Stonesfield, Oxfordshire

[SP 379 172], [SP 392 172], [SP 387 171], [SP 387 168]

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Introduction

Stonesfield, in Oxfordshire, is historically famous as the source of the Middle Bathonian Stonesfield Slate, a high-quality roofing stone used extensively throughout surrounding districts. The tilestone is restricted to an approximately oval area within 1.5 km of Stonesfield village (Figure 3.68), where old waste tips, shafts and an adit bear witness to the thriving industry of the 18th and 19th centuries, when freshly mined stone was exposed to winter frosts to facilitate splitting into roofing slates. Stonesfield may also be regarded as one of the most important Bathonian localities in the Cotswolds. It is known internationally for its prolific, diverse and stratigraphically significant fossil fauna and flora, which contain an unusual mixture of marine, freshwater and terrestrial forms, including a great variety of reptiles, early mammals, insects and plants.

The Stonesfield GCR site comprises four former slate mines known as Coldshore Cottage, Home Close, Robinson's and Spratt's Barn mines; these form elements of the type locality of the Stonesfield Slate. Coldshore Cottage Mine is served by a hillside adit, the others by shafts. A number of other shafts, up to 22 m deep, are identified in Aston's (1974) account of the former slate mining industry. Of the numerous published accounts of Stonesfield Slate, that of Boneham and Wyatt (1993) is the most recent and comprehensive; others are noted below.

Description

The commercially exploited tilestones comprise grey and fawn, commonly well-laminated, fissile, calcareous, fine-grained, quartzose sandstone and siltstone, and subordinate sandy limestone, with shelly partings. Impersistent oolite laminae or scattered ooids are common and, locally, the tilestone is interbedded with fissile, fine-grained oolite. Although regular horizontal lamination is characteristic, small-scale cross-lamination picked out by silt or ooidal partings is not uncommon. The best of the roofing tiles came from concretions, known as 'potlids', set in beds of uncemented sand. A layer of hard, bored, oolite pebbles is said to run through the best slate bed although, as shown below, this specific bed cannot be identified. The maximum recorded thickness is 1.8 m (Fitton, 1828), in a shaft thought to be in the eastern part of the village, although the thickness is commonly much less; the 'potlid' bed is only 0.46 m thick.

The adit at Coldshore Cottage Mine [SP 379 173] exposes the basal beds of the Hampen Formation resting on Stonesfield Slate, including its roof bed. The former comprises 1.20 m of buff, shell-detrital marl with scattered oyster shells and sporadic *Burmirhynchia concinna* (Davidson), overlain by 0.18 m of khaki, greenish-grey mottled, silty clay with 'race' nodules near the base and scattered carbonaceous plant-fragments, and then 1.3 m of ooidal, shell-fragmental marly limestone and marl. Woodward (1894) described the roof bed of the mine as a grey, 'oolitic' and sandy limestone, below which the productive bed is only 0.3 m thick.

In the shaft at Home Close Mine [SP 392 172] (Figure 3.69), the tilestones are encountered between 12.58 m and 13.64 m depth, above which there are 1.85 m of Taynton Limestone Formation, succeeded by 7.75 m of Hampen Formation (for details, see Boneham and Wyatt, 1993). Entrances to three headings are seen at the base of the shaft, but access to the former mine is now restricted by rockfalls.

The shaft at Spratt's Barn Mine [SP 387 171] is 7.85 m deep, the top 3.65 m of which is lined and obscured. The Taynton Limestone Formation, comprising ooidal, shell-fragmental limestones, is exposed in the underlying 3.0 m and the Stonesfield Slate occupies the lowest 1.2 m. From the base of the shaft, a circuitous heading extends to a point 28 m west of the shaft. Robinson's Mine [SP 388 168], *c.* 400 m to the SSE, is accessed by an 11.3 m-deep shaft (Bradshaw, 1978) to the floor of the mine heading. The slate worked here is at, or close to, the top of the Taynton Limestone

Formation.

Extensive lists of bivalves and gastropods have been published for the Stonesfield Slate (e.g. Woodward, 1894). The most abundant bivalves are *Chlamys* (*Radulopecten*), *Camptonectes, Gervillella ovata* (J. de C. Sowerby), *Placunopsis socialis* Morris and Lycett, *Praeexogyra hebridica* (Forbes) and *Vaugonia impressa* (Broderip). Crushed rhynchonellid brachiopods are common, a few of which have tentatively been assigned to the genus *Kallirhynchia.* The ammonite assemblage includes the genera *Clydoniceras, Micromphalites, Oppelia, Paroecotraustes* and *Procerites.*

The vertebrate fossils from the Stonesfield Slate are of international importance. Perhaps the most significant are the mammal-like reptile *Stereognathus ooliticus* Charlesworth and the three species, *Amphilestes broderipi* Owen, *Amphitherium prevosti* (V. Meyer) and *Phascolotherium bucklandi* (Broderip), collected in 1812; these were the first pre Tertiary mammals to be recorded. All four of these vertebrates are valuable in reconstructing the early evolution of mammals from reptilian stock. Dinosaurs known from Stonesfield include *Megalosaurus bucklandi* Meyer, the first dinosaur to be recognized and described (Buckland, 1824), and *Iliosuchus incognitus* Huene. Three pterosaurs have been collected, including *Rhamphocephalus bucklandi* (Meyer) and *R. depressirostris* (Huxley). The vertebrate fauna also contains a range of marine forms, of which there are over 30 species of fish; others are ichthyosaurs, plesiosaurs including *Cimoliosaurus,* several marine crocodiles, such as *Steneosaurus boutilieri* Deslongchamps, *S. brevidens* (Phillips), *Teleosaurus? geoffroyi* Deslongchamps and *T. subulidens* Phillips, and aquatic turtles, including *Testudo stricklandi* Phillips. Comprehensive accounts of the fossil reptiles and fossil fish from Stonesfield can be found respectively in the companion GCR volumes by Benton and Spencer (1995) and Dineley and Metcalf (1999).

Stonesfield is also a classic site for studies of fossil insects, which include large beetles and dragonflies. A variety of fossil plants has provided a glimpse of the contemporary flora of the London Landmass; they comprise ferns, cycads, conifers and ginkgos, as well as the enigmatic '*Phyllites* sp.', which appears to be a dicotyledonous angiosperm leaf. If confirmed, this would be the oldest angiosperm fossil (other than pollen) known from anywhere in the world. The flora is broadly comparable to that of the same age in Yorkshire but there are several forms unique to Stonesfield, such as *Podozamites stonesfieldensis* and *Sphenozamites belli,* both of which were first described by Seward (1904).

Interpretation

The dominance of horizontal lamination in the Stonesfield Slate, associated with subordinate cross-lamination, suggests that it was deposited under shallow-water, high-energy, 'upper flow regime' conditions. The tilestones represent periodic influxes of silt and fine sand into the shallow-water, carbonate shelf-sea in which the ooidal, shell-fragmental limestones of the Taynton Limestone Formation accumulated. The provenance of the silt and sand is uncertain, but it was probably derived directly or indirectly from erosion of sandstone rocks on the London Landmass to the east. The occurrence of freshwater and terrestrial organisms in tilestones with a dominantly marine fauna certainly indicates derivation of some material from the landmass. Sellwood and McKerrow (1974) suggested that a concentration of bone and plant material was picked up from a shoreline strand by strong storm-induced currents and re-deposited with the silt and sand in isolated shallow basins in the vicinity of Stonesfield. They noted that rapid burial is suggested by the good preservation of insect remains.

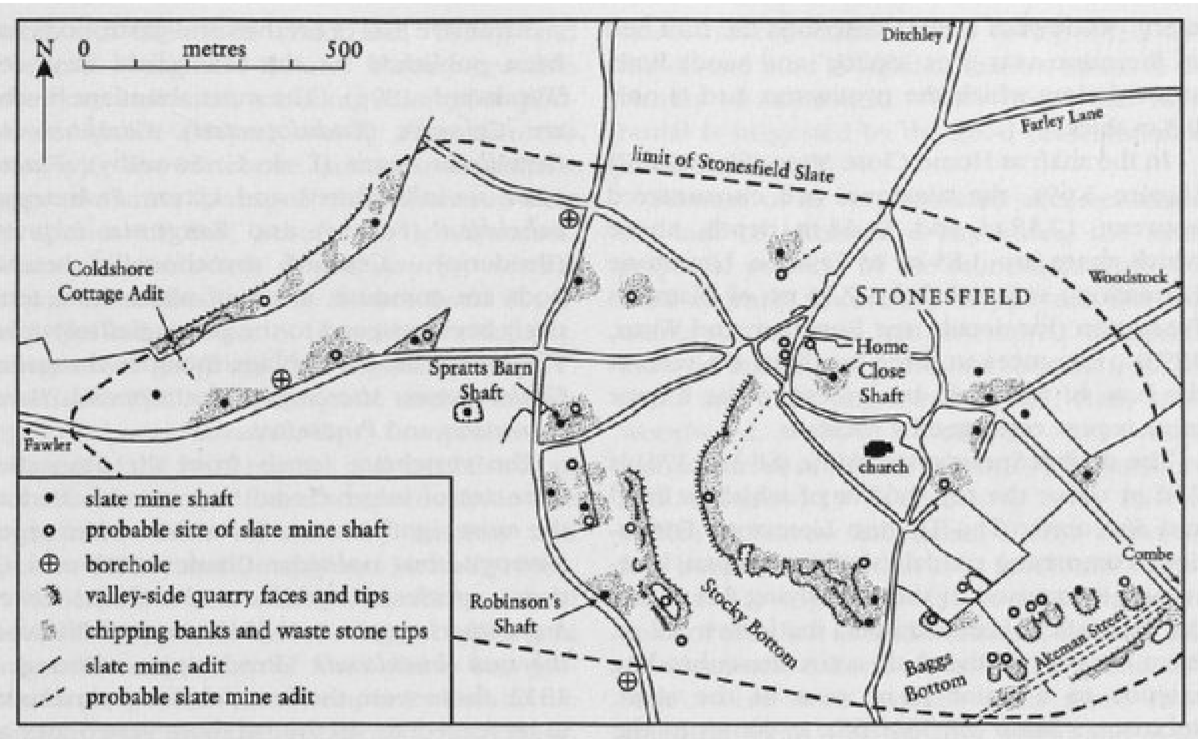
Because of its very localized occurrence and the lack of informative exposures, the stratigraphical position of the Stonesfield Slate was until recently uncertain, despite the fact that numerous authors had attempted interpretations on the basis of published sections from old shafts and adits (e.g. Fitton, 1928; Hull, 1859; Woodward, 1894; Walford, 1894–1896; Richardson *et al.,* 1946; Arkell, 1947b; Sellwood and McKerrow, 1974; Bradshaw, 1978; Torrens, 1980b; McKerrow and Baker, 1988). However, four boreholes drilled in 1991 just to the west of Stonesfield, together with revised interpretations of old shaft and adit sections, revealed that the tilestones, collectively known as 'Stonesfield Slate', were once worked from three stratigraphical levels — at the top, within and at the base of the Taynton Limestone Formation (Boneham and Wyatt, 1993). The lowest bed was worked from shafts in the eastern part of Stonesfield; the middle bed from shafts in the western part; and the middle and upper beds from shafts and adits just west of the village. The tilestones at all three levels are impersistent and localized. A consequence of these conclusions is that, because fossils comprising the specialized fauna and flora of the tilestones were not accurately documented when collected, they cannot now be assigned to any particular bed.

The ammonite fauna of the Stonesfield Slate, like that of the accompanying beds of the Taynton Limestone Formation, is typical of the Middle Bathonian Progracilis Zone. The most diagnostic of the ammonites are *Procerites mirabilis* Arkell and the zonal index taxon *P. progracilis* Cox and Arkell.

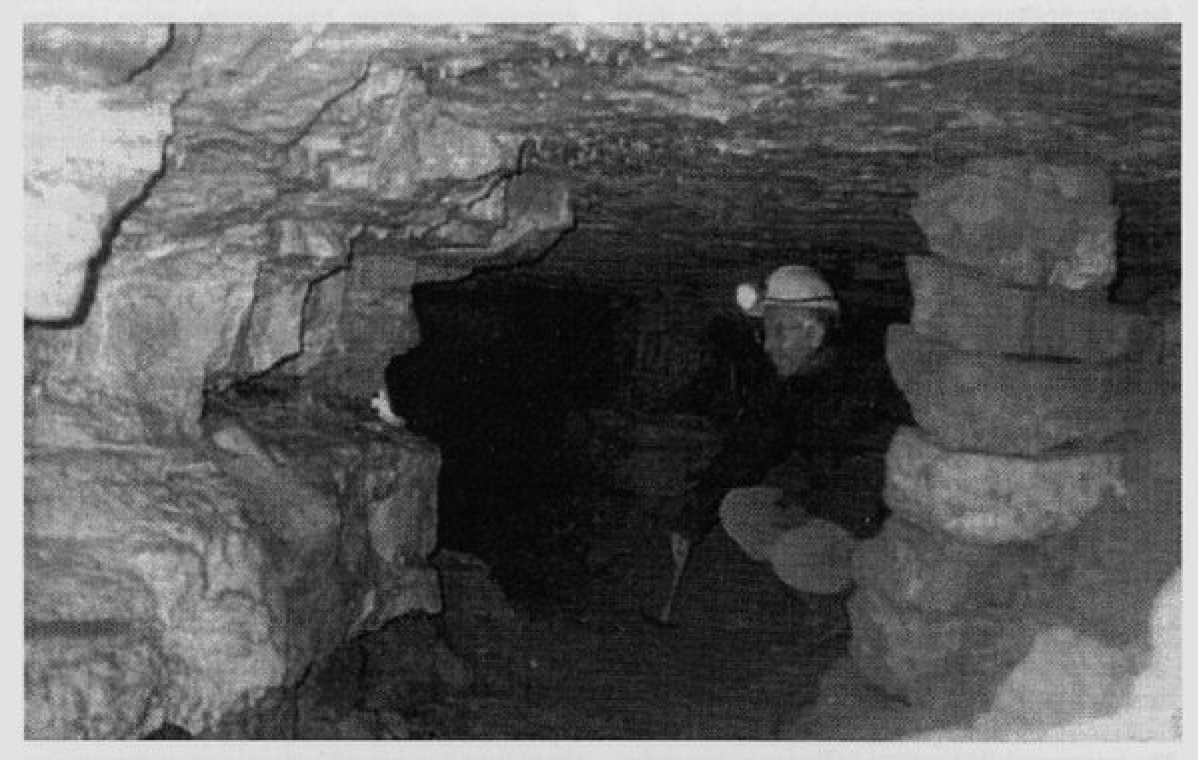
Conclusions

Stonesfield was once the scene of a locally important roofing industry, the evidence for which is the presence of old mine headings served by adits and shafts, now mostly inaccessible. The village is also of world renown for the diverse and spectacular fauna and flora it yielded during the years when tilestones were split to produce the famous Stonesfield Slate. Of special interest are the mammal-like reptile and three mammals that together have particular significance in the early evolution of the Class Mammalia. A wide variety of reptiles, both marine and terrestrial, includes the first dinosaur to be recognized, and represents what is probably the most important Middle Jurassic fossil reptile assemblage in the world. A fossil leaf, the identity of which is problematical, could well be the oldest angiosperm leaf known. The remaining flora and a large number of well-preserved insects add to the special palaeontological importance of the Stonesfield Slate. Ammonites, rare in the Bathonian succession, form part of the extensive fauna and are valuable in attributing the Stonesfield Slate and its host formation, the Taynton Limestone Formation, to the Progracilis Zone.

[References](#)



(Figure 3.68) Sketch map showing the distribution of the Stonesfield Slate. (After Benton and Spencer, 1995, fig. 6.6.))



(Figure 3.69) Typical Stonesfield Slate mine close to the shaft at Home Close Mine beneath Stonesfield village. The area on the right-hand side of the photo has been worked out, and the roof is supported by pillars of waste material. (Photo: M.G. Sumbler.))