

FORAMINIFERA FROM THE FOWEY ESTUARY, CORNWALL

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Foraminifera are described from the estuary of the Fowey River in South-East Cornwall. Part of the estuary has recently (November 2013) been designated as the 'Upper Fowey and Pont Pill' Marine Conservation Zone and this paper reports the first investigation of the foraminifera (marine and brackish water protists) that live in the area. Assemblages of foraminifera are described from the saltmarsh environments near Lostwithiel, at the head of the estuary, seawards to the sea grass meadows in Polruan Pool. The latter are outside the designated MCZ, though still represent an important marine habitat. The recorded foraminifera are typical of comparable communities along the South-West England coastline. The living foraminifera can be used to identify five assemblages, each with characteristic species. Each of these assemblages shows a close relationship with the salinity and temperature ranges experienced in the area. Deformed foraminifera have been recorded and may be related to the geochemistry of the sediments, which are mainly derived from the Fowey River catchment; an area that was extensively mined in the 19th Century.

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INTRODUCTION

The Fowey Estuary, in S.E. Cornwall, is one of a series of drowned valleys (rias) that characterise the south coast of both Devon and Cornwall. Formed by the rise in sea level after the Last Glacial Maximum, sediments are now building sea-wards, often forming a series of mud flats and saltmarsh environments. Extending from Lostwithiel, where the Fowey River enters the estuary, to the sea at Fowey and Polruan, there are a range of sub-environments including saltmarsh, mudflats, sand banks and – at the seaward end – rocky shores. Within Polruan Pool is an area of eel grass (*Zostera marina*) meadow (Figure 1). The areas bordering the estuary are extensively wooded, including a number of ancient woodlands (Station Wood, Penquite Wood, Great Wood, West Wood, Mendy Pill, Mill Wood and Ethy Wood). The whole of the estuary has been designated as a County Geology Site (previously known as RIGS) due to its geology and unspoilt nature. The area is also within an Area of Outstanding Natural Beauty (AONB) and the higher reaches of the estuary, prior to designation as a Marine Conservation Zone (MCZ), were part of a 'Voluntary Marine Conservation Area' (VMCA). The area at the head of the estuary, near Lostwithiel – which is known as Shirehall Moor – was proposed as a Local Nature Reserve but never fully designated. The important sea grass meadows of Polruan Pool lie outside the earlier VMCA and the present MCZ, though still within the County Geology Site. In November 2013, the Department for Environment, Food & Rural Affairs (Defra) recognised the "Upper Fowey and Pont Pill Marine

Conservation Zone", building on the existing VMCA. Information on the MCZ are available via the Defra or Natural England websites [<http://www.defra.gov.uk> and <http://www.naturalengland.org.uk>]. The two, spatially separate, areas of the MCZ include the upper reaches of the Fowey Estuary and tributaries (including Pont Pill, Penpol Creek and the Lerryn River). The eel grass meadows in Polruan Pool, which remain outside the MCZ, lie on the east side of the dredged channel that maintains access to the port.

The off-shore and near-shore (including estuarine) environments along the South Cornwall and South Devon coastline have seen some of the pioneering research on modern foraminifera (single-celled protists); see the work of George Montagu (1753-1815), Fortescue Millett (1833-1915), Edward Heron-Allen (1861-1943) and Arthur Earland (1866-1958). There are, however, no published descriptions of the foraminifera that live in the marine and estuarine environments of the Fowey Estuary, although the higher parts of the estuary were previously studied by Stubbles (1999). The off-shore foraminifera of South Cornwall have been described by Millett (1885) and Heron-Allen and Earland (1916, 1930). Other estuaries on the south Cornwall and south Devon coast have been studied for the foraminifera that live in, and on, the sediment surface including Restronguet Creek (Stubbles, 1993, 1999; Stubbles *et al.*, 1996; Olugbode *et al.*, 2005), Looe River (unpublished student dissertation), Plymouth Sound (Heron-Allen and Earland, 1930; Murray, 1965; Eddles and Hart,