8. *On a PROBABLE PALÆOLITHIC FLOOR at PRAH SANDS (CORNWALL).*

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ABOUT 7 miles east of Penzance a shallow bay lies between a rocky headland of slate and elvan on the one side, and the Godolphin granite on the other. Into this bay sand, principally shell-sand, has drifted, so as to show at low tide a mile or so of sandy foreshore, behind which occur low cliffs and sand-dunes. This tract is known as Prah Sands. In its leading characteristics it is a typical Cornish bay, dating from the period of the raised beach, but subsequently rendered less important, and partly obliterated, by changes of sea-level and the accumulation of drift.

The drift in the low cliff at Prah was described in 1879 by Mr. W. A. E. Ussher¹; but nothing exceptional seems to have been visible at that date, nor was anything unusual observed during two visits made by one of us in 1901. The ordinary succession of angular 'head,' on raised beach, resting upon a wave-worn rocky platform, was all that was noticed.

During the severe gales of 1902 and 1903 the sea washed away much of the talus and sand which masked the foot of the cliff between Sydney Cove and Hoe Point, and also removed so much of the beach as to lay bare numerous patches of the rocky floor below. The sections thus exposed are of such great interest as to justify a detailed description, for they yield what we believe to be the first evidence of Palæolithic man yet found in Cornwall.

The section lies between Sydney Cove (where the road comes down to the beach) and the well-known 'Prah Elvan,' less than 300 yards away, and close to the western horn of the bay. The general relation of the deposits will be readily understood from the accompanying section (fig. 1, p. 108).

An uneven, wave-worn, rocky platform rises to about 15 feet above high-water on the south-western side of the elvan. Beyond and behind it is a much-degraded ancient sea-cliff, with traces of caves, now well above the reach of the sea. This buried cliff trends inland, and then strikes eastward at a distance of about 200 yards from the present coast. On the rocky platform and banked against the cliff rest patches of shingly beach (mainly of elvan and killas), with big boulders and much sand, the whole deposit seldom reaching 10 feet in thickness; the beach-material has been entirely decalcified, and is now cemented by iron into a solid mass. About 60 feet of angular rubble or 'head,' loamy at the bottom and full of large blocks of elvan throughout, at this point rests upon the raised beach, forming the modern sea-cliff.

On the east side of the elvan-dyke the rocky platform gradually

¹ 'The Post-Tertiary Geology of Cornwall' 1879. 8vo, Hertford (privately printed) pp. 18, 19.

sinks to mean-tide level on the foreshore; and at 70 yards from the elvan it is lost under recent beach, or has sunk beneath the sea: it has also a slight seaward tilt. Bedded ferruginous sand, with well-worn pebbles and large rounded boulders, can be seen at various points to rest upon this rocky platform and to rise to about high-water mark; these deposits, however, do not directly concern us, and need not here be more fully described.

The strata to which we wish particularly to draw attention are those now visible at the foot of the cliff, where they rest upon the ancient marine deposits, and are clearly seen to pass under a great thickness of rubble-drift or 'head.' Perhaps the clearest way to show their relation is to give detailed measurements at a point where the cliff is nearly vertical and free from talus, and where the recent beach opposite has been swept away, so as to lay bare part of the foreshore. Such a section was measured at about 150 yards east of the elvan:—

	<i>Thickness in feet.</i>
Soil.....	3
'Head' or coarse angular rubble of local rocks (elvan, slate, and some greenstone)	20
Loamy 'head,' mainly consisting of vein-quartz	12
Black loam, with fragments of charcoal, burnt bone, and burnt earth	0½
Grey sandy loam, with small stones and traces of roots throughout.....	8
Clean grey sand (marine).....	1
Ferruginous gravelly beach.....	0½

At this point the rocky platform could not be reached, the lowest bed seen only lying a foot or two below high-water mark.

It will be noticed that in the section just described, the marine beds are succeeded by a few feet of sandy loam or brickearth. This loam is traceable for about 200 yards, and is seen wherever the foot of the cliff is free from talus. In part it may be only worked-up material formed from the marine strata below; but, in the main, it seems to be an ordinary soil washed from the slopes above, for it is full of small chips of vein-quartz, though larger stones are uncommon. Towards the ancient buried cliff which formerly bounded the old bay on the west, the loam becomes more stony and like the 'head' above; but unfortunately that part of the section was somewhat obscured by landslips, and we could not ascertain exactly where the change occurs.

Careful examination shows that the loam was at one time a true land-surface, for it is full of small vertical roots. Unfortunately, these are preserved only as ochreous casts, too much decayed for microscopic examination. Towards the top of the loam occurs a black seam, usually about 6 inches thick. At first this was thought to be peaty; but on washing a quantity of the material, we could find no trace of seeds or other fossils. We found, however, that the black colour was due to abundance of small fragments of charcoal, mixed with small splinters of carbonized bone, and fragments of burnt

Fig. 1.—Section of the cliff at the western end of Prah Sands. (See p. 106.)

earth. On further examination, we ascertained that this charcoal was particularly abundant at several spots where the loam, as a rule nearly clean, contained groups of three or four blocks or flattish slabs of stone, which were generally of elvan. At these spots the black loam was commonly full of pieces of quartz, usually small, possibly the remains of larger blocks shattered by fire.

As we had evidently found a true land-surface, on which man had made hearths and lighted fires, a careful search was made in this black layer. Unfortunately, the deposit seems to have been thoroughly decalcified and the fossils destroyed by percolating water, for only carbonized remains are preserved. We found, however, that some of the larger pieces of vein-quartz in this layer were apparently fashioned into rude implements¹; but these had been battered into shape, not flaked. This absence of flaking seems, however, to

¹ The specimens mentioned in this paper have been deposited at the British Museum, Bloomsbury, W.C.

be due to the intractable nature of the only material available. Vein-quartz breaks with a rough, splintery, fracture, for each lump is usually made up of portions of many crystals, and the material will not flake like Chalk-flint or like large crystals of quartz. No other local material is suitable for flaking into implements, for Chalk-flints are rare here and seldom occur in big pieces, while the granite, elvan, and slates are unworkable. The greenstone found in the neighbourhood is an extremely-tough rock, difficult to trim: but, though it is so suitable for hammer-stones, we found only one or two small pieces of it in the black seam. These, like the slate, were much decayed, and apparently had not been used.

Fig. 2.—*Rude implement (?) made of vein-quartz.* (See p. 110.)

[Photographed natural size.]

The quantity of charcoal observed, and the number of hearths found (six or seven) were surprising; but this bay must have been a particularly-favourable locality for occupation. It faces south, is sheltered by high land, and behind the terrace of raised beach the old sea-cliff in all probability furnished many dry caves suitable for dwellings. Within a few yards was also a stream of fresh water.

Above the black seam just described come several feet of loamy drift, in which the stones consist almost entirely of vein-quartz. Such a material is at the present day the ordinary soil of the

country, where time has allowed of the decay of all other rocks. Under present climatic conditions similar material is being washed down the slopes, to accumulate in the flat-bottomed valleys, such as this must have been. This quartzose base of the 'head' also yielded a few doubtful implements, one of which is shown in fig. 2 (p. 109).

The quartzose loam passes upward into the well-known 'head' or rubble-drift of Cornwall, which consists of an obscurely stratified mass of local rocks, in blocks of all sizes, included in a more or less loamy matrix. This deposit is so porous that any fossils have disappeared, if such existed, and we are still without direct evidence as to the climatic conditions under which it was formed; but the evidence seems decidedly in favour of the generally accepted view, that it belongs to the later stages of the Glacial Period. Its mode of occurrence strongly suggests soil-cap movement, or movement aided by snow-slopes or masses of half-melted snow. The blocks which it contains are fresher, larger, and have travelled farther down gentle slopes, than is possible under present-day conditions. It differs from the modern rainwash and soil, and from that below in which the supposed implements are found; but these land-surfaces so closely resemble one another, that it is not easy to distinguish them where landslips have brought the two into juxtaposition.

Though palæontological evidence is still deficient in Cornwall, yet the succession in these Pleistocene deposits corresponds so exactly with that found along the Sussex coast, that we cannot refrain from thinking that the strata are of the same date. The 'head' of the Cornish coast seems to be equivalent to the 'Coombe-Rock' of the Sussex coast. The raised beaches of the two districts correspond. In each case we seem to find between them Palæolithic and old alluvial deposits.

DISCUSSION.

Mr. E. T. NEWTON explained that, among the North American implements which he exhibited in illustration of Mr. & Mrs. Reid's paper, some beautifully formed arrow-heads were made from an easily-worked material; but one was made from vein-quartz, a very intractable substance, from which only very rough implements could be produced.

Sir JOHN EVANS congratulated the Authors on having discovered what was very possibly a Pleistocene land-surface in Cornwall, but he objected to the use of the term 'Palæolithic floor.' The word 'Palæolithic' had a definite significance, and he could not accept the implements exhibited from Prah Sands as Palæolithic. They were naturally-formed fragments of vein-quartz, which might indeed have been utilized by the people whose remains were found associated with the hearthstones. The question was only confused by terming them Palæolithic: there was no evidence to determine

absolutely the age of the land-surface. All that could be said was that it was the oldest, of human times, yet known in Cornwall.

Mr. STRAHAN considered that the paper was of wide interest. The raised beach which is recognizable at intervals for many miles along the coast of South Wales had been shown by Mr. Tiddeman to be overlain by the Glacial deposits of the neighbourhood. That it was of earlier date than those deposits admitted of no dispute, but Mr. Tiddeman had further expressed an opinion that a part of the raised-beach series was continued into the caves, and was there associated with the cave bone-beds. He (the speaker), while believing this to be highly probable, thought that it had not been actually demonstrated.

This Welsh beach corresponded, without much doubt, to that which occurred at Weston-super-Mare and at intervals along the coast of Devon and Cornwall. It seemed, therefore, to be highly probable that, although no Glacial deposits had been recognized in Cornwall, the band described by the Authors corresponded in position and age to beds which in South Wales were overlain by such deposits, and were probably associated with Pleistocene mammalia.

Doubt had been thrown upon the implements. But it seemed to him that the facts that stones of a special character had apparently been assembled for the definite purpose of making hearths, and that they were associated with charcoal, possessed the greatest significance. It would be necessary to prove, however, that the black fragments were really burnt wood, and not vegetable remains carbonized through lying in a porous matrix.

Mr. A. M. BELL congratulated the Authors on their having found an inhabited surface of Quaternary time; such were found more commonly on the Continent than in Britain, as, for example, in Moravia, on the central water-parting of Europe. The speaker had once, at a depth of 32 feet in unaltered river-gravel, found carbonized remains in Oxfordshire, but was unable to find implements along with them. Of the quartz-implements shown, he considered that some of them were probably used as tools, and resembled rude implements of Quaternary time.

Mr. W. SHONE said that there could be little doubt that the raised beaches of the South of England were post-Glacial, as compared with the Glacial Drift north of the Thames. The late Sir Joseph Prestwich had already pointed this out¹:—

‘There is the absence also in the Raised Beaches of such northern shells as *Astarte borealis*, *Leda pernula*, *Fusus islandicus*, *Natica grænlandica*, and others common in the Glacial drifts. The Raised-Beach mollusca agree therefore pretty closely with the molluscan fauna now living in the British seas, and this accords with the stratigraphical evidence, which leads us to place the Beaches with the latest of the River-valley Deposits.’

The speaker's own observations confirmed Prestwich's conclusions.

Mr. G. CLINCH enquired whether the Authors could furnish such particulars as to the number and position of the hearths as might throw some light upon the approximate length of time during which

¹ Quart. Journ. Geol. Soc. vol. xlviii (1892) pp. 301-302.

this spot was inhabited. He thought that it would be interesting to know something more as to the character of the hearths and the exact position of the so-called 'implements' in relation to them.

Mr. P. F. KENDALL observed that the relation of the raised beaches to the 'head' was clearly shown; the question turned on the mode of origin of the latter. He referred to the 'head' at Porthleven, which (as Searles-Wood, Jr., had suggested) was probably the result of soil-creep. The pulpy condition ensuing on the break-up of a severe frost might well produce such a 'creep.' It was very suggestive that the materials of which the hearths consisted were derived from elvans.

Mr. O. A. SHRUBSOLE asked for further evidence as to the age of the carbonaceous layer. The fragments of vein-quartz were not in themselves sufficiently definite.

Mr. REID, in reply to Mr. Strahan, explained that charcoal is almost indestructible, and the crumbs found in the loam have the rectangular fracture characteristic of charcoal. Unburnt vegetable remains might be found carbonized, but would occur as splinters, twigs, leaves, or seeds, none of which were seen. The only traces of plants, besides the charcoal, were small vertical roots, represented by fibrous ferruginous cylinders, too much decayed for microscopic examination. The charcoal appeared to be crushed and trampled into the soil, and the Authors had not yet been able to extract a piece sufficiently large for the determination of the wood, although the cell-structure was well preserved.

The Authors would not like to speak confidently as to any one of the stones exhibited being an implement; but the evidence was cumulative. The common occurrence of vein-quartz in a layer containing hearths of the fire-resisting elvan, the discovery of abundant crumbs of charcoal, the stratigraphical position of this layer, which seemed to coincide with the Palæolithic layer of the Hampshire coast, all pointed to the presence of man. If these rude tools were not implements, then we were confronted by the strange occurrence of numerous signs of human occupation, but no associated implements.