Letters to the Editors

SOME RECENT DISCOVERIES OF ICE-WEDGE CAST NETWORKS IN NORTH-EAST SCOTLAND—A COMMENT

Sirs—In their recent description of newly discovered occurrences of ice-wedge polygons in north-east Scotland, Gemmell and Ralston (1984) concluded that such permafrost features, except perhaps for those in ‘Moraineless Buchan’, were most probably formed during the cold period of the Loch Lomond Stadial. This conclusion appears to rest on an assumption that the earlier period of recession of the main Devensian ice was in general characterised by a ‘rapid and substantial warming’, thus precluding permafrost activity at that time.

The most significant amelioration associated with the period of recession of the main Devensian ice took place at about 13000–13500 years B.P. at the beginning of the Windermere Interstadial (Coope and Pennington 1977). It coincides with the warming-up recorded at this time in Atlantic cores by Ruddiman and MacIntyre (1973) and probably also with the change in the Scottish late-Glacial marine sequence from the arctic faunas of the Errol Beds to the high boreal faunas of the Clyde Beds (Peacock 1975) and the Powgavie Clay (Paterson et al. 1981). The Errol Beds, which were laid down in the wake of the retreating main Devensian ice-front, have been recognised in the area west of Perth and also (Browne et al. 1984) in the vicinity of Inverkeithing. It is apparent, therefore, that, by the beginning of the Windermere Interstadial, a major part of Scotland had already been deglaciated, and on the evidence of the faunas, that this deglaciation had taken place in a cold climate.

No confirmatory radiocarbon dates are yet available, but the pre-Windermere Interstadial deglaciation of the Scottish landmass must have been protracted, as the sequence of shorelines formed in east-central Scotland before the time of the Main Perth Shoreline, which probably relates to the period of amelioration (Paterson 1974), exhibits a wide range of gradients (Cullingford and Smith 1966). Andrews and Dugdale (1970) estimated from its gradient that the oldest shoreline in eastern Fife has an age in excess of 18000 years B.P., a figure which may be somewhat high (Sissons 1974). However, even the cautious suggestion of Cullingford and Smith (1980) that the features of pre-Main Perth Shoreline age date from the later part of the period 17000–13000 B.P. implies that large areas of Scotland were deglaciated in a cold climate for about 2000 years before the onset of the Windermere Interstadial.

On this basis we suggest that permafrost-related features, including those reported by Gemmell and Ralston (1984), may well have formed during the

Scott. J. Geol. 21, (1), 107–108, 1985
recession of the main Devensian ice. We do not thereby suggest that a pre-Windermere Interstadial age is proven for any of the features, and it is not the purpose of this note to deny that permafrost was active during the Loch Lomond Stadial, but to indicate that this is not the only possible age for the ice-wedge networks.

It is noteworthy that a very large proportion of known fossil frost wedges (Sissons 1974, fig. 2; Gemmell and Ralston 1984, fig. 1) appear to lie outside the ice-limit at the time of formation of the Main Perth Shoreline, a line coinciding very roughly with the limit drawn (Sissons 1967, fig. 59) for the now discredited Perth Readvance. A possible interpretation of this is that, after the onset of the Windermere Interstadial, permafrost was never again so active, even during the Loch Lomond Stadial.

References


British Geological Survey,
Murchison House,
West Mains Road,
Edinburgh EH9 3LA

M. Armstrong
I. B. Paterson

MS. accepted for publication 1st October 1984