Excursion A: The Lewisian at Loch Torridon

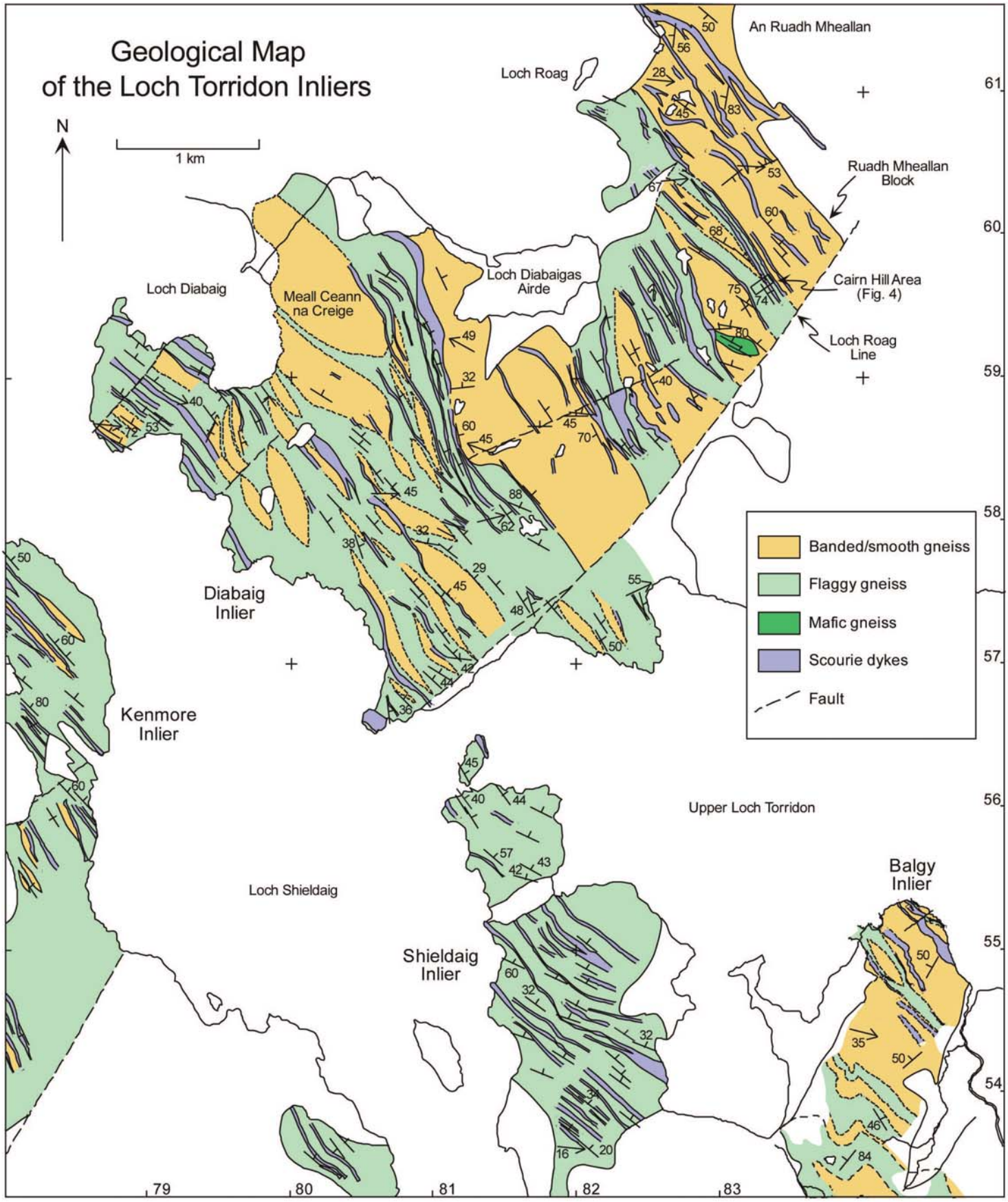

Fig. 1.1. General features of the Lewisian inliers at Loch Torridon, showing thickest Scourie dykes and schematic strain variations in gneisses. Gneisses are classified as banded/smooth gneiss (with no fabric, or banding at high angle to dykes) and flaggy gneiss with strong LS shape fabric and/or attenuated banding fabrics, often sub-parallel to dykes. Modified from Wheeler et al. (1987).

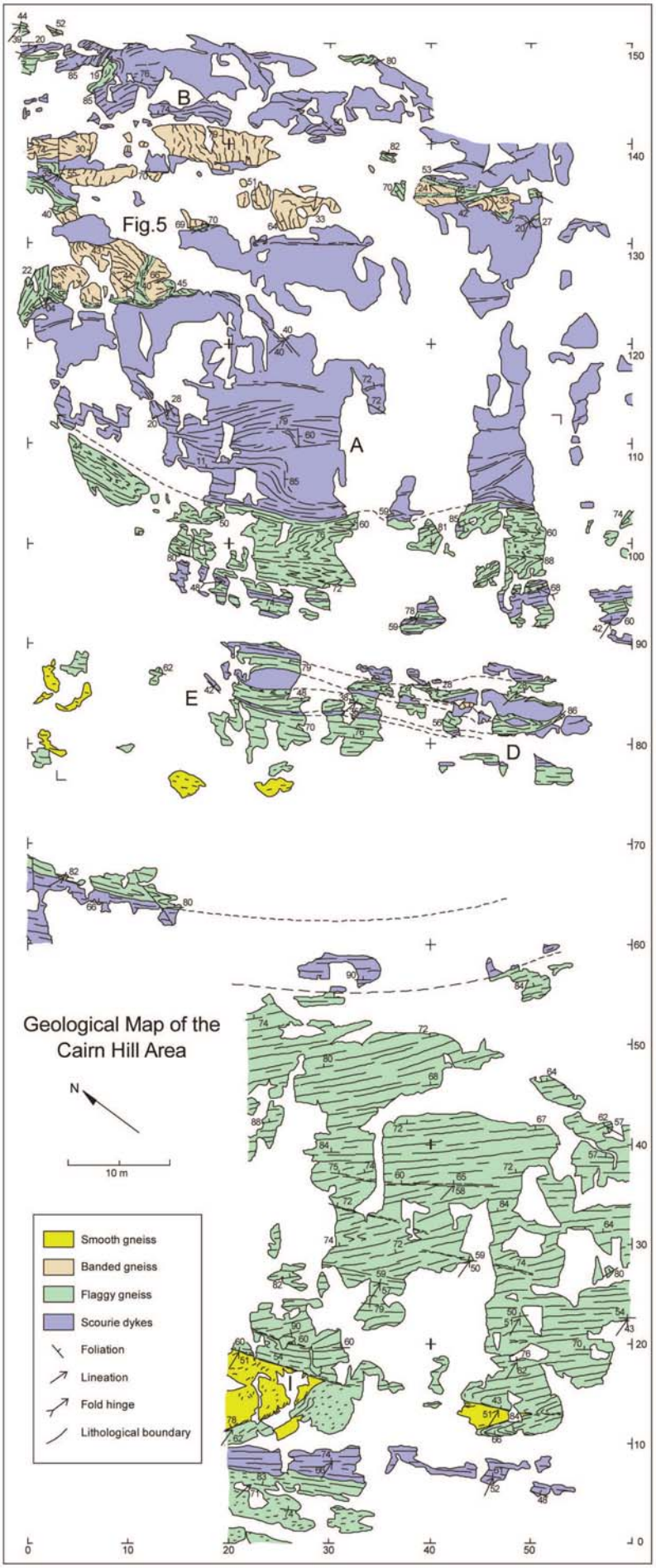

Fig. 1.2. Detailed map of part of a high strain zone in the NE part of the Diabaig inlier (Loch Roag Line).

The Torridon inliers show a transition southwards from Archaean (Badcallian) gneisses to a Proterozoic (Laxfordian) shear zone. Strain is distributed heterogeneously on all scales from m to km (Fig. 1.1) with the gneisses being reworked in shear zones to acquire a "flaggy" appearance. The Archaean gneisses are mainly quartzofeldspathic with some basic pods and larger agmatitic bodies. Before the main shearing, a suite of basic dykes (Scourie dykes) was intruded. However there is evidence for shearing before dyke intrusion but with the same orientation as Laxfordian structures – the Inverian episode. There are intriguing relationships between dykes and country rocks on the transect shown in Fig. 1.2 north of Loch Torridon. In the Balgy inlier south of Loch Torridon (Fig. 1.1, 1.4) there are good examples of Scourie dykes crosscutting Badcallian migmatites, and of a late Laxfordian pegmatite.

Migmatitic quartzofeldspathic gneiss

Scourie dyke cutting, but subparallel to, earlier fabric

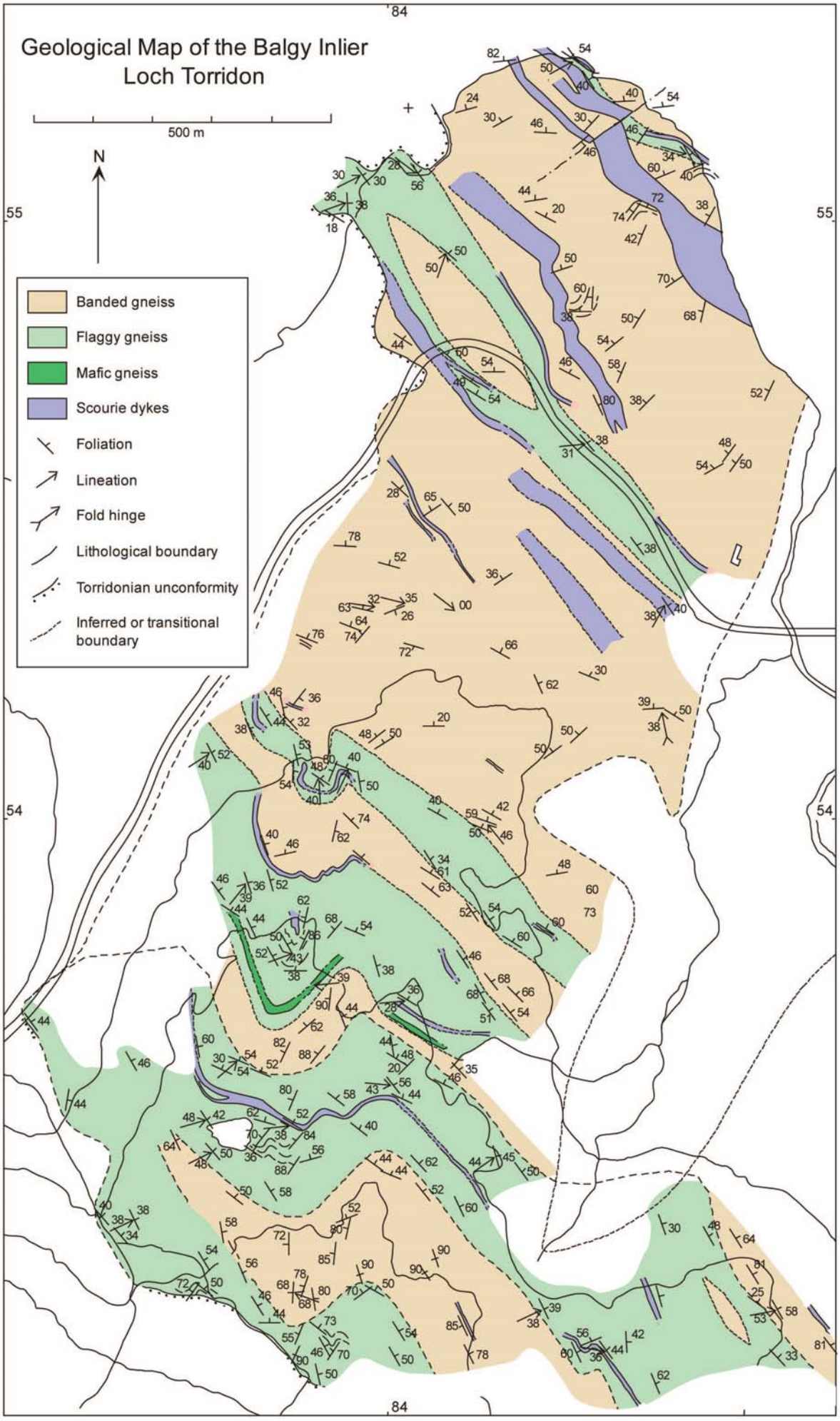

Fig. 13. Map of the Lewisian inlier at Balgy, south side of Loch Torridon. Coastline shown is high water mark.

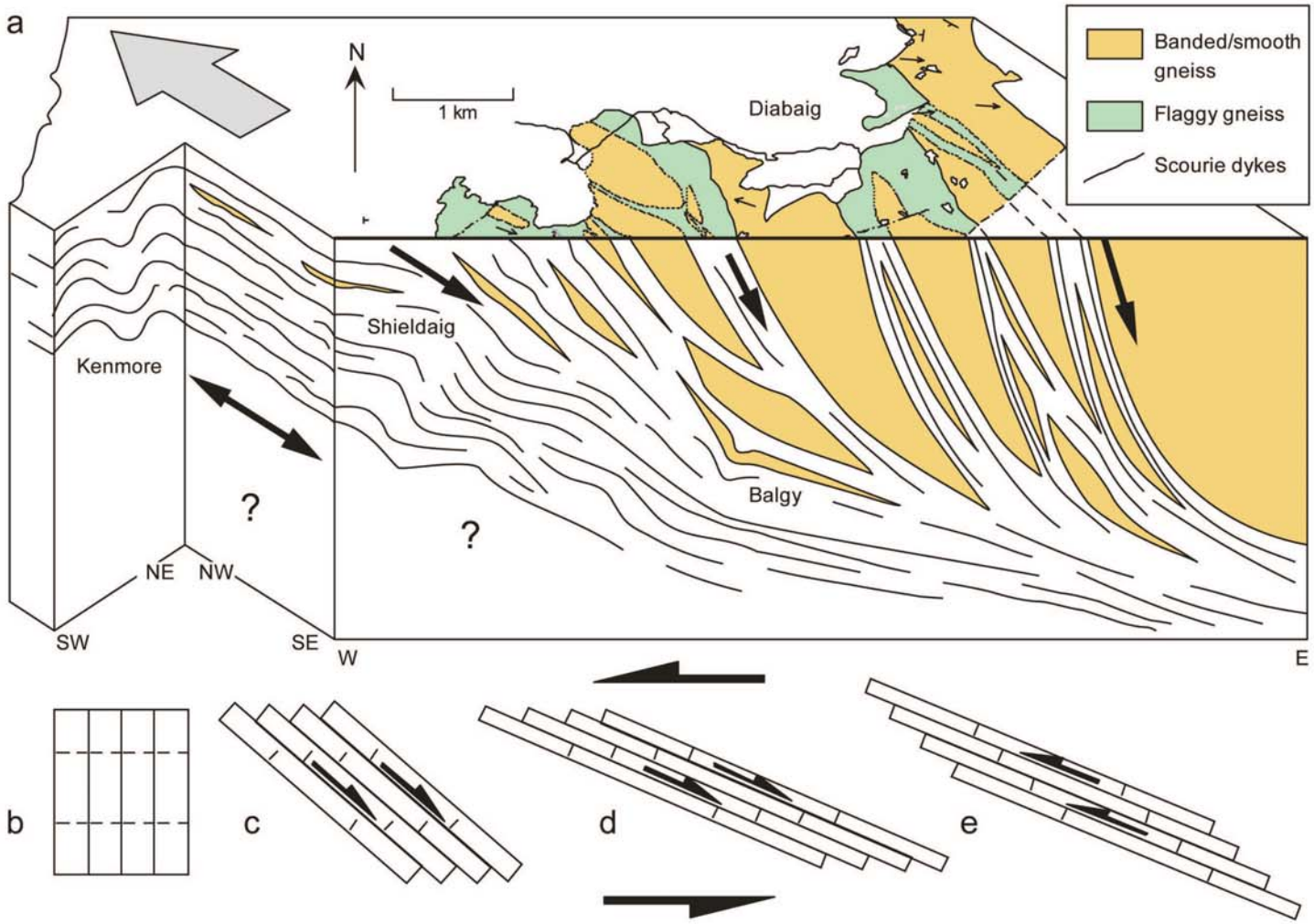

Fig. 1.4. (a). Schematic block diagram showing structure of the Loch Torridon inliers, see text for details. (b), (c), (d). Illustration of how overall top-W shear can induce top-E shear in dykes if they are less competent and form easy slip horizons. Increasing displacement on the large scale causes increasing pure shear strain in grey gneisses between dykes. Dashed lines indicate notional marker levels. Laxfordian strain in the country rock could then be pure shear, and not necessarily very intense. (e) When dykes are rotated to be sub-parallel to the shear plane as in (d), the movement sense may reverse.

Intense shear in country rocks at edge of Scourie dyke (bottom)

Fold at edge of Scourie dyke

Shear zone cutting quartzofeldspathic gneiss

Screen of country rock in Scourie dyke, later folded