

## THE ST ERTH FORMATION: GEOMETRY OF THE DEPOSIT AND MICROPALAEONTOLOGY

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In 1999 a paper was presented to the Ussher Society which described, in some detail, the location of the St Erth Formation and the history of the minerals workings. At that time the authors described the results of a resistivity survey across part of the area, which, it was hoped, would locate *in-situ* sands and fossiliferous clays. In October 2003, using the same equipment (an ABEM Terrameter and Lund Imaging System), further lines have been documented which provide more data on the distribution of the marine sediments of Late Pliocene age. In conjunction with this additional survey work a number of shallow cores were drilled in an attempt to locate the fossiliferous clays that, since 1886, have been known to lie in this area. In most cores only wet moulding sand was recovered. In two cores thin clay interbeds were found and a limited marine fauna of foraminifera identified. Associated with these foraminifera are abundant bolboformid-like microfossils.

At a location close to the site of the trench excavated by Prof. G.F. Mitchell in the 1970s a few samples of weathered clay were recovered by hand auger. These samples also contain abundant foraminifera and 'bolboformids'. Samples collected by Millett during the original quarrying operations, and which are in The Natural History Museum (London), also contain beautifully preserved foraminifera and a diverse assemblage of these unusual 'bolboformids'.

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### INTRODUCTION

The St Erth Formation, of Late Pliocene age, is only found close to the village of St Erth (Figure 1) in west Cornwall (SW 5564 3520). The present outcrop is extremely limited, although a number of other locations in the area were listed by Roe *et al.* (1999). The "St Erth Sand Pits" Site of Special Scientific Interest (SSSI) was notified under Section 28 of the Wildlife and Countryside Act 1981 as amended, on the 17th December 1986. The citation, which is available on the English Nature website [www.english-nature.org.uk], reads as follows:

*"St Erth is a famous and classic site for its sequence of Late Pliocene marine sediments, which contain an exceptionally diverse fossil faunal assemblage, particularly macrofossils. It provides a unique source of evidence relating to the geomorphological evolution of S.W. England, former sea-levels and past environments. St Erth has attracted considerable scientific interest and controversy for over a century and will continue to be a focus of research at the highest level."*

The St Erth Formation was discovered in c.1834 (*vide* Mitchell, 1966) and a series of small pits were opened for the extraction of moulding sand. These initial workings closed in about 1874 and were abandoned until 1881 when they re-opened as a source of clay for a new dry dock in Penzance Harbour. During that year Nicolas Whitley, a local geologist, visited the site and collected specimens from the "heaps of

broken shells" in the clay pit(s). He described the clays and the fauna in a paper read to the Royal Geological Society of Cornwall in November 1881. The 'blue clay' described by Whitley was seen to rest above 'the fine sands' and below a level of (weathered?) yellow clay, angular stones, clayey loam and soil/head. Whitley (1882) was convinced that these were glacial deposits, although Wood (1885) clearly disagreed with this conclusion, and said as much at a public meeting. Subsequent publications by Kendall and Bell (1886), Bell (1887a, b, 1887-1888, 1898), Johnson (1903), Milner (1922), Mitchell (1960, 1966) and Cullingford (1982) have continued the debate as to the age of the formation.

The various workings of the pits and their subsequent investigation have been fully described by Roe *et al.* (1999). The major investigation of the St Erth Formation was by Mitchell *et al.* (1973) where the authors describe the sedimentology and palaeontology of the area, largely based on a newly excavated section. Subsequent workers (Jenkins, 1982; Head, 1993) have either used these samples for their investigations or re-assessed material in the Millett collection, which is housed in The Natural History Museum, London.

In recent years the Department for Environment, Food and Rural Affairs (DEFRA) has begun measuring performance by the creation of "Public Service Agreements" both within the ministry and in external centrally-funded organisations. English Nature has been asked to ensure that 95% of SSSIs (by area) in England are in either "favourable" or "unfavourable-recovering" condition by 2010; definitions of these terms are available on the English Nature website [www.english-nature.org.uk]. As an SSSI, it is clear that the St Erth Sand Pits no longer show the