
Cull-pepper's Dish

[SY 814 925]

Highlights

The doline fields in the chalk karst of Dorset are noteworthy for their density, and Cull-pepper's Dish is the largest, most spectacular and best developed of the individual dolines. Nearly all the dolines lie in a covered karst where Tertiary and Quaternary sands overlie the chalk karst and their relationship to datable archaeological remains suggests a very short time-scale of evolution.

Introduction

The Dorset heathlands, along the northern edge of the western Hampshire Basin, are pock-marked with an impressive array of dolines. Over 370 are recorded on Puddletown Heath, and there are more than 100 on the smaller Southover Heath. Cull-pepper's Dish is the largest and most spectacular individual doline, and occurs on the Bryants Puddle Heath, along with just a few other dolines of larger than average size (Figure 7.1).

The Dorset doline fields gained early mentions by Stevenson (1812), Mansel-Pleydell (1873), Fisher (1858, 1859) and Reid (1899), and the site geology is described by Wilson *et al.* (1958). The doline genesis was explained by Sperling *et al.* (1977), and again further considered by House (1991, 1992) and Goudie and Gardner (1985). These chalk karst dolines are comparable with some of those developed on the Carboniferous Limestone (Coleman and Balchin, 1959; Thomas, 1974).

Description

The doline fields of the Dorset heathlands reach densities of 99 km⁻² on Southover Heath and 157 km⁻² on Puddletown Heath, where the majority of the dolines are only about 10 m across. Cull-pepper's Dish, located in woodland on Bryants Puddle Heath, is the largest single doline in the area, and lies in a region of lower doline density (Figure 7.5). It is a conical depression, 21 m deep with a mean diameter of 86 m, slightly elliptical in plan, with uniformly graded sides sloping at about 30° (Sperling *et al.*, 1977). The whole depth of the visible doline is developed within the clastic sediments which survive over the chalk. These are the sands and gravels, with minor clay horizons, of the Eocene Reading Beds, overlain by a thin spread of Pleistocene plateau gravels. Beneath the Reading gravels, the Cretaceous Upper Chalk is a soft pure-white limestone over 100 m thick, which dips at less than 3° (Wilson *et al.*, 1958). Soils mask all the bedrock, except at a few exposures of unconsolidated sand. In the floor of the doline, a sinkhole is choked with soil between loose blocks of chalk; there is no evidence of any collapse structure.

Two other large dolines occur in the immediate vicinity, but Cull-pepper's Dish is the largest and least vegetated, and consequently the best exposed. They all lie in the heathlands at altitudes around 80 m, overlooking the chalk slope to the valley floor 50 m below. None of the dolines bears any relationship to the surface drainage pattern which is poorly developed on the very permeable sand.

Interpretation

The formation of the dolines was initially ascribed to the subsidence of the clastic material into pipes in the subjacent chalk, owing to the percolation of rainwater, which dissolved the chalk (Fisher, 1859). Reid (1899) further suggested that the moist climate and acidic peaty soils combined with the vertically extensive vadose zone to provide conditions favourable to doline development. It is notable that the doline fields lie along the ridge where groundwater can drain rapidly downwards to a deep water table within the chalk. The same location provides the required thickness of the sediment cover, where it thins enough to permit substantial through drainage.

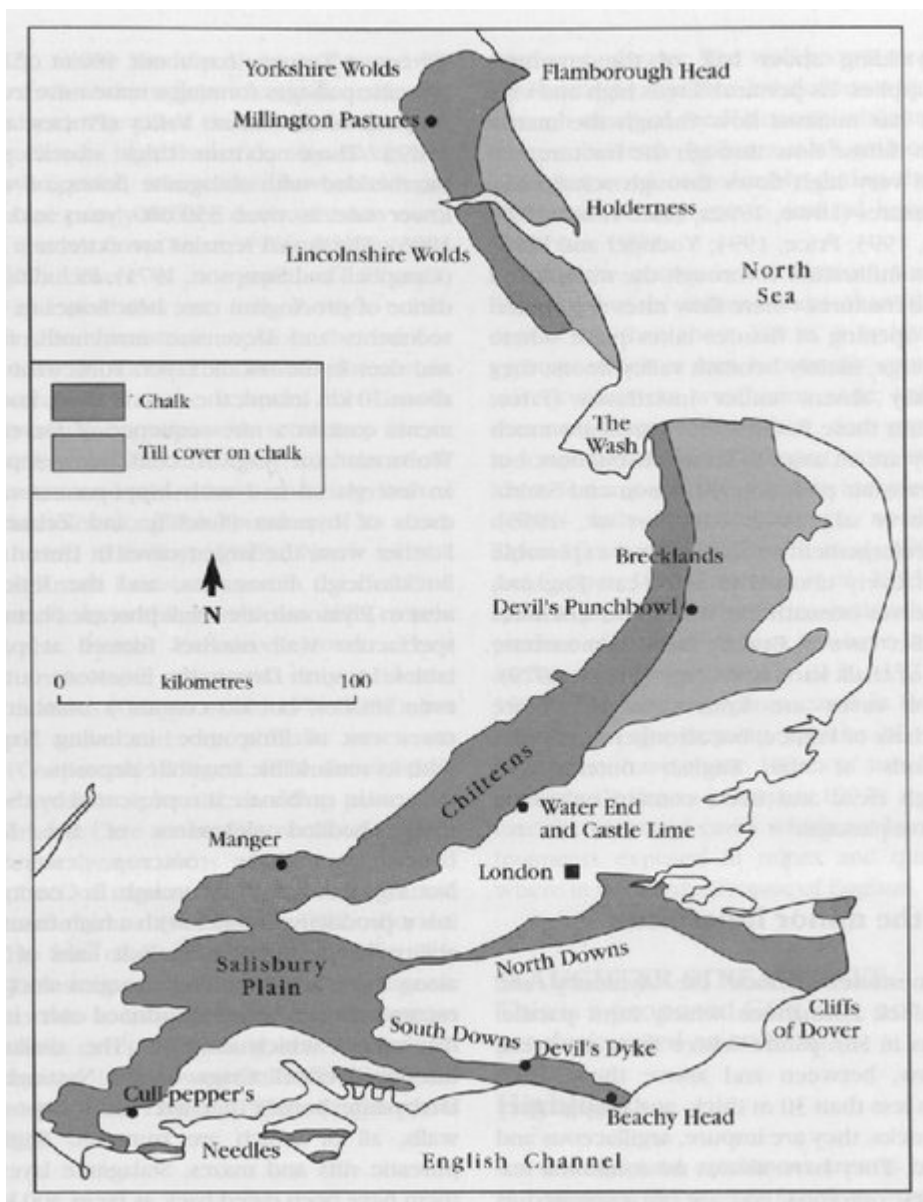
Solution of the underlying chalk by highly acidic percolation water from the peaty heathlands may be locally concentrated by discontinuous clay-rich beds in the very variable Reading Beds. This creates small cavities and fissure networks in the Chalk. Collapse may occur when they reach a critical size, but is unlikely to be a significant process as there are no comparable collapse features in the exposed chalk to the north. With or without any collapse, the loose unconsolidated sands ravel and slump into the chalk voids, and are carried to depth by the vadose drainage. Most of the dolines are formed where the Reading Beds are capped by Quaternary gravels — which are even more permeable and prone to ravelling. At some sites, less concentrated recharge may cause solution and subsequent lowering at the interface between the chalk and the overlying material, producing more gradual surface lowering.

The age of the dolines is open to debate. They clearly postdate the Pleistocene gravels in which they are formed, but these deposits on the higher levels of the heaths are probably older than Ipswichian. New dolines continue to form, and small collapses have been recorded in recent years (Goudie and Gardner, 1985). Doline development within the last 4000 years has disturbed a Bronze Age burial site (House, 1992), but this is located west of Dorchester and correlations with Cull-pepper's Dish are tenuous.

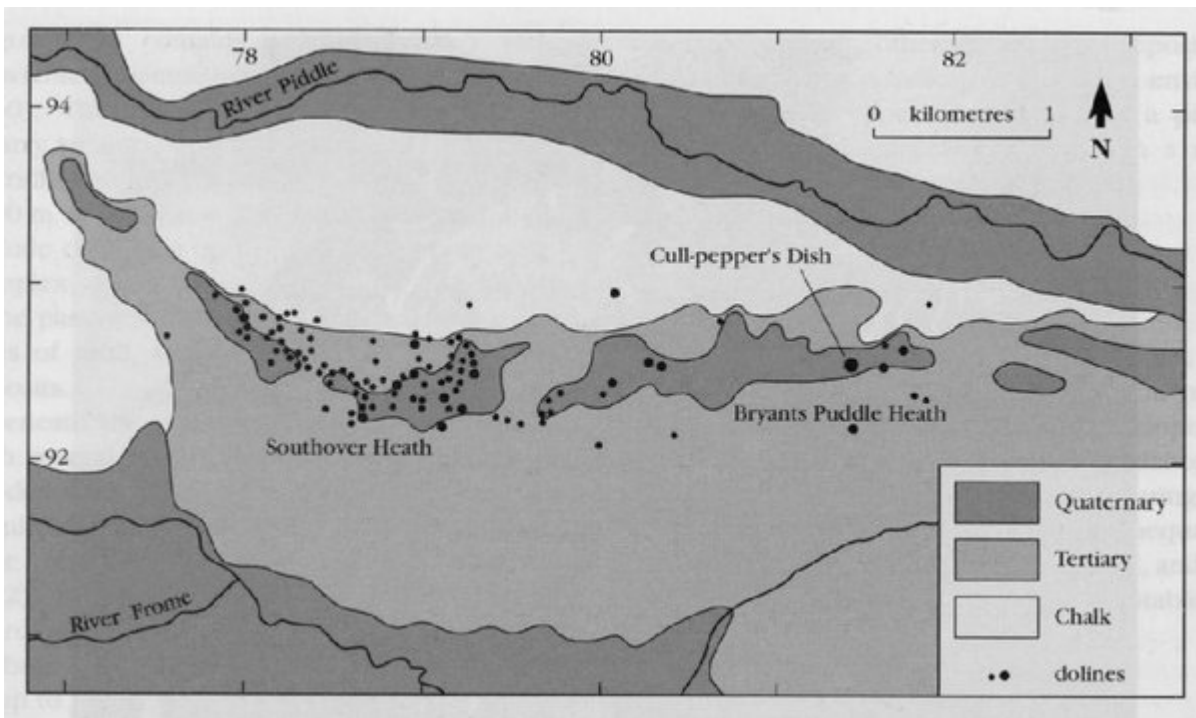
Conclusions

Cull-pepper's Dish is the largest and most spectacular of the dolines developed on the covered chalk karst of Dorset. It provides an excellent example of a conical subsidence doline formed in unconsolidated sands and gravels of Tertiary and Quaternary age.

[References](#)



(Figure 7.1) Outline map of the chalk karst of England, with locations documented in the text. Superficial deposits occur on many parts of the Chalk outcrop; only the large areas of glacial till are distinguished on this map, as they mask most topographic expression of the karst.



(Figure 7.5) Geological map of Cull-pepper's Dish and the doline fields of the adjacent Dorset heaths on sediments overlying the chalk. The Tertiary rocks include the Reading, London and Bagshot Beds. The Quaternary rocks include plateau gravels along the central strip of heathland, and also alluvium in the valleys north and south (after Sperling et al., 1977).