

DENEHOLES, AND ARTIFICIAL CAVES WITH VERTICAL ENTRANCES.

By F. C. J. SPURRELL.

The Deneholes of Kent and Essex have received my attention for a long time, but I delayed publishing an account of them until it appeared that I could add something to our knowledge of their origin and use.

Living as I did in a country where deep holes abounded, whose bottoms no one knew of, and whose intercommunication by endless passages over miles of country was the universal belief—lone, useless, and deserted in the depths of woods—it would have been strange indeed if I had not examined them with some care.

These holes too have always been, and are frequently now, a source of danger to wanderers in the woods, to huntsmen, and to horses ploughing in the fields, and not a few are credited with the harbouring of robbers and smugglers in old times. As an instance of the origin of such legends, I once came across a man who told me that he had fallen down a pit, in which he passed two days. On recovering from the fall he wandered down deep passages for immense distances, until, regaining the entrance, he sat under it and howled until some one heard him (for a path led near the hole) and he was extricated. I induced this man to show me the exact spot, which he did with some reluctance. When the opportunity came and the hole was descended, no passages presented themselves ; but the size of the cavern, its great circuit, its buttresses and pillars, and high irregular mounds of earth fallen from the vault, fully explained the account of the poor fellow, who, bruised, starved, and in darkness, had crawled round and round the cave "in wandering mazes lost."

Nothing would induce him to descend it with me

again, and he could not be persuaded that no passages existed. This cave is figured and sketched in Plate II, fig. 2.

Sometimes alone, sometimes with parties of friends, (for a pic-nic in a hole at Stankey has been a favourite and frequent amusement with us), I have been down all the deneholes in the neighbourhood to which a rope ladder could conveniently be carried.

Though less satisfactory to some persons, the discovery that in no case did an open passage exist added to the interest with me, for it indicated plainly that some special object was involved in the close proximity, yet careful separation, of the caves from each other.

The thickness and antiquity of the woods made their apparent connexion with each other at the surface very difficult, for the ground could only be examined in the winter, yet at the same time it promised success. An extensive and careful survey of parts of the counties of Essex and Kent, particularly that between the rivers Darent and Cray, justified this. On Plate I a portion of this area is shown, and by its aid can be seen, in the first place, the relation of the deneholes to each other to the number of 120, and, secondly, their connexion with ditches and banks, some of which appear to be contemporary with the holes, and indicate roads or tracks between settlements and hunting paths, and the hedges and enclosures of a pre-historic "village."

I shall now enumerate some literary notices of these deneholes, chiefly as illustrating their antiquity, and also the difficulty that there has been in explaining their existence. Authors indulge in endless conjectures, for which their works must be examined. I will add my own observations in due order.

It would be impossible to record all the spots or clusters where the pits occur in Kent with which I am acquainted, and I have therefore contented myself with indicating their general whereabouts, and may sum up by saying that they are found over most of the country between the spots mentioned in greater or less numbers.

Their ordinary sites are the sides of valleys leading from a river, which, from its moisture, would grow brush-wood and prove to a certain extent a cover to the road

leading to the holes. They may thus be followed along the "dry valleys" of Kent to the crest of the North Downs. The table land at the head of a valley generally has several holes. When several valleys lead up to one table they are frequent on it; such tables are those between Bexley and Dartford, Blackheath, Hangman's Wood, &c.

In the larger number of instances in which these holes can be now seen they present the appearance of wide basin-shaped depressions, mostly shallow, sometimes deep, and not unfrequently in the state of ponds, at least in winter; others, of which the vault has not fallen in, show but a small depression; and lastly, shafts and the cave itself remain; these are comparatively rare. The holes have disappeared, partly from natural causes, the action of weather, or bad workmanship, or they have been filled in purposely.

The caves are of very various dimensions, from 15 to 50 feet in general diameter, and from 15 to 30 feet in height. Some are round, some square, some pillared, some not; the shafts vary from 2 feet to 3 feet 6 inches in width; these are the least injured; but while all have suffered from enlargement, some have become gaping chasms. Their depth is regulated in most instances by the depth of the chalk from the surface.

The rudest and earliest caves descend into the chalk at once, spots being chosen, with but a few inches of *humus* to penetrate, or none at all; these have comparatively short shafts, and, though some have foot holes, they appear to have been descended by a short rope or a tree trunk; such are the holes on the edges of the chalk hills bordering the Thames, as at Rochester, Northfleet, Purfleet, &c.; occasionally some of them show marks of enlargement or trimming with metallic picks of a late date.

The next kind, and later in age, are those in situations where usually the superincumbent soils are dry and tenacious, having little inclination to fall in (Thanet sand); these were usually descended by foot-holes on either side of the shaft, in some wholly to the bottom, in others the latter part of the descent must have been aided by a rope or tree. The foot-holes of a cave in

Stankey (Plate II, fig. 2), as in others, are opposite to each other, about 18 inches apart, and mostly 6 inches deep, some reaching 20 inches. I supposed that these latter were for sticks or poles to be inserted as rests, but on trying one I found such poles very difficult to pass, unless indeed the whole of the passage down was made into a kind of ladder. It is noticeable that any one below, inserting a pole across the shaft, could easily prevent any one descending.

The Thanet sand bears the wear and tear of use well, but in the lapse of years, perhaps to be counted by thousands, many of these pits, which were once descended by holes, have got too wide for the stride of any man.

Thirdly, those pits which were dug in crumbly rocks, such as the Woolwich pebble beds and London clay, would fall in quickly unless steined, to preserve them for use even temporarily. They were of course inaccessible by foot-holes, therefore they could only be got at by ropes, long and strong, aided perhaps by a winch. These pits are the latest variety.

This rough classification is supported when the soils passed through and the difficulty of preserving access to the cave is considered, for the more friable and unstable the soils passed through the greater the improvement in appliances and labour.

Minor distinctions in situations favourable to comparison can of course be made.

The behaviour of these caves is somewhat peculiar, and, unless a careful watch is kept on them, results somewhat at variance with our comfort and safety are apt to occur. The habit of digging them is now gone out of fashion; and familiarity with the space excavated below being lessened, too little care is bestowed in filling them up. When a large cave gets filled with anything, whether stone or rubbish, up to the crown of the arch, the shaft being filled with earth, long remains firm, partly from the pressure on the sides and partly from the effort to consolidate the soil by ramming. In time, however, when the rain trickling down between the side and the new material in the shaft, carries with it, first, the supporting cone at the bottom, then, spreading that about, receives more and more from the shaft above,

it will leave only a portion of the hard rammed soil at the top, somewhat resembling a cork, fixed ; until excessively dry weather contracts it from the sides (as in spring) ; or after a heavy rain, when it becomes too heavy for its loosened condition (as in autumn) ; or until the receipt of a jar, as when one jumps on to the spot, as I once did ; or the passage of horses in ploughing, &c.

Deneholes¹ are common in Thanet. The Nash court cave was one.² The interior has been adapted to modern uses, and, besides the old well entrance, a sloping one has been made, and four galleries exist, though now disused.

A shaft was described by Mr. Dowker,³ which, notwithstanding the peculiarity that it penetrated the chalk for 30 feet, probably ended in a cave, from the fact that the workmen, while exploring it, started the soil, which sank down 12 feet.

The caves at Manston were originally deneholes, and caves have been found at Hoo Farm, Callis Court, Dent de Lion, St. Nicholas and Margate. The smugglers undoubtedly improved and extended these caves ; yet they are largely credited to the "monks," the "Danes," and even to that ancient Briton, "Vortigern."

Col. Lane-Fox⁴ described a pit at Broadstairs whose dimensions were 30 by 40 feet, with sides sloping at an angle of 40° to the lowest bottom, 11 feet below the surface ; it penetrated brick earth to the chalk. Col. Lane-Fox says it is somewhat similar to pits at Crayford, Dartford and Tilbury. This, of course, is a mistake,

¹ The names by which they are best known are Dene-holes, or Dane-holes, the last being the ancient manner of pronouncing the A.S. word *Denu*. This word implies a retired dwelling, or den. It is always joined with "hole," and appears very suggestive of the light in which the early English regarded the caves.

Caves. This word is also used for them in France. The Cavey spring, or wood-fall of holes, at Bexley, is an ancient mode of pronouncing the word.

Sound-hole. The verb to sound, to probe, to try the depth, is at once suggested, and it is possible that the adjective *sound* had formerly a signification of depth.

Tolts. This word, Mr. Meeson said,

was applied to caves at Darenth in Kent. It is not known to me, however. It can in no case be explained by "t'holt," as he suggests. It appears to be a mistake, and I think is merely the rapid pronunciation of "the holes."

Stankye is a name given to the little wood full of caves at Bexley ; it is also pronounced *Stanka* ; it seems to have the signification of *digged holes*. Scott, in a note on Cadyow Castle, quotes an old diary, in which he translates "*Stanka*" as "ditch ;" perhaps the A.S. *Stingan* may be the root thereof in this country.

² Hasted and "Archæ. Cantiana," xii, 419.

³ "Archæ. Cantiana," xi, 127.

⁴ "Journal of Ethnological Society," N.S., i, 8 ; also ib., ii, 439.

which the measurements show ; it was perhaps a marl pit.

Camden¹ says, "*Juxta Faversham et alibi per hunc agrum, hinc unde putei magnæ profunditas reperiuntur, qui ore augusto sed inferius capaci spatio distinctas habent, quasi cameras cum suis e creta columnis.*" This is identified by Lewis² as Hegdale pit in Preston, and by Hasted³ as situated in the south-eastern extremity of Faversham parish. After searching for this cave in vain, I applied to Mr. F. F. Girard, who tells me that what he takes to be the site of Hegdale pit is now ploughed over. Hasted⁴ mentions several others in Fridwood near Murston.

The country around Sittingbourne affords many examples, and the high chalk hills to the south are plentifully sprinkled : Wormshill, Bredgar, Stockbury, Rodmersham, &c., all have them. They are very numerous at Binbury, Deptling, Hollingbourne, &c., and the chalk hills around. Since this paper was read a remarkable series of caves have been found between Greenstreet and Teynham railway station. These were small caves of the usual pattern there common, *i.e.*, a double trefoil or quatrefoil in plan, which have been run into and absorbed in one instance by a later reworking, involving three, perhaps four, smaller caves. This larger excavation is quite different in the method of working, and is somewhat straggling in shape. Here sand is penetrated for about 20 feet, but, as usual, the chalk is bare at a short distance. The tool-marks on the later work are short and unsteady, and show a light tool to have been employed to prize, rather than pick the chalk. This reworking of an old site resembles that at Crayford, but is much earlier.⁵

There are traditions of deep caves in Rochester, but on the chalk hills near Rochester are many holes ; they usually enter the chalk immediately, there being no *humus* whatever ; they vary from 15 to 30 feet in depth, the shaft passing sometimes through the chalk for 20 feet

¹ "Britannia," p. 236.

² Lewis, "History of the Abbey Church of Faversham."

³ "Kent," ii, 717.

⁴ "Kent," ii, 611.

⁵ I am indebted to Mr. G. Payne of

Sittingbourne for much assistance in this part of Kent, and to Mr. G. Warren for a bold examination of the Teynham cave at a time when it was nearly 5 feet deep in water (surface drainage).

before the small caverns or bays spread out below. The shafts have been much enlarged by the action of frost, which detaches large blocks of chalk. There are several at Sharsted and at Hempsted, Gillingham, Chatham Lines, &c.

Shafted caves are found on the hills on either side of the Medway valley. Mr. T. Wright¹ says, "Just within the limits of Aylesford Common I found a large flat stone," round which he dug, and found what he thought was a large circular pit filled with flint stones. He enquired, and learnt from the cottagers, "squatters," not natives, that pits of stones with one or two large stones on the top were frequent, and that they were sought after and emptied for road metal; one that was emptied for 10 feet was shown him.

It is much to be regretted that Mr. T. Wright, whose description is very loose, should have neglected to make an examination of his supposed sepulchral caves rather than that he should have amused himself with conjectures and suppositions. There are peculiar geological conditions at the spot mentioned which make me think that the round (?) pit covered with the flat stone was a purely natural deposit, pockets of clean flints being common and large flat stones too. Here and there, however, depressions indicate the possible presence of deneholes, but a lengthened and careful examination of the district on the plateau of Aylesford Common has convinced me that flat stones covering round pits rests on very doubtful evidence.

Around Cobham a few are to be seen, but they are not conspicuous. Mr. Wright² described one on the hills to the south overlooking the Medway.

In the cutting of the North Kent Railway one can still be seen in section, about a couple of hundred yards westward of Gravesend station.

In cutting a tramway at the bottom of the Ebbsfleet valley a cave was opened in May, 1881. Its shaft passed through old river deposit for 21 ft. 6 in. to the crown of the arch in the chalk, thence at 12 ft. 9 in. a permanent water level was reached, below which the workmen could not excavate. However, it was ascertained by the use of

¹ "Wanderings of an Antiquary," p. 176.

² *Do.*, *ib.*

a pitcher that the made soil extended "a good yard" (*i.e.* 3 ft. 4 in.) before anything hard was reached, and this appeared to be only a movable block of chalk and not the true bottom. As the older caves hereabouts are generally 18 to 20 feet in height (never less, that I know of), it is unlikely that the bottom was quite discovered. These measurements are, however, very interesting, especially considering that a permanent water level was reached, below which work could not be carried on without removing the water. This was during the uninterrupted and remarkable drought of the spring of 1881.

Let it not be forgotten too that the tide reached to within 200 yards of the spot on its passage up the Ebbsfleet, before the embankment of the river Thames at Northfleet (a recent event) dammed the water out of the Fleet channel; so that the height to which the water rises in the cave now, low as it is, points to a great change in the condition of the land since the time when the cave was dug; besides which the measurements above given, *viz.*, 37 ft. 6 in., being subtracted from the level above the ordnance datum of the top of the shaft, *viz.*, 40 ft. 4 in.,¹ takes the lowest ascertained part of the cave far below high water mark of the present day. Greatly to my regret the cave was filled and a tramway laid over it before I could take steps to examine it more carefully as it deserved.

The greatest width was 14 ft. 3 in. It did not appear that a very good layer of flint was reached, yet a remarkable feature was the burrowing all round the sides, of thin holes or horizontal ledges as if in search of flint; some were very deep, in one place reaching nearly six feet.

The opening of this cave was within fifty yards of where the chalk is bare. No tool marks were visible on its sides, which, though rough, presented a rather curious appearance of wear.

The material at the bottom of the cave consisted of rubble, mould, &c., silted in by rain, and high up of pottery, Roman and Roman-British, and bones, such as

¹ In order to secure accuracy in this measurement I sought the help of Mr. W. M. F. Petrie, to whom for this and other assistance I am much indebted.

commonly occur in the upper parts of these caves in the neighbourhood.

Besides this cave in the bottom of the valley are several more on either side of the stream just perceptible, and others which are now invisible will, I expect, be discovered. Higher up the sides of the valley are other and deeper caves, including the Clapper-napper close to the old road, whose great defensive work on Swanscombe Hill and its eastern side did not prevent the Romans using it at least for a time and thickly occupying this fertile valley.

The well-known Clapper-napper's hole is partly fallen in. It is on the east side of Swanscombe Wood. The cave is now outside the wood.¹ It was once supposed to communicate with another four miles distant. The name *Clapper-napper* given to this hole is hard to explain. *Napper*, or *nabber*, is a robber; it occurs in our "kid-napper," and a robber is mentioned as occupying it by Mr. Fussell,² though the tradition seems very old. *Clapper* is found again in Clapper-field near Stifford in Essex, a field containing the remains of such caves as we are discussing. I sent the name to Prof. W. W. Skeat, who, very courteously replying to my repeated suggestions, said, "I think of an etymology for clapperfield plausible enough to be worth transmission. A clapper or coney-clapper is the sixteenth century word for a rabbit burrow," and he enjoins caution. I find it in Chaucer's "Romaunt of the Rose"—

"Connis
 . . . comin out of their clapers."

There are many more caves in Swanscombe parish and some in Darenth Wood, in distinct connexion with ditches and banks. On the edge of the wood, a third of a mile due west of the hamlet of Bean, are several shafts.

These may be found in, or rather by a ditch running over the hill westward for nearly half a mile to the other edge of the wood, until other caves, fallen and open, are met with; from this point, at nearly a right angle, another ditch may be traced to the south, having on one side of it a cave; further on a branch from this ditch at right angles northward leads to a cluster of hut-circles;

¹ "Gent. Mag.," May, 1803.

² L. Fussell, "Journey, &c.," p. 32.

the ditch ultimately winds about and joins the main one again at Bean. Signs of other caves are found in its course and about the district.

To the northward of this wood near the high road at Greenhithe a cave was opened in 1879; it has been imperfectly described.¹ The cave was from the surface 35 feet in depth and had a roughly angular figure (Plate II, fig. 9); near one corner, however, a pot-hole or perpendicular pipe of gravel was found to interfere with the excavation in that direction. This pipe was not touched from the inside, but was allowed to project into the cave; so neatly was this done, that in parts not two inches of chalk was left for a casing to the gravel pipe. Had this casing been penetrated the loose gravel would soon have filled the cave, and the drainage in wet weather would have entered and flooded it. Besides this, great care was taken to smooth the floor and sides, and the pick marks were very close and the trimming good, the whole having an air of permanent use and lengthened occupation such as the caves rarely present. I can only consider it an adjunct to the dwellings immediately above, of which there is still abundant evidence in burnt wood, bones, flint flakes, pottery, &c. The burnt human remains thickly bedded in wood ash point to the destruction of the dwelling above by fire, and the casting of the remains down the hole.

A cave may be seen in section at the spot where the railway leaves the cutting to enter the Darent valley, and further west, by the footbridge on the other side of the valley, a very good example, well excavated and cleverly worked, was exposed for a while; it contained no Roman relics, and went down to a layer of flint, which was taken up; its plan was circular and 15 feet in diameter.

The Rev. E. Barrel² described a cave which fell in to the depth of 10 feet, from the shock of an earthquake, at Sutton in Hone. This being near the river was very soon partly filled with water.

A series of these caves of the older type seem to have followed the outcrop of the chalk between the brick

¹ *Archæ. Journal*, xxxvii, 193.

² "Phil. Trans.," xxxv, 365.

earths on the one hand and the superior strata on the other, which marks the ancient and sometimes buried cliff of the (palæolithic) Thames. Several of them are to be seen at Crayford in the wall of the chalk pit adjoining the great brick pits there. I have described three of them in this Journal¹: two are figured which were in proximity (Plate II, figs. 7-8); one of them was 36 ft. 6 in. in total depth, and its greatest diameter 18 feet. The floor reached to the layer of flint which all the other caves reached, and part of the flint had been taken up and piled in a heap at one side of the cave. From the floor rose an obtuse cone of sandy clay, very hard, six feet high, washed in very slowly and evenly by the rain. In the cone was found several flakes, worked scrapers, and a "core," but no pottery; above this lay coarser soil, several sorts of pottery, some made with shells, some with chalk, and ornamented by the finger nail; higher still Roman pottery, a fine Samian plate, and bones and rubbish to the surface. The time which has elapsed since the deposit of Roman remains we can calculate. It is well within bounds to date the commencement of the deposit of mud at half that period earlier, and that would not reach the time of its excavation. The sister cave (8), from bad management in the digging, fell in early.

Their proximity did not escape my notice at the time, nor the existence of a small opening of communication between them, about $3\frac{1}{2}$ inches in diameter, which greatly puzzled us when excavating the caves.² Though these caves were dug without the aid of instruments of metal, for they showed no pick marks, they were well and symmetrically worked, and more time than was necessary was employed in their shaping and in the making of the little hole (3 ft. 3 in. in length). On the sides too, of broad slabs of chalk, which were deeply stained with yellow oxide of iron, white scorings, in a kind of rough circular and crossed pattern, were scrawled with flint chips, like those at Cissbury mentioned by Gen. Pitt-Rivers³ and Mr. Park Harrison. I therefore think that

¹ *Archæ. Journal*, xxxvii, 333. The title of "mines" which I gave to these pits is a mistake, as they do not appear to have been dug solely for that purpose, but quite otherwise.

² Perhaps this was intended to be enlarged.

³ "Journal of Anthropol. Institute," v, 374, and *ib.* for May, 1873.

these caves may be compared with the Cissbury caves as to some points; but their separation from each other and the absence of galleries point to different objects and uses.

One of these caves, a few yards from the others, had passages. Some have fallen in and others have been excavated away. The cave itself cannot yet be entered, but the passages varied from 3 ft. 6 in. to 2 ft. in height and somewhat less in width; they spread in several directions for thirty or forty feet, following the layer of flint. Another further west was worked on a different principle: the centre pit was open to the sky about 10 feet wide and 15 feet deep; the smaller caves around had their vaults on a level with its floor, extending horizontally 12 or 15 feet, and with a depth of 10 feet reached the layer of flint here 25 feet below the surface. In one cave a fire had been lighted; flaking appeared to have been conducted on the upper floor, the bits falling into the lower chambers; pottery, flakes, &c., filled the pit, which is not yet fully explored.

All these caves formed part of a series, the sites of some of which can be detected in the orchards near, and one has been worked for chalk up to within the last fifty years, presenting a very interesting labyrinth of modern galleries, which have united several old shafts once separate; though there was once evidence of small-sized galleries radiating from the old shafts, made without metallic tools, and following the line of flint, which might have been of neolithic age.

The great chalk pit itself was originally a denehole in my recollection. The modern works are for brickmaking purposes. The series may be traced up the little valley running to Caught-leg bottom, and there are many in the woods around.

On the side of the Cray river near Crayford are many holes (fallen in) in the wilderness belonging to the Elms,¹ and others may be seen in Gibbet-Spring, both by the side of the pre-historic roadway, which ultimately became Roman, got the Saxon name of Watling street, and is now the Old Dover road. All these pits are at a low level amongst the brushwood growing in the valley.

¹ I am informed that in the roadway near by a Roman leaden coffin was found,

in what appears to have been one of them, opened when digging a sewer.

I now come to that locality which has always received the greatest attention from writers, and still does so. Lambarde was our first topographer, and made the first mention of the holes in 1570.¹ "There are to be seene as well in the open heath near this town (Crayford) as also in the closed grounds about it, sundry artificiall caves or holes in the earth whereof some have ten, some fifteen and some twenty fathoms in depth; at the mouth and thence downward narrow and like the tunnel of a chimney or passage of a well, but in the bottom large and of great receipt insomuch that some of them have sundry roomes or partitions one within another, strongly vaulted and supported with pillars of chalk," &c.

This is a precise description of those now visible, especially in Stankey wood, and it is likely that they were the ones meant.

Camden² (who lived at Camden House, Chislehurst, and who knew the district) describes them, as also do Thomas Pennant³ and Hasted.⁴ Dean Buckland,⁵ however, treats them with some disdain. John Dunkin⁶ and his son,⁷ and "Murray's Guide to Kent," discuss the subject with care. The Rev. S. Denne and many other authors, chiefly compilers of guides, refer to them. They are carefully referred to by King⁸ in his "Munimenta," and by the late Mr. E. T. Stevens.⁹

On Crayford and Dartford Heath no caves remain now, as mentioned by Lambarde; the places where they are most abundant is called Jorden's Wood and the copses around it.

The holes hereabout may in a certain sense be taken as the best examples remaining. The wood, which is the centre of it, has been undisturbed ground for an immemorial period, a very large portion of it consisted until lately of barren land, and Dartford Heath, Jordens, Ruxley Heath, with Row Hill, &c., was a spur of wild country extending from the chalk downs. It is on the watershed

¹ M. Lambarde, "Perambulation," p. 401, ed. 1826.

² "Britannia." See also Gibson's "Camden," i, 263; and Gough's "Additions."

³ "Journey from London to Dover," vol. i, pp. 45, 55.

⁴ "History of Kent," i, 211.

⁵ "Geol. Trans.," iv, 290.

⁶ "John Dunkin, "History of Dartford."

⁷ A. J. Dunkin, "History of Kent."

⁸ King, "Munimenta Antiqua," vol. i, p. 44, &c.

⁹ "Flint Chips," p. 58.

See also De Caumont, "Cours d'Antiquite Monumental," i, 167.

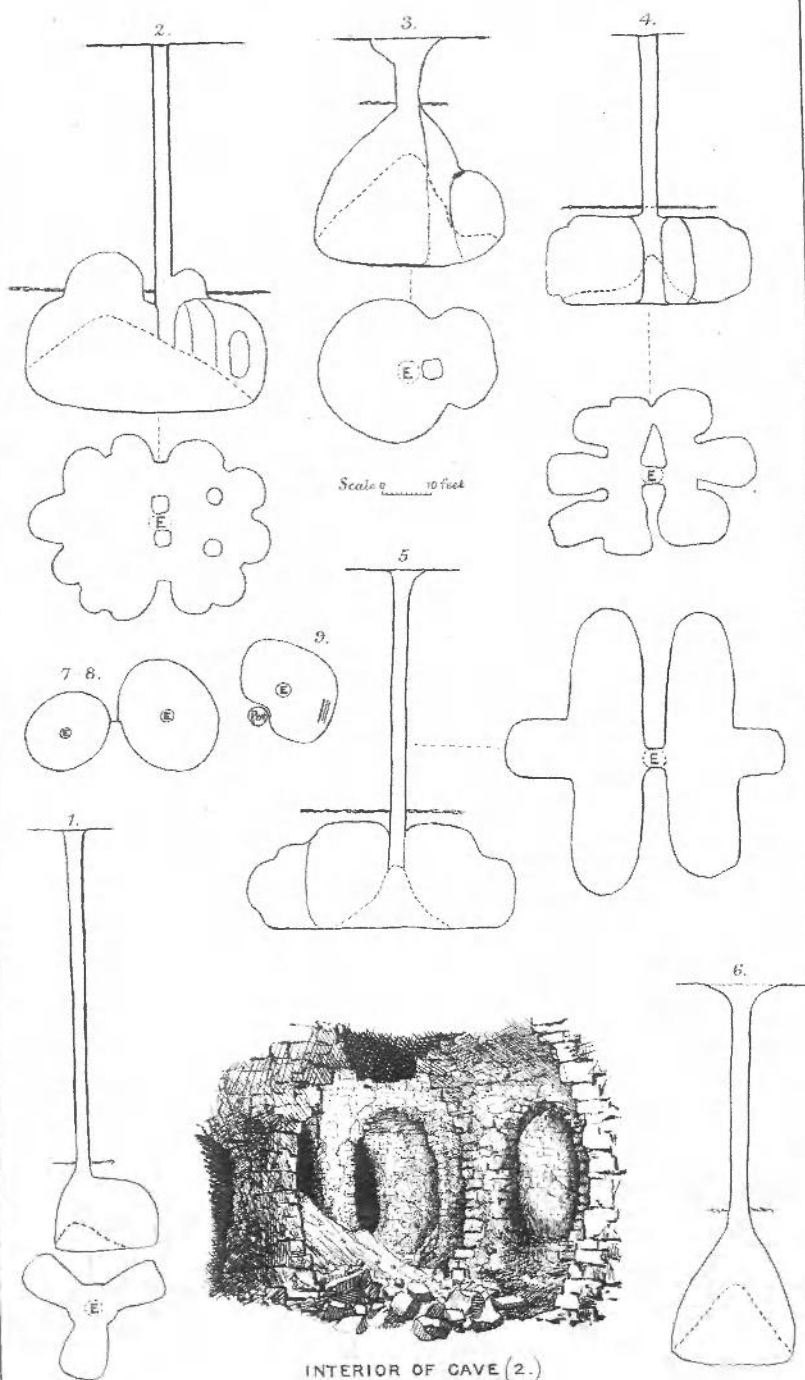
between the Darenth and the Cray, and small valleys from either stream run up toward each other in the centre of the wood. Plate I. represents a survey of the district, on which arable land is encroaching and obliterating the remains. The caves are represented by round black spots and the ditches by black lines; both are somewhat enlarged, but the centres of the dots and of the lines are the true places required.

In consequence of the return to cultivation going on, many ditches have disappeared, by which some caves were connected with the system, especially at Cavey Spring, yet even round that cluster the remains of ditches can be found, which appear to be prolongations of the rest. Most of the caves here are fallen in. Two at least lie in the centre of the footpath.¹

The caves are represented by large black spots, most having fallen in; the larger are those which have utterly collapsed, the smaller are shafts. In the area shewn in the map are between 30 and 40, of which I have descended to the bottom or as far as possible. In my remembrance some have been filled up, and others have been discovered by their sudden subsidence.

At Stankey is a cluster of which 21 shafts and several good caves are open, some of which I have shewn on Plate II. Many caves are circular in plan, one (fig. 3) has one pillar, the pit marked (4) has one pillar, and only wants the thin wall on the other side of the shaft pierced to make a second. This excavation, like many others, is planned on the rule of working the cave in adits at right angles to each other, as in fig. 5, and allowing the central pair of buttresses to remain for access to the bottom, (by footholes) until the adits had proceeded far enough to pierce, thus leaving pillars, which were trimmed round; this plan has reached a further step in pit marked (fig. 2), which has four pillars. The neglect, however, to leave the two pillars eastward of the shaft has caused the falling in of this vault, a neglect which appears to me and to many who are well accustomed to visit this cave, to have resulted from a desire to obtain a large space, less obstructed than the other. The whole cave is embayed, yet rounded and symmetrical,

¹ A notice of these has lately appeared, my suggestion. "The Engineer," Mar. 18, 1881.
Mr. T. V. Holmes having visited them at



INTERIOR OF CAVE (2.)



JORDENS WOOD, KENT.

all combining to give the idea of an excavation seeking space rather than the material excavated. The nearest cave to it on the west is within 10 feet, yet no effort in this case was made to unite them, though I have when in one cave heard persons knocking in the other.

The access to this cave was until lately practicable from the surface to the bottom, and by this means I and others have gone down it unassisted.¹ These holes are continued down the central pillars; they wind for an eighth of a circle round the shaft.

The plan, which is drawn to scale, is intended to be a sufficient explanation, yet I may mention the greatest diameters to be 49×38 ft., and the height about 25 ft. This cave, of which I have attempted a sketch, is very interesting, particularly when illuminated by a few dozen candles.

A cave in Jordens marked (1) is on a different plan, the adits being in three radiations; each of these in another case extends as far as 50 yards, and is of great dimension. At two parts of the wood (see Plate I), at E in the square camp A, and at B, there appear to have been cottages, perhaps mediæval. They were placed by the public footpath winding through the woods. At both places a well was dug, which penetrated the chalk over a hundred feet in each case, and to which no bottom can be discovered; they are partly steined.

The square camp A, which is not a true square, is very interesting, as it enables me to give a relative date to the slight earthworks connected with the caves. It is from wall to wall roughly 400 ft.; the sides are not parallel, all bulge slightly outwards near the middle. The west one is somewhat irregular at its northern part. This camp is Roman in plan; I have found coarse Roman-British pottery of various kinds within its enclosure; some old banks and ditches have been re-arranged to form it. I was kindly assisted in making a careful plan of this camp by Mr. W. M. F. Petrie.

It will readily be perceived that some of the works in the camp are unconformable to the square outline. This arises from the fact of the camp being placed upon and

¹ A photograph shewing a person descending, and another of the interior, have been taken by magnesium light.

over earlier works, apparently those of the boundaries or defensive works and the paths of a "village."¹ From the 120ft. well near B a ditch or path may be traced through (past) a strongly marked earthwork westward into the square camp, thence part branches northwards to C and part continuing westwards turns northwards, constituting part of the western ditch of the square camp, but modifying the symmetry of the square by its presence. That part of the west wall and the whole northern wall of the camp were banks belonging to the old village which, running down to the stream (now dry) at D, protected the way to the water, and crossing the hill descended to the water again, where the complicated paths diverge and are confused.

The well-marked earthwork to which I alluded is locally called the Roman road ; it is, however, older than that, the square camp being determined in its site by the road. I have traced this way from within a short distance of Fooks Cray as a mere depression in the open fields, or deeper as a boundary ditch, until, on entering Jordens, its double and triple character slowly appears. Near G it becomes suddenly a hollow way with steep banks more than 10ft. in depth and of defined outline. High up on its banks on each side ditches which have been removed to form the great hollow may be perceived these become more marked until at H the section represented at H I is reached. While passing the camp a branch is sent to the east, and its main line is diverted slightly by the shaft F previously existing. It can thence be traced over Dartford Heath by Leyton Cross towards Dartford.

Of this ditchway Hasted² (Ed. 1796) says, "In Jordens Wood, on the western side of this parish (Wilmington) is a hollow way formerly a high road which has not been made use of for more than a hundred years as such," and I suggest that a thousand more might be added.

The deneholes to the south of the camp appear to be the oldest, the ditches of communication between them appearing to be of a date anterior to the village works on which the square camp stands.

For it will be seen that the ditchway which comes

¹ Compare Cæsar De Bell. Gall., Lib. iii, ch. i.

² "History of Kent," i, 234.

from K at the extreme south of the map, passes by M, with the pit (*m*) which I excavated for 15ft., and joins the "village" works in a somewhat uneven manner at X, is suggestive of accommodation with a different plan.

At M, around the pit (*m*), is a cluster of hut circles, part of which fills up and obliterates the older ditch K-M. These circles are connected with a ditch which, running north-westwards, joins another at right angles, coming from the great road, then turning and passing up to and under the ditch at N on which the square camp stands, it may be traced on its other side towards B: Thus there can be little doubt that the ditchway K-M is older than N-P. A later and stronger bank and ditch Q has been made on part of the ditch N-P, and somewhat obscured it.

Throughout the area above described the direction of the surface works appears in general to have been determined by the situations of the caves.

The whole of the area in this map and its neighbourhood is covered with flint chips, arrow heads, and implements, some large ones having formerly been found here.

These caves at the south, frequently enter the chalk immediately, which comes to the surface there. The character of the flint chips which cover the surface in this neighbourhood, whether chalk or sand, is different, having a thick white coating of changed flint; while the majority of the chips northward have only reached that lesser stage of exposure which give them a grey or bluish tinge. As, geologically speaking, the flints employed for chipping must have come from the same veins, which are without difference here, this affords additional evidence of a considerable diversity of age in the works of the settlement.

I have said that the valleys lead to the Darenth and Cray, but they are dry now-a-days. The soils lying on the chalk in the wood are Thanet sand, Woolwich, and Oldhaven beds and old river gravels.¹

In Camden Park chalk mine, now fallen in, caves were frequently met with and carefully avoided by the workmen. I once saw five in the works, one of which was

¹ By way of guide to visitors, I should say that a public path runs from Bexley,

through Cavey Spring, the Square Camp over Row Hill to Dartford.

that described by Mr. R. B. Latter.¹ This contained much Romano-British pottery, bones, &c. The shaft, which was 13 feet deep, penetrated the chalk almost immediately. The sides of the cave were carefully worked. Mr. Latter informed me that he found several flint knives in it.²

These caves are remarkably frequent on the Cray, a river like the Darent, running in the bare chalk. At Arpington and St. Mary Cray they are particularly common, Mr. Latter mentioning several shafted chambers as occurring in the railway cutting west of St. Mary Cray station. Shafts are found at Halstead, Knockholt, Cudham, &c.

At Eltham, on the estate of Mr. Jackson, by whose invitation I examined it, a very deep hole was found. Mr. Petrie described it,³ and his drawing has been reproduced by Mr. T. V. Holmes.⁴ This is a very deep cave of 140 feet, having three pillars, and the open area is wholly on one side of the shaft. The shaft has been steined with brick (of the early part of the sixteenth century) and chalk. The single opening from the shaft into the cave was concealed by a curtain, and the iron pins holding it are still visible; a candle sconce for thrusting into the crevices of the chalk was found in it. Evidently this cave was even in the sixteenth and seventeenth centuries (though of much older date) a place of refuge.

Caves exist at intervals along the river Thames between Crayford and Woolwich, one is known in the grounds of Walnut Tree house, Erith, and several between that and Abbeywood, where one fell in to a depth of sixty feet in the roadway leading from Bostol Heath to the railway station.

In the parish of Kidbrooke I have known shafts to subside into caves, and several instances are recorded in local prints.

The *Times* and local prints contain particulars of holes dropping in recently on Blackheath. They are discussed by Mr. De Rance,⁵ Mr. T. V. Holmes,⁶ and Mr. Lemon⁷;

¹ "Archæ. Cantiana," i, 137.

² The *Swelgende*, or Swallow, of the Saxon Charter, mentioned by Mr. Latter as the cave described by him, rests on a mistranslation of "haga," which does not mean "dwelling."

³ *Archæological Journal* xxxv, 179.

⁴ "The Engineer," 18th March, 1881.

⁵ "Nature," xxiii, 365.

⁶ "The Engineer," 18th March, 1881.

⁷ Proc. Blackheath Nat. Hist. Soc. for 1881.

three of them being partly visible in 1879. I can remember others, however, on the heath behaving in a similar way; one of them was near "Washerwoman's Hole." Some have been slipping gently for many years in the gravel pit near Whitfield's mound, and I could point to several spots where others may probably "subside."

In the direction of Charlton are some. The late Sir T. M. Wilson told me of several, and that one which fell in at the east end of his avenue was examined by him. He mentioned several which once existed at Hangingwood and between the south lodge and Blackheath. He understood them well, and assisted me in taking photographs of them both above and below ground. I find an interesting notice of a subsidence on Blackheath in the old "Gentleman's Magazine," for November 9th, 1798.

(To be continued).