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SWALLETS AND CAVES IN THE CHALK

The Chalk is the most widespread limestone occurring in Britain, forming the Chiltern Hills, the Downs and Salisbury Plain, also the Wolds of further north, and for the most part being about 700 ft. thick. However, none of these regions contains any known caves although they do exhibit many of the classical karst features, such as dry valleys, sinkholes, springs, blind valleys and complex underground drainage systems. This general lack of caves is due to the nature of the Chalk itself, because, unlike the Carboniferous Limestone, chalk has a certain primary porosity so that water can filter through it by way of intergranular pores and microfractures. Consequently, the underground drainage is not entirely restricted to cave-sized streamways, though a significant proportion of the flow is by way of such larger fissures, some of which may be of explorable size.

Genuine cave systems do exist in the Chalk of northern France (see below), and although there are none known in England there are some promising indications. Many of the smaller streams crossing the Chalk in south-eastern England lose their entire flow underground in dry weather. These intermittent streams are generally known as bournes and famous examples can be seen at Croydon and Berkhamsted where the streams sink and rise a number of times down their course. Furthermore, when a period of heavy rain follows a relative drought some dry risings may become very active in a short time, and it has been observed that immediately before the main volume of flood water resurges some of the risings emit a very strong wind. This appears to represent the expulsion of air from a quite considerable volume of underground cavities, and the rapid flow suggests that at least some of these must be reasonably large and well integrated. Another sinking stream is the River Mole which flows across the Chalk north of Dorking and during low water part of the stream disappears down a number of conical swallow-holes in its bed. In the winter of 1947 one of these sinks ran in to reveal a 40 ft. deep shaft known as Policeman's Hole, since infilled.

Remnants of old solution cavities can be seen in a number of chalk quarries around London but they are mostly just pipes up to 40 ft. long, nearly vertical and a few feet in diameter. They were formed during Tertiary times, so are now filled with clay, and were merely phreatic enlargements of joint intersections, only joined to each other by much smaller fissures. Finally it should be noted that the Chislehurst Caves and the various Deneholes of South Essex are entirely man-made.

Mymmshall Swallets

It is perhaps somewhat surprising that the largest enclosed karstic drainage basin in England is not in the classic caving areas but in outer London. Mymmshall Brook has a catchment area just west of Potters Bar of 17.9 sq.miles (compared to Goyden Pot with 12.6 sq.m., and Gaping Gill with 1.1 sq.m.) and the entire stream normally sinks at Mymmshall Swallets (N.G.R. - TL.232044).

The water collects on the Tertiary clays and flows northwards to where the valley has been cut down into the Chalk. Here the Chalk is presumably relatively free of fissures for the stream flows over it for about two miles in a valley now partly filled with sandy alluvium. But at Waterend the entire stream normally sinks in the Mymmshall Swallets. There are three major sinks and about 15 minor ones spread over an area of about five acres. The principle sink which takes most of the water in normal weather is at the end of a classic blind valley cut 20 ft. deep in the alluvium - a most inspiring sight to a cave hunter. This has been seen to easily engulf a flow of about 1.5 cusecs (similar to an average wet Swildons) when the water can be heard flowing away underground. The passage is extremely small however and often choked with rubbish, but digging in the past has permitted entry for a few yards, the stream then flowing away enticingly in an impossible small cave. In winter the stream may swell to about 150 cusecs, which cannot pass down the swallets, and hence a lake may develop a few hundred yards across and up to 30 ft. deep which then overflows down a normally dry valley to the west. This valley was the original course of Mymmshall Brook.

Some years ago dye was introduced into the swallets and the results are shown on the accompanying sketch map. The underground courses therefore range between $5\frac{1}{2}$ and $10\frac{1}{2}$ miles in length with a drop of 65-145 ft. The fact that the one group of swallets (with most of the water and dye going down one sinkhole) feeds four widely spaced risings, suggests that the water is passing through a saturated zone of rock with complex multidirectional flow in microfissures and a maze of larger fissures. In other words a discrete cave system is unlikely to exist for the entire underground course. On the other hand the rapid flow-through times (see map) suggests that there is significantly large passage permitting rapid, easy, vadose flow for at least some of the route - probably the initial stages, and it is this possibility which appears to present the best chance of discovering a significant chalk cave in England. However, we cannot necessarily assume to find a vadose passage leading down, for 65 ft. in depth to a rest level at the height of Woolmer's Park resurgence; the system of microfractures which the water must pass through for some of its course could impose a considerable hydraulic drag on the flow and thus result in a distinctly inclined water-table. In this case the passages may be waterlogged at very little depth below Mymmshall Swallets.

Chalk Caves in France

Perhaps we may take heart from the fact that France boasts a number of caves in the Chalk, some of quite reasonable size. Two of the largest are found near Rheims; one is 2000 m. long with an active streamway and an abandoned high level system while a second is 1500 m. long and contains a variety of formations. Furthermore, some caves near Rouen contain such features as 50 ft. pitches and presentable chambers, entered via numerous crawls.

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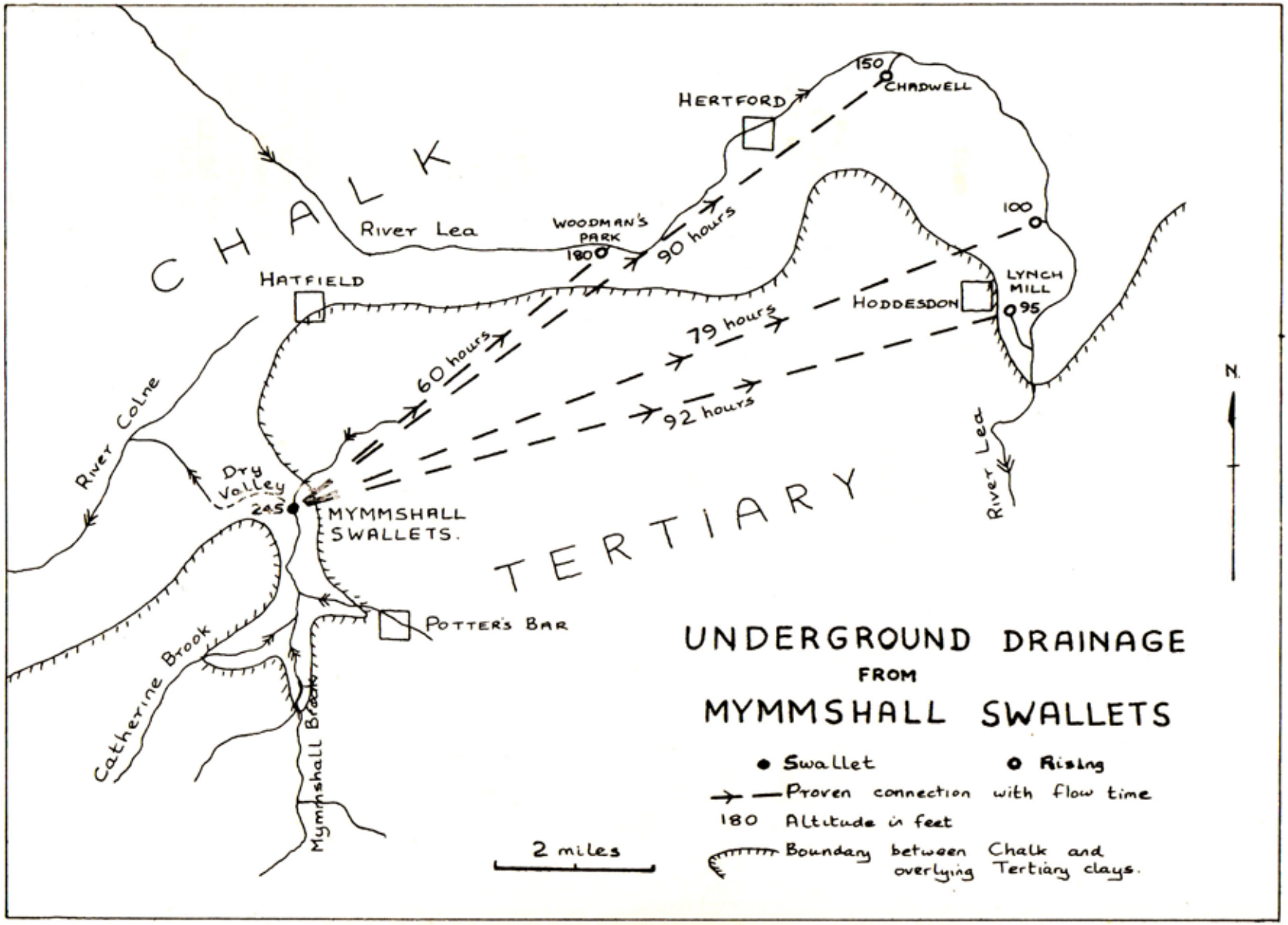
CHALK
TERTIARY
River Lea
HERTFORD
150
CHADWELL
WOODMAN'S PARK
180
90 hours
100
LYNCH MILL
95
HODDESDON
HATFIELD
79 hours
60 hours
92 hours
River Colne
Dry Valley
245
MYMMSHALL SWALLETS.
River Lea
N.
POTTER'S BAR
Catherine Brook
Mymmshall Brook
2 miles
UNDERGROUND DRAINAGE
FROM
MYMMSHALL SWALLETS
● Swallet
o Rising
Proven connection with flow time
180 Altitude in feet
Boundary between Chalk and overlying Tertiary clays.