
Vertebrate-bearing fissure deposits of South-West England

Cave and fissure systems developed in the Carboniferous Limestones of the Mendips and Glamorgan during the Late Triassic and earliest Jurassic contain abundant vertebrate remains. The Mendips and parts of South Wales appear to have comprised an archipelago of low islands, and the fissures preserve a record of the diverse and often insular faunas of the time (Robinson, 1957; Tarlo, 1962; Halstead and Nicoll, 1971; Kermack *et al.*, 1973; Fraser, 1985, 1986, 1988b). The nature of the palaeokarst and the geology of the caves was reviewed by Simms (1990); Savage (1993) reviewed the potential of the palaeokarst for further vertebrate finds.

Fish sites

The numerous vertebrate-bearing fissure and cave fill deposits of southern England and South Wales that have yielded fish remains, as well as reptilian and mammalian material (Benton and Spencer, 1995) are listed below.

Gloucestershire

1. Slickstones (Cromhall) Quarry [ST 704 916]. Typical Rhaetian fishes including *Gyrolepis*, *Hybodus minor* and *Severnichthyes acuminatus* occur in the covering sediments at Cromhall (Walkden and Fraser, 1993). These are important as they indicate a Rhaetian and possibly Westbury Formation age for the fissure, and confirm that the infilling is of a saline intrusion (i.e. neptunian dyke) type.
2. Tytherington Quarry [ST 660 890]. Typical reworked Rhaetian fish fauna including *Pholidophorus*, *Gyrolepis*, *Hybodus minor* and *Severnichthyes acuminatus* (Marshall and Whiteside, 1980; Whiteside and Marshall, 1985).

Somerset

3. Emborough Quarry [ST 623 505]. Usual Rhaetian fish fauna, including *Gyrolepis alberti*, *Hybodus minor* and *Severnichthyes acuminatus* (Morgan and Reynolds, 1901; Richardson, 1911b).
4. Windsor Hill Quarry, near Shepton Mallet, [ST 615 452]. Mixed reworked Rhaetian and in-situ Hettangian marine fish fauna consisting of *Lissodus* (*Acrodus*) *minimus* (ten teeth), *Acrodus anningae* (two teeth), *Hybodus minor* (few teeth), *Severnichthyes acuminatus* (five teeth), and over 400 unidentified chimaeroid dermal tubercles, which form an important constituent of the fauna, and which are associated with the Liassic mammal-like reptile *Oligokyphus* at all times, suggesting that they are not reworked from Rhaetic beds (Kiihne, 1956).
5. Holwell Southern Quarry, near Frome, [ST 727 452]. Types of the neoselachians *Polyacrodus* n. sp. Duffin, in prep., *Palaeobates* n. sp. Duffin, in prep., and the hybodont sharks 'Hybodont' n. gen. n. sp. Duffin and Herman, in prep., and *Palaeospinax rhaeticus* Duffin, 1982. Other remains include *Polyacrodus* (*Hybodus*) *cloacinus*, *Lissodus* (*Acrodus*) *minimus*, *Hybodus* sp., *Nemacanthus monilifer*, *Pseudodalatias barnstonensis*, *Vallisia coppi*, shark coprolites, placoid, hybodontoid and ctenacanthid scales, *Agkistracanthus mitgelensis*, *Severnichthyes acuminatus*, *Gyrolepis alberti*, *Colobodus* sp., *Sargodon tomicus*, *Lepidotes* sp., *Ceratodus latissimus*. Full lists are given in Kiihne (1956) and Duffin (1978, 1982, 1994). The material sorted by Charles Moore in the late 19th century (Moore, 1867, 1881) included over 70 000 undiagnosed fish remains (including 45 000 'Acrodus' teeth) and 29 mammal teeth (Robinson, 1957; Savage, 1993).

None of these sites could be selected as having a greater or lesser claim as a candidate GCR site to represent British Triassic fissure-fill fish faunas. The fish faunas are similar to those of bedded Rhaetic deposits, and in some cases have been reworked from substantially earlier sediments. The contemporary fossil reptile and/or mammal faunas of several fissure sites are unique (Slickstones (Cromhall Quarry), Gloucestershire, [ST 704 916]; Durdham Down, Avon, [ST 572 747]; Emborough Quarry Somerset, [ST 623 505]; Tytherington Quarry Gloucester, [ST 660 890]; and Windsor Hill Quarry, near (Benton and Spencer, 1995). Several localities Shepton Mallet, Somerset, [ST 615 452]), and have been entirely worked out, and new ones these are included in the relevant GCR volumes are found when suitable sites are excavated.

