Holwell Quarries, Somerset

[ST 726 450]

Introduction

The Holwell Quarries GCR site is a site of international importance both geologically and historically, from which Charles Moore obtained some of the earliest known mammals. Fissure fills here range from late Triassic to mid Jurassic in age and include a diverse fauna of both terrestrial and marine vertebrates and invertebrates. The site provides important evidence for the relationship between faulting and the pull-apart fissures, and the relationship of the fissures to late Triassic and mid Jurassic palaeo-surfaces also exposed in the quarry complex.

Limestone was being quarried at this site in the first half of the 19th century and this quarrying continued for the next 150 years, leading to a complex of abandoned quarries that straddle the A361, the main Frome–Shepton Mallet road (Figure 3.20). Charles Moore was the first to recognize that the Carboniferous Limestone here was cut by numerous fissures filled with substantially younger material. His investigations, described in a major paper (Moore, 1867a) revealed that these fissure fills were Mesozoic, principally late Triassic and early Jurassic, in age. The discovery of teeth of what, at that time, were the earliest known mammals provoked most interest in the fissures at Holwell Quarries. Further work on the vertebrates was undertaken by Kühne (1947), Robinson (1957), Benton and Spencer (1995) and Dineley and Metcalf (1999). Savage and Waldman (1966) included a description of the site and a sketch map of the main geological features visible in the quarry complex at Holwell, and Savage (1971) described a tritylodontid maxilla from here. Savage (1977) published an updated description of the quarry and (Savage, 1993) described the history of investigation of the site and included a photograph, taken in 1864, of the main face described by Charles Moore. There have been many other brief references or descriptions, such as those of Richardson (1909), Reynolds (1921) and Macfadyen (1970), particularly in relation to the taxonomy of the mammals and other vertebrates. However, since the vertebrates are considered to be largely Triassic in age (Evans and Kermack, 1994) they are not considered in any detail here.

Although much discussed by Moore (1867a), the Lower Jurassic marine invertebrate fauna from the fissure fills has been largely neglected. Some elements were mentioned by Copp (in Duff *et al.,* 1985), who described the disused quarry at Holwell Brook [ST 729 450], and Copestake (1982) discussed the microfauna obtained from one fissure fill here.

Description

Carboniferous Limestone of the Vallis Limestone Formation crops out in an elongate window, extending north-east towards Frome, but otherwise is concealed beneath a cover of Middle Jurassic (Upper Bajocian–Bathonian) limestones and clays. In the vicinity of the quarry complex the Carboniferous Limestone dips almost due south at about 20° and is traversed by several major faults with east–west or north-east-south-west trends. Savage and Waldman (1966) provide the only sketch map of the distribution of fissures and other geological features within the quarry complex covered by the GCR site. A third quarry is currently operating to the north of those figured by Savage and Waldman (1966), but lies beyond the GCR site boundary. In the original description by Moore (1867a) it was observed that several of the fissures narrowed upwards, from 8 m or 9 m near the quarry floor to almost nothing at the top. Moore (1867a) noted a range of lithologies within these fissures, including clays, laminated limestone and conglomeratic units, and listed (Moore, 1867b) 32 Lower Jurassic species from them. In particular he recorded the brachiopods *Spiriferina walcotti, S. munsteri,* '*Rhynchonella*' *variabilis* (possibly *Cirpa* sp.; see Ager, 1956–1967, pp. 55–56) and *Lobothyris punctata* from two of the wider fissures. Moore (1867a) commented on the diversity of small gastropods obtained from one fissure, citing the presence of ten genera; Hudelston and Wilson (1892) subsequently produced a revised list of 11 gastropod species. Copestake (1982) recorded four species of foraminifera and three species of ostracod from a grey siltstone in one fissure on the southern wall of the southern quarry. The vertebrate fauna has always formed the main focus of palaeontological interest at this site. It was recognized by Moore and by others subsequently as being largely Triassic in age.

Although some of the fissure fills are at least partly Triassic in age, the site is important for demonstrating the relationship of the fissures to the geology. Most of the fissures cut the Carboniferous Limestone. Savage (1977) noted that they were truncated by horizontally bedded Middle Jurassic limestones which overlie the planed-off Carboniferous Limestone just to the north of the GCR site. In the southern part of the site several almost vertical fissures penetrate an extensive boulder conglomerate, of presumed Triassic age, described and mapped out by Savage and Waldman (1966). Another fissure cutting through Carboniferous Limestone on the west face is developed on a minor dip-slip fault.

Interpretation

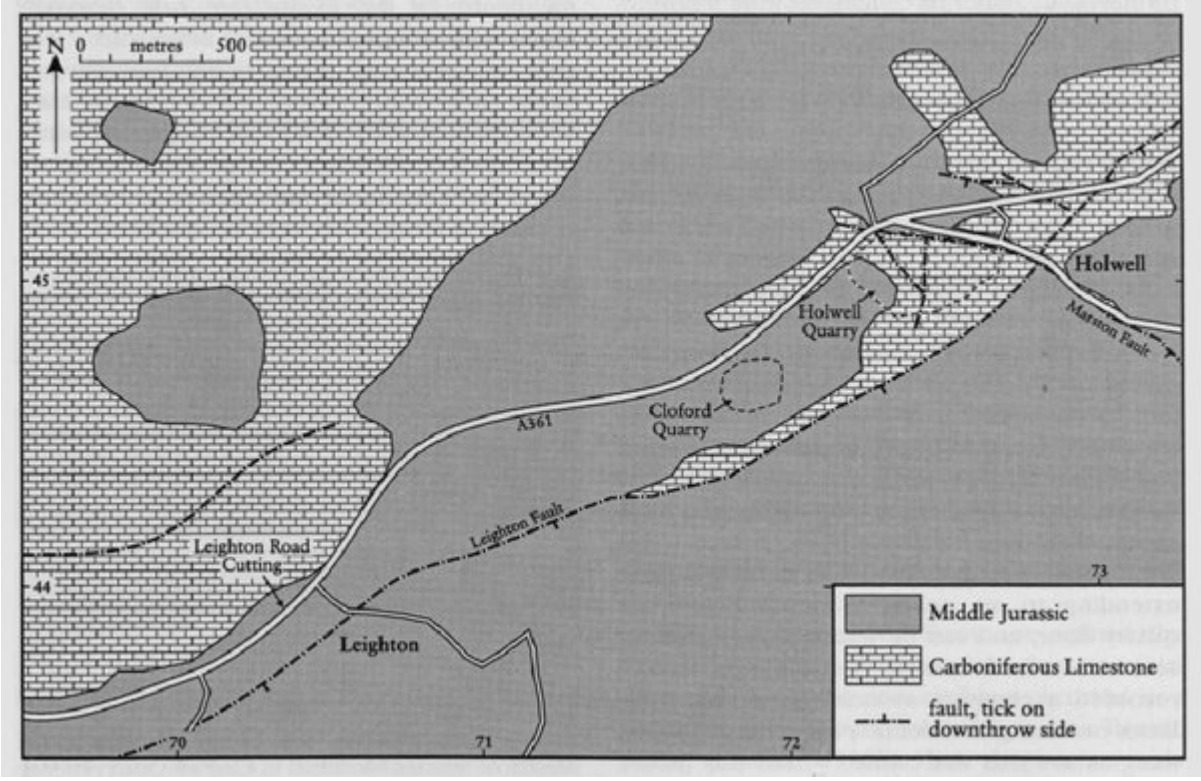
Most of the fissures in the Holwell Quarries GCR site do not differ significantly in their configuration and in the nature of their sediment infills from examples seen at the Cloford Quarry GCR site. However, at least one shows a clear relationship between faulting and fissure development. Other fissures within this site cut through boulder conglomerates that were interpreted by Savage and Waldman (1966) as Triassic wadi deposits. The relationship of the fissure boundaries, which cut some of the larger lasts, demonstrates that these wadi-fill conglomerates were well cemented by the onset of fissuring.

The age range of the fissures cannot be constrained precisely although at least some post-date emplacement of the boulder conglomerates and many, if not all, pre-date deposition of the Inferior Oolite Group limestones above the unconformity surface. Much of the vertebrate material appears to be latest Triassic in age. Kühne (1947) noted considerable similarities between the Holwell Quarries fauna and that isolated from the basal Penarth Group bone bed at Aust Cliff. Although *Oligokyphus* is considered an early Jurassic taxon on the basis of evidence from Windsor Hill Quarry [ST 614 452] (Kühne, 1956), Savage and Waldman (1966) did not make any assumptions concerning the age of the specimen found at Holwell Quarries. This was subsequently shown to be referable to an indeterminate tritylodontid, a group known to span the Triassic–Jurassic boundary (Savage, 1971). The invertebrate fauna also does not enable fissure fills to be precisely dated, particularly since no ammonites have been found. Moore (1867b) claimed a Pliensbachian age for at least one fissure, on the basis of gastropods, but accepted a late Triassic, Rhaetian, age for another fissure on the basis of its vertebrate fauna. The brachiopods suggest an age range spanning much of the Sinemurian and Pliensbachian stages. Copestake (1982) deduced that the microfauna indicated a Lower Sinemurian, Bucklandi Zone, age for the sample he analysed. Most of the remaining fauna is of little biostratigraphical value, although *Isocrinus tuberculatus* also suggests a Lower Sinemurian age.

Conclusions

The importance of the fissure fills at the Holwell Quarries GCR site concerns the early mammalian fauna that they have yielded. Although traditionally this fauna has been considered late Triassic in age, other elements of the invertebrate fauna from this site indicate a substantial early Jurassic component to the fissure fills. The site is also important for demonstrating the relationship of the fissures to minor faults and to earlier Mesozoic terrestrial deposits.

References



(Figure 3.20) Sketch map of the geology in the Cloford and Holwell area of the eastern Mendip Hills.