FIRST SCOTTISH DATE FROM THE LAST INTERGLACIAL

SIRS—At present, only three sites claimed to be of interglacial age are known from Scotland (Fitzpatrick 1965; Birks and Ransom 1969; Birks and Peglar 1979). The interglacial status of these sites—Teindland, Fugla Ness and Sel Ayre—is based on evidence from pollen analysis of organic lenses. Attempts to date two of these deposits by 14C-assay have produced finite dates of 40 100 ± 400 B.P., 37 000 ± 100 B.P., 34 000 ± 80 B.P. (all from Fugla Ness), and 36 800 ± 150 B.P. (Sel Ayre). Because the last interglacial is beyond the range of the radiocarbon dating method, these dates are widely regarded as incorrect, having been contaminated by younger material (Sissons 1981).

The effective range of the 230Th/234U disequilibrium dating method is much greater. Application of this technique to a speleothem from a cave in Sutherland has provided the first radiometric interglacial date from Scotland. The cave, Uamh an Claonaite [NC 2710 1657], is located some 5 km SSE of Inchnadamph, in the Assynt district of Sutherland in the NW of Scotland. Formed in Cambrian dolomitic limestone, Uamh an Claonaite has the distinction of being the longest cave system yet surveyed in Scotland (at least 1700 m of cave passage). Current opinion is that the cave developed on several levels under deep phreatic conditions, and is now undergoing some vadose downcutting (Young 1980). The present waters from Loch an Claonaite drain through the cave as part of the largely subterranean drainage system of the Allt an Uamh area.

As part of a larger programme of research, samples of calcite speleothems were taken from this cave. One sample (AU1-80) was a large piece of flowstone from amongst breakdown blocks at the lower end of Mud Passage, above sump 3 (Young 1980, fig. 3). Although not strictly speaking in situ, the angularity of the sample indicated that it had not been moved far from its original position in the chamber as a false floor, broken up by a fall of rock from the roof. 230Th/234U dating of the sample was undertaken at the Scottish Research and Reactor Centre, East Kilbride, by Dr. R. S. Harmon. A date of 122 000 ± 12 000 yr B.P. was obtained from the base of the flowstone fragment. A 230Th/232Th ratio of >200 indicated that the sample was free of any detrital thorium contaminant.

Besides giving a maximum date for the roof-fall event that resulted in the formation of the breakdown deposits in which the sample was incorporated, and a minimum date for this part of the cave system, the date is interesting in a wider context.

It has been argued on theoretical grounds that speleothem deposition ceases, or is significantly reduced, during periods of periglacial and glacial conditions (summarized in Atkinson et al. 1978, pp. 24–25). Dating of speleothems from North America
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(Harmon et al. 1975; Harmon et al. 1977) and from Britain (Gascoyne 1977; Atkinson et al. 1978; Atkinson et al. in press) has shown that the age determinations fall into several groups, indicating periods of essentially non-glacial conditions. One of these clusters of dates suggests a phase of non-glacial conditions from 90,000 to 130,000 yr B.P. The date from Uamh an Claonaite can be assigned to this group.

The Late Quaternary oxygen-isotope stratigraphy of deep-sea cores is now considered to provide the most complete record of glacial/interglacial climatic fluctuations (Bowen 1978). Shackleton (1969) suggested that the last interglacial period as defined by terrestrial evidence correlates with oxygen-isotope substage 5e, a view that has recently been confirmed (Shackleton and Heusser 1977; Mangerud et al. 1979). Recent work has assigned a date of approximately 125,000 yr B.P. to substage 5e (Shackleton and Opydyke 1973, 1976; Shackleton and Matthews 1977).

The close similarity of the Uamh an Claonaite date with that of oxygen-isotope substage 5e, plus the fact that the dated speleothem indicates non-glacial conditions at that time, as do other speleothems from British and American caves, would seem to suggest that the dated flowstone relates to the last full interglacial period.

REFERENCES


A REVISION OF THE STRATA TO BE INCLUDED IN THE MILL HILL MARINE BAND IN EAST FIFE

Sir,—The discovery of the first recognizable goniatite in the Mill Hill Marine Band (Wilson 1980) has drawn attention to this unusual horizon in the Lower Limestone Group (Brigantian Stage of the Dinantian; P2 goniatite zone). It has also made necessary a revision of the strata to be included in this band at St. Monans (formerly St. Monance) on the east Fife coast.

The Mill Hill Marine Band was first described under that name in west Fife, from Mill Hill quarry [NT 100 873], Dunfermline, by Haldane and Allan (1931, p. 29), who recorded the occurrence of calcareous brachiopods in it and indicated that the band had also been found, in mudstones with calcareous nodules, at Duloch quarry [NT 133 847] (they also stated wrongly that it had been found in the Kinghorn shore section, farther east). The Mill Hill Marine Band lies above the sandstone for which these quarries were opened and is about 45 m above the Charlestown Main Limestone. The Annfield Borehole (Forsyth 1971) was put down in the same area: the Mill Hill Marine Band was affected to some extent by faulting but the occurrence of calcareous brachiopods was confirmed. In central Fife, however, it has only been found at Bowhill (Francis et al. 1961, p. 26) and it has not yet been recognized in Midlothian.

In east Fife the Mill Hill Marine Band was found in two boreholes, Drumcarro and Muircambus, by Forsyth and Chisholm (1968). The latter section includes 2-8 m of marine strata, mostly siltstones; in the former there is 0-7 m of fossiliferous mudstone overlying a 10-cm band of argillaceous, sandy clayband ironstone with much shell and crinoid debris. This band is very like the 15-cm band of iron, sandy nodular limestone described by Forsyth and Chisholm (1977) as constituting the whole of the Mill Hill Marine Band in the coast section [NO 533 017] on the eastern limb of the St. Monans Syncline, where it was recognized by Wood as long ago as 1887. There it disappears westwards and is not present on the western limb, but reappears again at