the dolomite was recrystallized by contact metamorphism during the emplacement of the Loch Ailsh syenite or by some other agency.