Aberlemno Quarry, Angus

[NO 526 551]

Potential ORS GCR site

M.A.E. Browne

Introduction

Aberlemno Quarry is one of a number of quarries (including Tillywhandland Quarry) worked on and around Turin Hill near Forfar, Angus for Arbroath Paving Stone during the eighteenth and nineteenth centuries (Mackie, 1980). Of these, Aberlemno Quarry and Clocksbriggs (or Wemyss) Quarry are well-known fossil plant localities, and Aberlemno is (as 'Furin Hill') already a confirmed GCR site for its Palaeozoic palaeobotany (Cleal and Thomas, 1995) and for its fossil osteostracan fish fauna (Dineley and Metcalf 1999).

Description

Descriptions of the quarry were provided by Armstrong *et al.* (1978b), Cleal and Thomas (1995) and Dineley (1999c). It lies on the northeast flank of Turin Hill, forming an elongate entrenchment alongside a minor road (Figure 3.20). About 9.5 m of strata belonging to the Dundee Flagstone Formation and the overlying Scone Sandstone Formation (both of the Arbuthnott–Garvock Group) are exposed (Figure 3.21), (Figure 3.22). The succession exposed in a 300 m-long face is remarkably persistent laterally and comprises about 7.5 m of red-brown, medium- to coarse-grained, trough cross-bedded sandstones (Melgund Sandstone Member of the Scone Sandstone Formation) overlying about 2 m of fish-bearing, fine-grained sandstones and greyish green, fissile, laminated siltstones and mudstones (Dundee Flagstone Formation). The latter show much synsedimentary deformation and contain many ovoid, carbonate (non-ferroan micrite) nodules up to 30 cm in diameter.

Much of the fish remains collected from Turin Hill since the late 1800s are not identified as coming from specific quarries, but comparison of lithologies suggests that many came from this quarry. Heavily armoured cephalaspids dominate the fauna, in contrast to Tillywhandland Quarry (see GCR site report, this chapter) where free-swimming acanthodians dominate. Dineley (1999c) lists the cephalaspid species that are most likely to have been collected from Aberlemno, but only *Cephalaspis pagei* is definitely attributed to the quarry. Acanthodian spines have been recorded, as well as the arthropod *Dictyocaris* and the eurypterids *Pterygotus* and *Erieopterus.*

The fossil plants in the basal laminated beds are particularly renowned and belong to the *Zosterophyllum* Zone of Banks (1980). Cleal and Thomas (1995) described them in detail. The commonest are impressions picked out by iron staining, but some coalified compressions and petrifactions also occur. *Prototaxites forfarensis. Parka decipiens, Pachytheca* sp., *Cooksonia caledonica* and *Zosterophyllum myretonianum* have been identified. Most significant are the well-preserved specimens of the alga or early land-plant *Parka,* the early vascular plant *Zosterophyllum* and the holotype of *Cooksonia caledonica.*

Interpretation

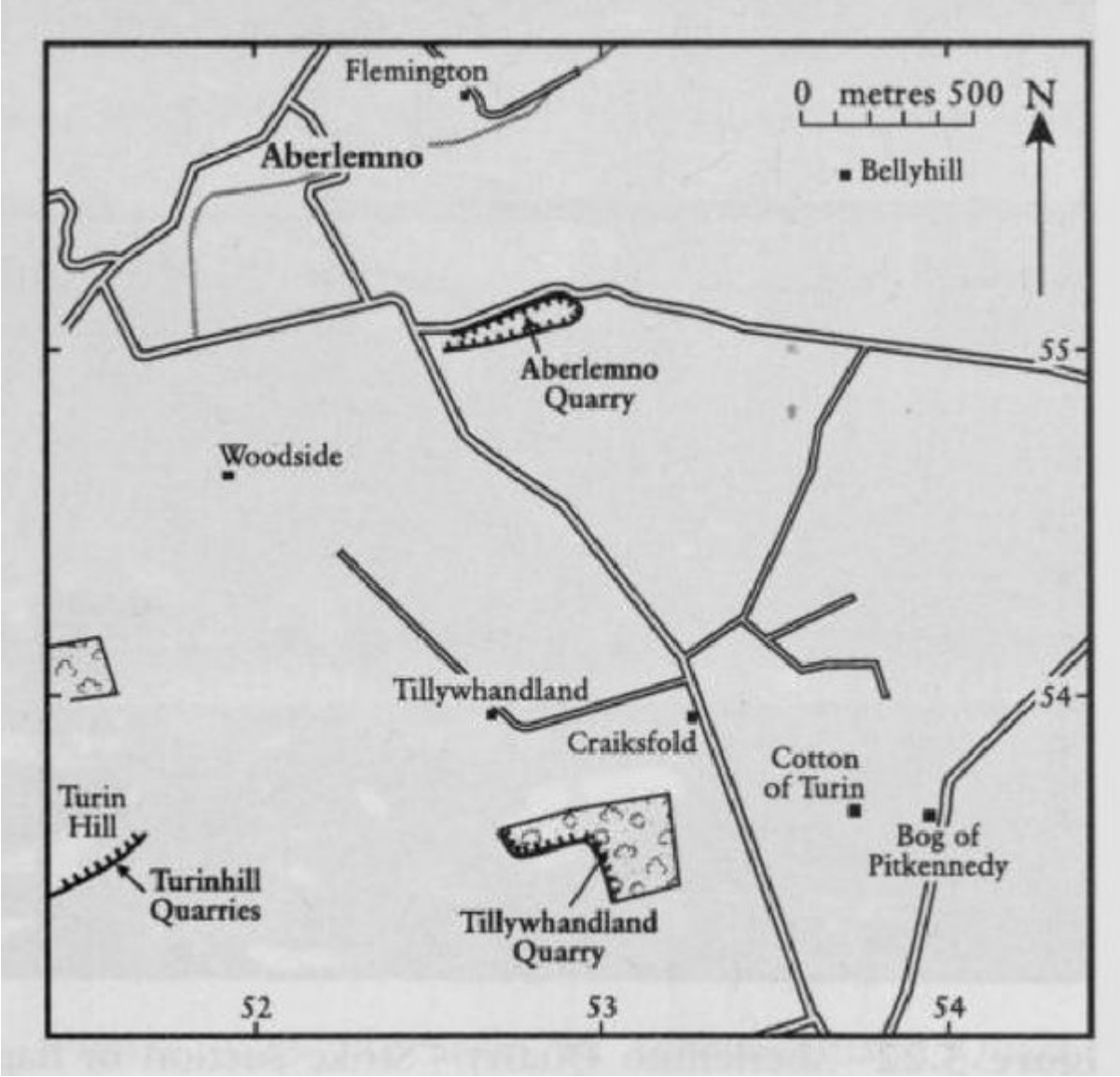
The laminated beds at the base of the quarry were interpreted by Armstrong *et al.* (1978b) as the deposits of a shallow lake. The overlying sandstones of the Scone Sandstone Formation have a varied internal geometry consistent with deposition in a braided stream complex flowing to the west, and probably marking a switch from small local drainage systems to a larger regional one (Bluck, 2000). The switch was diachronous and transitional, the uppermost part of the Dundee Flagstone Formation interdigitating with the lowermost part of the Scone Sandstone Formation. This may have been due to blocking of local drainage by lava flows and the establishment of shallow lakes.

Armstrong and Paterson (1970) correlated the Aberlemno fish bed with No. iv of the eight (i to viii) fossil fish horizons they identified in the Arbuthnott–Garvock Group; five beds (i-v) lie in the Dundee Flagstone Formation. The flora recorded from the Arbuthnott–Garvock Group belong to the *Zosterophyllum* Zone (Banks, 1980) and suggest a Gedinnian (Lochkovian) or early Siegenian (Pragian) age (Edwards, 1980; Edwards and Fanning, 1985). Palynological and fish evidence supports an early Gedinnian age (Edwards, 1980; Edwards and Fanning, 1985). The fish and eurypterids indicate an age not older than the base of the Dittonian of the Anglo-Welsh Basin (Weston, 1977). Richardson *et al.* (1984) correlated the Aberlemno horizon with the middle subzone of the *micrornatus-newportensis* Zone (= Lochkovian Stage) of the Anglo-Welsh Basin. A radiometric age of 407 ± 6 Ma was determined by Thirlwall (1983) for the lower part of the Arbuthnott–Garvock Group.

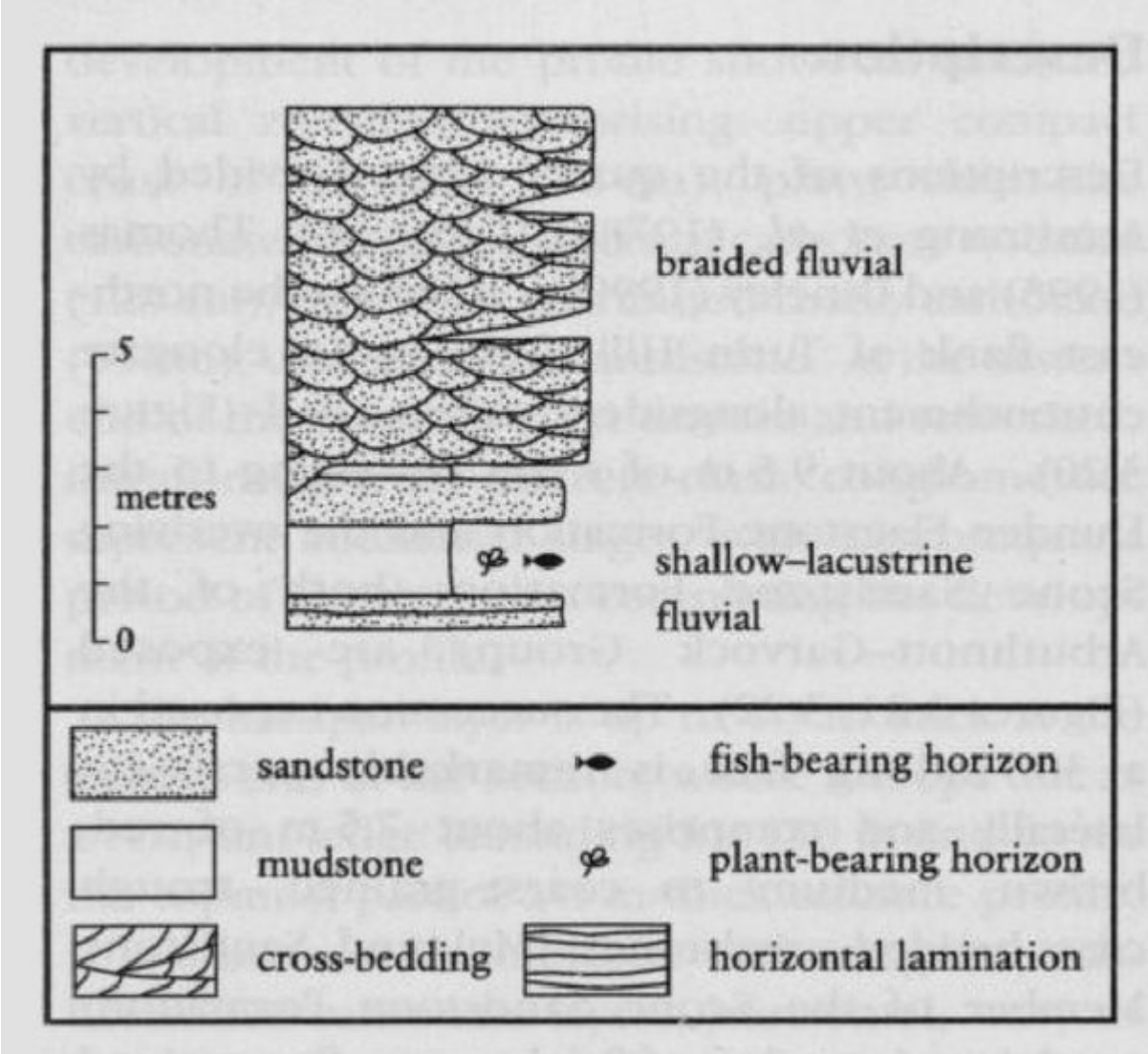
Conclusions

Aberlemno Quarry is of international importance for its fossil plant flora, having yielded one of the best *Zosterophyllum* Zone assemblages in the world. It is also important in being one of the two quarries on 'Ruin Hill (the other being Tillywhandland Quarry) that remain open. A rich fossil fish fauna is dominated by the armoured cephalaspids, in contrast to the free-swimming acanthodians that dominate the fauna at Tillywhandland. The site's conservation value lies in providing an opportunity for further excavation and collection of its fauna and flora.

References



(Figure 3.20) Locations of Aberlemno, Tillywhandland and Turin Hill quarries



(Figure 3.21) Section of Aberlemno Quarry. Based on Dineley (1999c) and Armstrong et al. (1978b).

(Figure 3.22) Aberlemno Quarry. Strike section in flaggy sandstones of the Dundee Flagstone Formation. (Photo: C.J. Cleal.)