



Photo. 4. Swansea Bay and Mumbles.



Photo. 5.

Till deposit (Devensian?) exposed at Rotherslade, Gower. Note the typical shape of the clasts, mainly sub-angular and sub-rounded. The lens cap is approximately 5 cms. in diameter.

3 Quaternary Evidence in South Gower

R. A. Shakesby

Aims

- 1 To observe the evidence available in South and West Gower for the interpretation of the Quaternary chronology of the area.
- 2 To learn how to interpret observations made in the field, of evidence of Quaternary geomorphology.
- 3 To understand the present state of knowledge of the Quaternary environmental change in South and West Gower landscapes.

Objectives

After completing the excursion you should be able to:-

- 1 Describe the evidence available for the interpretation of the Quaternary chronology of South and West Gower.
- 2 Record and interpret evidence from similar sites not visited on this excursion.
- 3 Present a reasoned account of the development of South and West Gower landscapes during the Quaternary.

Maps

OS 1:50,000 Sheet 159 Swansea and Gower

Suggested itinerary

Swansea Bay - Limeslade* - Rotherslade Bay* - Brandy Cove+
Deep Slade (Hunts Bay)* - Horton/East Slade - Broughton Bay -
Rhossili Bay - Worms Head (Inner).

*+ similar suites of features can be observed at each pair of sites.

To visit all the sites listed above would require two days of excursions. If time is limited to one day the following itinerary is suggested:

0900 Swansea Bay	1600 Broughton Bay
0930 Deep Slade	1730 University College
1330 Horton	

Important Note:-

Worms Head is accessible on foot for a maximum of two hours either side of low tide. It is essential to check tide times with Coastguard Enquiries, Tel Swansea (0792 367761) and if you do intend to cross, it is advisable to leave a message at the Coastguard House in Rhossili.

SECTION 1 BACKGROUND

Ideas concerning the timing, extent and number of glaciations affecting the British Isles have altered considerably since 1970 and are likely to change further over the next few years (*cf.* Scourse 1986; Bowen and Sykes 1988). The classic Alpine 4 glaciation model became redundant by the 1960s as detailed study of the ocean floors started to reveal that repeated cold periods with an approximate 40,000 and then later a 100,000 year periodicity had occurred throughout what is now viewed by many as the circa 2.4 million year duration of the Quaternary period. Results implied that many of these cold periods caused major glaciations on land, yet because of scant evidence and lack of suitable dating techniques, Quaternary scientists in most parts of Britain had, until recently, effectively been restricted to considering the last (Devensian) glacial period (Table 1) with only sketchy evidence of one or possibly two earlier glaciations. The application of new techniques is now beginning to reveal a far more complex story. Evidence on Gower is at the forefront of some of the radical reinterpretations of Quaternary events in the British Isles. In large measure this results from its marginal position with respect to glacial expansion (with consequently a better chance of preservation of earlier deposits) and its well preserved sequences of fossiliferous marine and terrestrial, glacial and periglacial sediments in cliff exposures and in a number of caves on the south and west coasts (Sutcliffe and Bowen 1973; Sutcliffe 1981, 1985; Stringer *et al* 1986).

The maximum extent of the last glaciation (Late Devensian, 17,000 years BP; alternatively referred to as the Dimlington Stadial (Rose 1985)), has been hotly disputed for some 60 years (Campbell 1980; Bowen 1981a) in South Wales (Fig 1a) and in Gower in particular (Fig 1b). Such a diversity of opinion has arisen from the lack of unequivocal dates and the apparent paucity of clear morphological evidence associated with a major ice sheet terminus (eg major moraine complex and outwash deposits).

The ice sheet margin has been reconstructed on the basis of whether mixed lithology diamicts (diamict is a non-genetic term for sediments with a range of particle sizes) are regarded as *in situ* Devensian glacial tills overlying cemented fossil beach fragments of mostly interglacial age, and therefore lie within the Devensian limit, or whether they are thought of as older glacial deposits that have slugged down the cliffs under periglacial conditions during the Devensian, and therefore lie outside this limit. Across Gower, Bowen's early limit (1970-81a) was largely determined by topographic controls (Fig 1). A later, more extensive limit (1981b) was published in the National Atlas of Wales. Bowen's latest limit (Bowen and Sykes 1988) is less extensive over Gower than the earlier ones and omits the Paviland-Oxwich Bay enclave which is apparently underlain by thick hummocky drift, now referred to as the Paviland Moraine and which is said to date from a pre-Devensian glaciation (Bowen *et al* 1985; Bowen, Rose, McCabe and Suttherland 1986; Bowen and Sykes 1988; Campbell and Bowen 1989). To date, however, no evidence for this glaciation has yet been published. Others have suggested slightly different ice limits (eg Campbell 1984; Bridges 1985) and it must be assumed that ideas on ice extent on Gower will continue to change in the future. What does seem established is that most of the south coast of Gower remained unglaciated during the Devensian period.

Glacial diamicts, whether *in situ* or reworked by periglacial and some temperate mass movement processes, are distinguished by their content of mainly subangular to subrounded rock fragments (clasts) which mostly reflect the bedrock geology of those parts of the South Wales Coalfield across which the ice moved. There are also diamicts along the south and west coasts of Gower dominated by angular and subangular clasts of the bedrock type, found upslope, set in a reddish or reddish-brown matrix of sand, silt and clay size particles (fines). These clasts normally have a preferred orientation of long axes in a downslope direction, which is interpreted as indicating a solifluction (ie periglacial) origin. In Britain, such deposits are commonly referred to as Head.

During major glacial events, world-wide sea level dropped 120 m, but during interglacial periods recovered to or rose slightly above its present level. Given the extremely high tidal

Geographical Excursions from Swansea

Volume 2 Human Landscapes

Edited by
GRAHAM HUMPHRYS

published by
The Department of Geography
University College of Swansea