Coryton's Cove, Devon

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Introduction

The sea cliffs at Coryton's Cove expose an extensive section through the Coryton Breccia, the Teignmouth Breccia, and the overlying Dawlish Sandstone Formation. This is the type location for the Coryton Breccia. The Teignmouth Breccia includes flat-bedded and normally graded deposits produced by sheet floods and also matrix-supported debris flows.

The succession at Coryton's Cove has been described by Laming (1966, 1982), Perkins (1971), Selwood *et al* (1984), Mader (1985), and Mader and Laming (1985).

Description

The outcrops around Coryton's Cove are part of the Dawlish Cliffs Site of Special Scientific Interest (SSSI). At the northern end of the beach a large, steeply inclined fault runs down the cliff; and reaches the beach level close to the entrance to the railway tunnel (Perkins, 1971). This fault brings the Coryton Breccia and the overlying Dawlish Sandstone Formation into contact with the older Teignmouth Breccia.

The Coryton Breccia is a pebble- and cobble-rich breccio-conglomerate, which weathers to produce a honeycombed texture (Perkins, 1971). It contains a wide range of clast types, including quartzite, porphyry, and pink feldspar crystals with a length of approximately 20 mm. The feldspars, formerly known as 'murchisonite', are a variety of sanidine and have been linked to a feldspar-effusive volcanic episode (Laming, 1982). Mader and Laming (1985) divided the Coryton Breccia into a lower pebble- and cobble-rich part, and an upper part, consisting of sandstones and sporadic breccias. Dewatering structures comprising sand-filled cracks that open upwards into breccia units are present (Mader, 1985, p. 29).

The Teignmouth Breccia comprises coarse-and finer-grained rudaceous sediments, often arranged in fining-upwards units (Figure 2.40). Individual beds may show planar bedding, and the bases are commonly erosional. Basal lags of imbricated pebbles are common. The breccia clasts comprise Devonian and Carboniferous sandstones, slates, and cherts, hornfels, slate, aureole metamorphic rock, igneous rocks such as granites and microgranites, 'murchisonite' feldspar, Devonian limestones (generally at the base of units above limestone outcrops), and intraclasts of reworked soft, reddish-brown sandstones. The breccia beds are locally interbedded with sandstones and mudstones; the latter may show raindrop imprints and desiccation cracks (Selwood *et al.,* 1984).

Overlying the breccias, and partly interfinger-ing with them, are the dominantly arenaceous sediments and interbedded lenses of breccia of the Dawlish Sandstone Formation. The lower part of this unit comprises well-sorted sediments, composed primarily of quartz with frosted surfaces and thin coatings of haematite. Minor constituents of the sandstones include orthoclase and plagioclase feldspars and lithic fragments. Large-scale cross-beds with asymptotic bases are common, and are arranged in large wedge-shaped units separated by planar bounding surfaces. The upper part of the Dawlish Sandstone Formation consists of sandstones reworked from the lower, aeolian, parts of the formation, and preserves cross-bedding, and breccia-filled channels and scours (Laming, 1966, 1982; Selwood *et al,* 1984).

Interpretation

The Permian breccio-conglomerates and sandstones exposed at Coryton's Cove were deposited by terrestrial processes under semi-arid climatic conditions. The breccio-conglomerates were deposited on aeolian fans, and the sandstones accumulated through a combination of aeolian and fluvial processes (Laming, 1968; Mader and Laming, 1985).

The breccias indicate high-energy deposition on alluvial fans. The lower pebble- and cobble-rich unit of the Coryton Breccia was presumably deposited on the medial and distal regions of alluvial fans with little or no reworking of aeolian dune deposits (Mader and Laming, 1985). The overlying upper unit was deposited on the distal parts of a fan complex, and shows reworking of aeolian sediments. In the Teignmouth Breccia, the coarser-grained sedi ments are typical of high-energy fluvial channels, and the finer-grained sandstones were deposited by a combination of fluvial and aeolian processes (Selwood *et al.,* 1984).

The overlying dominantly arenaceous sediments of the Dawlish Sandstone Formation continued the trend of deposition on alluvial fans, although the importance of aeolian dune fields and dune flats increases. The 20-m-thick cross-bedded unit indicates that the aeolian sand dunes reached at least that height. The dunes had a crescentic (barchanoid) form, and foreset dips indicate that the dominant wind directions were from the SSE (Figure 2.36); Laming, 1966, 1982; Mader and Laming, 1985). Thin beds of coarser-grained breccio-conglomerate represent higher-energy fluvial phases initiated by infrequent or episodic heavy rain storms (Laming, 1968; Mader and Laming, 1985).

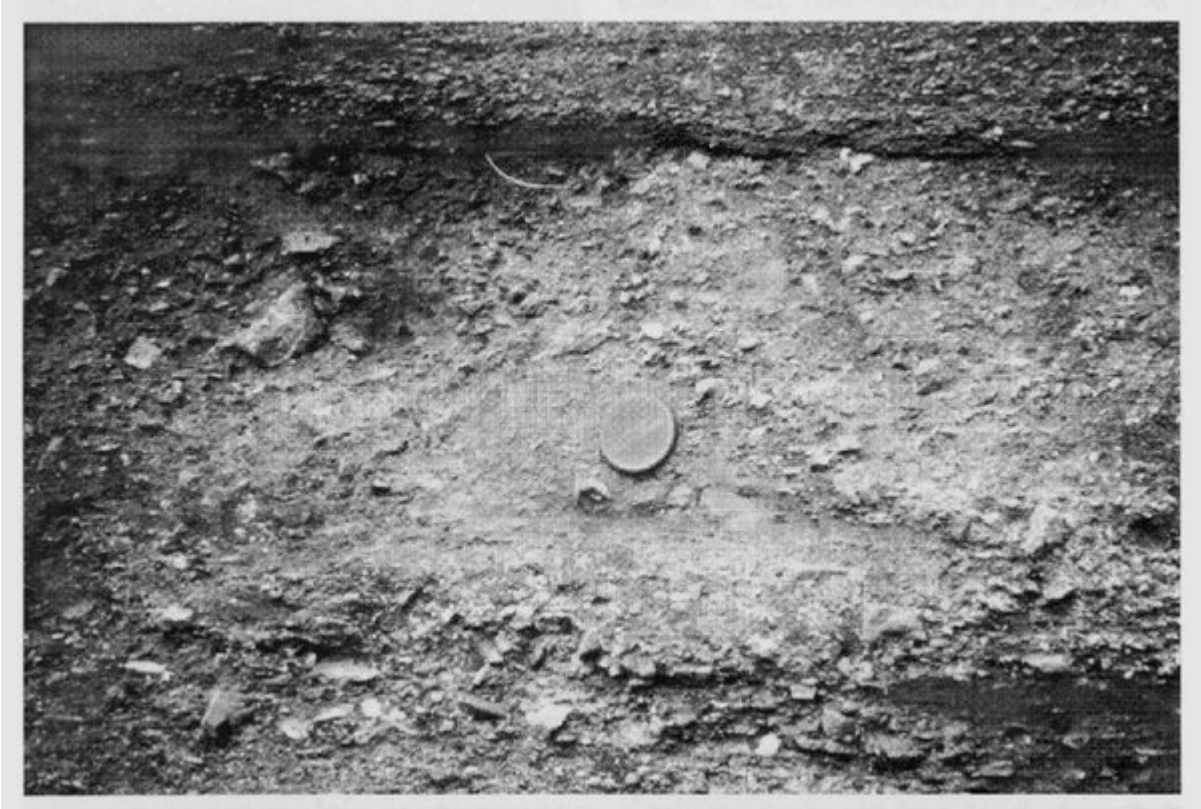
Dating of the succession at Coryton's Cove is based on circumstantial evidence. The presence of 'murchisonite' in both the Coryton and Teignmouth breccias may be a useful stratigraphical indicator (G. Warrington, pers. comm., 2001). In the clast succession demonstrated in the Exeter Group around Exeter (Edwards *et al.,* 1997) this mineral appears in the Newton St Gyres and Heavitree breccias that underlie the Dawlish Sandstone Formation (Figure 2.30). Its appearance in the Coryton and Teignmouth breccias may indicate correlation with those more northerly units, and hence a comparable Mid to Late Permian age.

The Dawlish Sandstone Formation partially overlies the Teignmouth Breccia, and partially interfingers with it. In the Exeter region, the Dawlish Sandstone Formation follows a succession of sandstones and breccias dated by miospores as Late Permian and is assigned a latest Permian age (Edwards *et al.,* 1997).

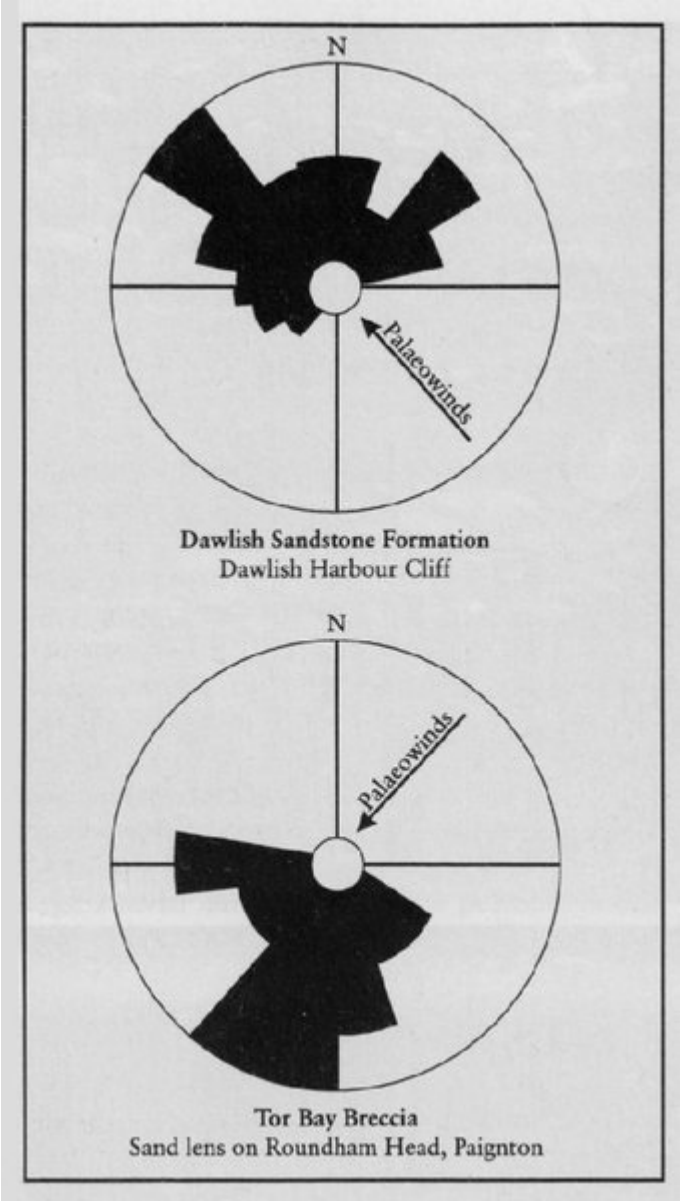
Conclusions

The sequence exposed in the cliffs at Coryton's Cove includes the Coryton Breccia, the Teignmouth Breccia, and the Dawlish Sandstone Formation, all probably Mid to Late Permian in age. The breccias were deposited within a major alluvial fan complex, where sediment was occasionally reworked by aeolian processes. The overlying Dawlish Sandstone Formation is largely aeolian in origin. Coryton's Cove is critical for understanding of Permian palaeoenvironments and palaeogeography in the Devon region.

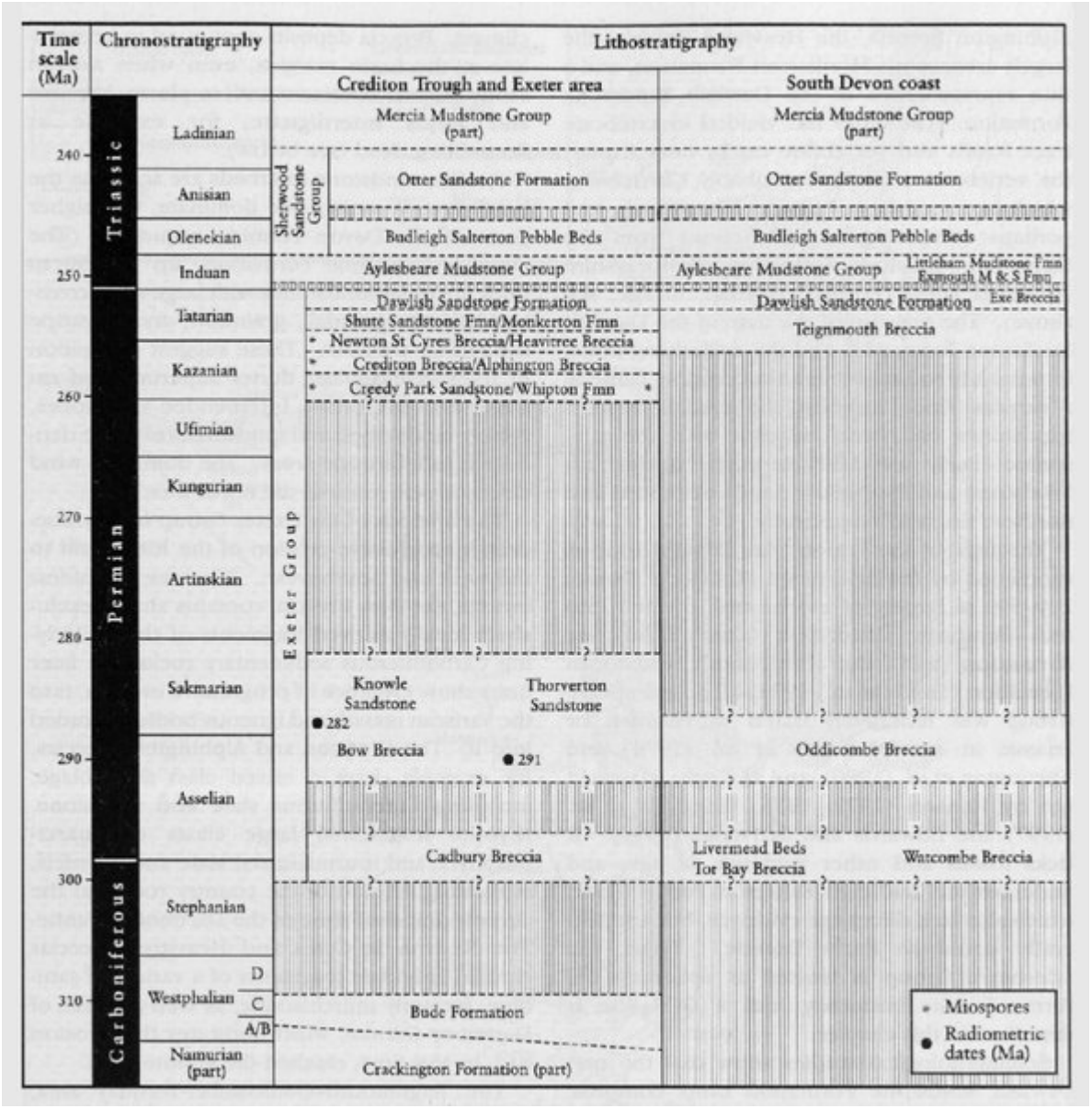
References



(Figure 2.40) Debris flow in the Teignmouth Breccia at Coryton's Cove. Near the top of the photograph is a sharp transition to an overlying sheetflood deposit. (Photo: P Turner.)



(Figure 2.36) Rose diagrams of palaeowind directions from aeolian foreset orientations for the Tor Bay Breccia and the Dawlish Sandstone Formation. (From Laming, 1982.)



(Figure 2.30) Stratigraphy of the Permian successions of the East and South Devon basins. Formal divisions for the Crediton Trough and Exeter area are from Edwards et al. (1997), and the successions around Torquay and Teignmouth are updated tentatively from Smith et al. (1974), Selwood et al. (1984), and Warrington and Scrivener (1990).