R. S. Waters
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NORTH DEVON EXCURSION

Monday, 13th July 1964 *

Leader: Mr N. Stephens

Intinerary: Exeter — Barnstaple — Fremington (SS/529318) — Saunton (SS/440379) — Croyde Bay (SS/430398) — Exeter

Mr Stephens had introduced members of the symposium to some of the complexities of the Pleistocene sections in North Devon when he delivered his paper on the preceding Saturday.

Two distinct layers of head (congelifluxion deposits) were described from Barnstaple Bay. They occur in an apron or solifluxion terrace often of wide extent; they are up to fifty feet thick and represent material which moved down the coastal slope. The upper layer of Vistula (Würm) age, disturbed in places by frost wedges and convolutions, is less weathered than the lower or main head regarded as Saale (Riss) in age. The calcareous shelly boulder clay at Fremington is considered to be Saale (Riss) also, and equivalent to the Irish Sea till of southern Ireland. Erratic boulders, in places up to 50 tons in weight, occur sealed below the raised beach or below the main head, and no boulder clay has been found in association with them. The large boulders are regarded as ice-rafted blocks which were floated on to existing wave-cut platforms in the early Pleistocene. The presence of an ice sheet in Ireland, Wales and North Devon would seem to imply that ice pressed high against the cliffs between Hartland Point and Lynton. Accordingly Mr Stephens suggested that temporary drainage diversions resulted in the production of marginal, glacial drainage channels, including the Valley of the Rocks west of Lynton. Previous explanations of the dry valleys along the coast, by rapid marine erosion causing disruption of former drainage lines, can now be reconsidered in

* This report is based on the abstract of the paper by Mr Stephens: "Some Pleistocene deposits in North Devon", and on additional notes provided by Mr Stephens.

the light of the inferred presence of Irish Sea ice against this coast. The "lake clay" below the shelly boulder clay in the Fremington section could indicate the existence of a former lake, which may have overflowed via an inland route or alternatively over the ice.

FREMINGTON CLAY-PIT

It was generally agreed that a boulder clay was present, overlain by a layer of washed sand (representing a phase of erosion of the surface of the till), a layer of weathered till (3—4 feet thick at the point of observation) and a solifluxion "earth" (8—10 feet). Erratics recorded from the boulder clay include chalk, flint, various granites, dolerite, quartz porphyry, and carboniferous limestone. Shell fragments were seen to be abundant.

There was a lively discusion on the possible origin of the thick (up to 22 feet have been recorded in this pit) stoneless clay which lay immediately below the uppermost layer of boulder clay. It was seen to contain only occasional stones and a few large "rafted" erratic boulders. The clay was variously interpreted as lake clay, estuarine clay, and stoneless till.

By chance, during the visit the foreman at the claypit was able to show that another identical layer of calcareous, shelly till lay beneath the stoneless clay, which was thus sealed between two till bodies. This lower till had never previously been recorded in this or in any other pit in the neighbourhood. It therefore seems likely that the clay body as a whole must be considered as a till.

SAUNTON

Cliff sections were examined near the Bloody Basin, where fossil raised beach gravels were overlain by sandrock (lower part marine, upper part wind-blown = calcareous aeolianite) and by head deposits. The main or lower head was represented in the cliff sections as some 20 feet of shattered rock with much sandy matrix and considerably weathered. The upper or younger head was seen in roadside cuttings where it consisted wholly of angular, shattered rock which passed downwards into bedrock. This layer did not reach the cliff top or front edge of the main solifluxion (head) terrace.

CROYDE BAY (NORTH SIDE)

A solifluxion terrace of head was noted on the south side of the bay below Saunton Down. At Middleborough raised beach shingle and sandrock, overlain by head, were seen to rest upon a platform at 45 feet O.D.

Particular interest was aroused at a nearby section which showed multiple layers of head. Professor Dylik and Professor Cailleux demonstrated that the several layers could represent one cold period, of increasing cold and varying humidity. However, on a subsequent visit with Professor Fairbridge on 14 July it was found that there was a separate, lower head at the base of the cliff section, and that this was clearly and sharply separated from the rest of the multiple layers of head by a layer of red sand. This lowermost head rested upon sandrock and a rock platform. Thus the complete section appears to represent more than one glacial period.

Further sections at Freshwater Gut showed a large gneiss-granulite erratic resting upon a 25 feet rock platform (height at notch), with a 35—45 feet platform cut into by the lower platform. Professor Fairbridge claimed that a third platform was present because fossil notches partly filled with sandrock could be seen at 18 feet O.D. Main head covered all three platforms and the large erratic.

During further discussions on the puzzling sections with multiple layers of head it was suggested that the upper blocky layer (3—4 feet thick) with fossil wedge-like structures represented the total depth of the active layer during the maximum cold phase of the last glacial period. Thus where head of considerable thickness (say 8—16 feet minimum) could be shown to be disturbed by convolutions to a depth of up to 12 feet and to be overlain by an upper head it must represent an earlier glacial period.

PENCIL ROCK

Here the 45—50 feet platform was seen to be very clear, with a sharp notch, and a trace of the 25-feet rock platform could be seen below it. Members were shown a shelly, shingle beach containing many angular blocks of head, and there was discussion as to the implications of this and the thick sandrock which overlay it.

Mr Stephens interpreted the shingle as part of a regressive beach that was formed as sea level began to fall and cold conditions began to produce head on the coastal slope. This head was incorporated in the beach gravels. Subsequently the fall of sea level exposed a sandy strand from which shell sand was blown against the cliff to seal the old beach and pla-

tform. The sand (now sandrock) contains lenses and fragments of head throughout its entire thickness, and it is sealed off by head. This section can be matched elsewhere in Devon and Cornwall and in Southern Ireland; it is not purely a local phenomenon.

Professor Cailleux argued that the sea must have stood at approximately its present level when the shell sand was deposited:

"Le dépôt éolien, ou calcarénite, diffère beaucoup des dunes que nous voyons au fond de la baie, en particulier par sa disposition en une sorte de placage le long du versant abrupt et à son pied, alors qu'au contraire les dunes sont édifiées sur des parties plates. Il s'agit de deux dynamiques très différentes.

D'autre part, puisque la calcarénite est interstratifiée avec quelques lits de head, d'origine périglaciaire, elle s'est formée lors d'une phase froide. Mais étant faite surtout de débris de coquilles marines, elle nous indique qu'alors le niveau de la mer était élevé, voisin du niveau actuel. La calcarénite a donc dû se former, en majeure partie, tout au début d'une période glaciaire, ou tout à la fin, quand le niveau de la mer était haut."