

## WELL PRESERVED LATE PRECAMBRIAN PALEOSOLS FROM NORTHWEST SCOTLAND—REPLY

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A simple solution to the apparent problems outlined by Stewart lies in the extreme variation in thickness of the Torridon Group. In contrast with Stewart's novel assertion of selective erosion of these sediments in the extreme northwest corner of Scotland from Sheigra to Cape Wrath, we followed past mapping and correlations indicating that only the upper part of Torridon Group was originally deposited on Lewisian basement there. Kilometers of paleorelief on the basal Torridonian angular unconformity have been known for some time (Peach et al. 1907), and the Torridon Group from Cape Wrath to Sheigra has been correlated with the uppermost part of the thick sequence filling deep valleys to the south (Williams 1966, 1969; Johnson 1983; also shown in our reconstruction, Retallack and Mindszenty 1994, fig. 14). Such a setting for the paleosols near Sheigra is an essential element of the piedmont slope model of Williams (1969), which was corroborated over an alternative peneplain model (presumably favored by Stewart) by our demonstration of moderate to strong rather than exceptionally strong soil development (Retallack and Mindszenty 1994). The lack of thick paleosols in steep-walled paleovalleys to the south of the paleopiedmont, which is so puzzling for Stewart's "layer cake" view, is also compatible with the idea that the Torridon Group filled a rugged landscape of hills and valleys. We also agree with Williams (1968) that these paleosols were little altered by burial. They were not so little altered by burial that they could be Cenozoic, as indicated by Stewart, considering the clear petrographic and chemical evidence for illitization like that found at burial depths of 1–2 km (Retallack and Mindszenty 1994). Nor were they buried to depths of 6–9 km indicated by Stewart. Such deep burial would create minerals and fabrics of the greenschist facies of metamorphism, well documented for paleosols (Retallack and Kirsley 1993) and

not found in the paleosols near Sheigra (Retallack and Mindszenty 1994). We are unconvinced by Stewart's attempts to extrapolate metamorphic grade associated with a major thrust fault that is upward steepening (thus probably close to its western edge) and marine rocks deposited in shallow water (thus close to former shoreline) at localities no closer than 20 km from the studied paleosols. We continue to support Williams' (1968) conclusion based on his study of these same sites that these Precambrian paleosols have been illitized and otherwise diagenetically altered but have escaped metamorphism of the greenschist facies or higher that would be expected from Stewart's extrapolations.

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