Gribun shore and crags, Mull, Strathclyde

[NM 444 334]–[NM 480 362]

Introduction

The sea cliffs and foreshore at Gribun expose an excellent section through the conglomerates and sandstones of the Stornoway Formation. The basal contact with ancient Moinian rocks is magnificently exposed, and the red beds are overlain by fossiliferous Rhaetian deposits. The Stornoway Formation includes a range of conglomerates formed in alluvial fan and braided stream situations and associated with siltstones. Many of the siltstones have well-developed columnar and nodular calcrete profiles, often with oolitic or pisolitic texture. The site is important for its demonstration of alluvial fan deposits and calcrete horizons in the red beds, and for their unusual exposure in continuity with the overlying Penarth Group.

Brief accounts of the Gribun site have been given by Bailey and Anderson (1925), Lee and Bailey (1925), Craig (1965), Steel (1974b), Hudson (1983), Walker *et al.* (1985), and Warrington and Pollard (1985).

Description

The Gribun Shore and Crags Site of Special Scientific Interest (SSSI), on the west coast of the Isle of Mull, contains three areas of geological interest: the shoreline, the crags, and a small area close to Balmeanach Farm. The Stornoway Formation is seen in a narrow strip along the shore, overlying the Moinian rocks, and overlying red beds and marine sediments of the Penarth Group are seen in the banks of the Allt na Teangaidh upsteam from Balmeanach Farm. Above it is a representative of the Penarth Group, which is overlain successively by Jurassic, Cretaceous, and Tertiary rocks, some of them affected by landslides.

Sedimentology

At Gribun the Triassic sedimentary sequence consists of 20–30 m of red beds in the coastal strip. The unconformity with the underlying Moinian rocks is striking (Figure 3.15)a, and it is highlighted by the tilted banding of the latter. The plane of unconformity presumably represents the Triassic land surface. The basal unit of the red beds consists of fine- to coarse-grained sandstones, many with conglomeratc bases, and channel forms, and, here and there, siltstones and mudstones. Calcrete horizons are common (Figure 3.15)b, occurring as small and large nodules, which may be elongate and vertically orientated, and as vertical pipes and horizontal sheets. In places, calcium carbonate dominates the units, and the original host sediment is seen only in small isolated patches. The nodules commonly preserve an oolitic or pisolitic texture, and may show laminae and micro-breccias. The breccias consist of carbonate and a few chert clasts; cements may be calcium carbonate or silica (Steel, 1974b). The conglomeratic and arenaceous basal beds are overlain by sandstones and mudtsones with calcretes.

The red beds are overlain by approximately 12 m of Penarth Group sediments. The middle part of this group is best exposed in the bed and banks of the Allt na Teangaidh stream, ENE of Balmeanach Farm (Warrington and Pollard, 1985). The Penarth Group comprises dark grey sandy limestones, calcareous siltstones, and sandstones; some yellowish calcareous sandstone and darker grey or black shales are also present.

Palaeontology

In the Allt na Teangaidh stream the Penarth Group has yielded examples of the bivalves *Rhaetavicula* (*Pteria*) *contorta, Cblamys* (*Pecten*) *valoniensis,* and *?Placunopsis alpina.* Trace fossils, for example *Planolites* and *Teichichnus,* have been recorded from sandy calcareous siltstones in this section (Warrington and Pollard, 1985). In addition to the macrofossils, miospores have been recovered, including *Alisporites* sp., *Ricciisporites tuberculatus,* and *?Ovahpollis pseudoalatus,* all from the dark silty mudstones and shales exposed in the course of the Allt na Teangaidh (Warrington

and Pollard, 1985). Plant macrofossils, including small pieces of woody and vascular material, have also been recovered from dark grey siltstones and mudstones and black shales.

Interpretation

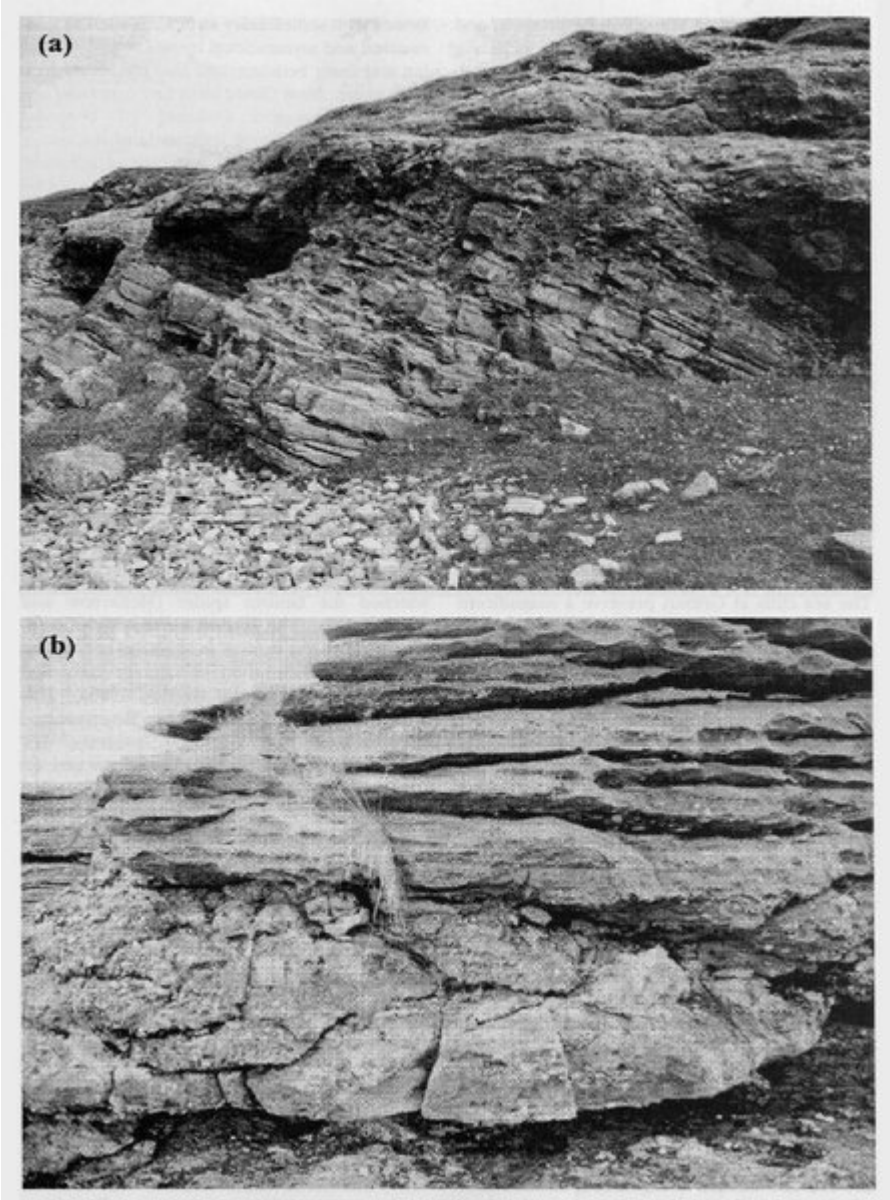
The Triassic rocks of Gribun, Mull, were deposited on the margins of an asymmetrical sedimentary basin. The conglomeratic sediments accumulated as fans against the active margins of the basin. The finer-grained siltstones, with their associated calcretes, represent a fluvial environment with soils developing on the interfluves and banks. The presence of calcareous nodules is evidence for periodic flooding and a semi-arid climate (Hudson, 1983). The plant remains suggest a continental humid environment.

The miospores indicate a correlation of the upper mudstone units with the Penarth Group of England (Warrington and Pollard, 1985).

Conclusions

The sea cliffs at Gribun preserve a magnificent section through conglomerates, sandstones, siltstones, mudstones, and calcretes of the Stornoway Formation, with, inland, a succession that extends up to the Penarth Group. The Stornoway Formation was deposited under dominantly terrestrial conditions, in part of a large-scale river system characterized by braided channels and alluvial fans. The presence of calcrete nodules indicates that soil profiles formed on the sediments. The succession here is important in documenting the basal unconformity spectacularly, and in showing, in close association, the Penarth Group sediments that are usually absent in the western Scottish region.

References



(Figure 3.15) The Stornoway Formation at Gribun: (a) the unconformable junction between the banded and tilted Moine basement and the Stornoway Formation, marked by a hammer; and (b) a palaeosol horizon within beds of coarse sandstone. (Photos: C. MacFadyen.)