Linn Spout, North Ayrshire

[NS 283 485]

Introduction

The natural exposures in the gorge and waterfalls on the River Caaf at Linn (or Lynn) Spout [NS 283 485], 1 km south-west of Dairy in Cunninghame, provide an excellent exposure of the Upper Linn Limestone and associated shales. 'Upper Linn Limestone' is the local name for the Calmy Limestone of the Upper Limestone Formation (Clackmannan Group, Arnsbergian). Richey *et al.* (1925, 1930) have provided general details of the site, which is primarily famous for its rich and unusual fauna. Descriptions and chemical and petrographical information are given in Robertson *et al.* (1949) and Muir and Hardie (1956).

Description

At Linn Spout the medium-bedded Upper Linn (Calmy) Limestone (*c.* 18 m thick) forms a series of small waterfalls in the gorge (Figure 2.37). The slightly argillaceous limestone beds are finely bioclastic. They are grey when fresh but weather to a yellowish colour. Bedding surfaces are slightly irregular and limestone beds are bioturbated and recrystallized. Associated with the limestone are about 5 m of fossiliferous calcareous mudstones. At the base there is a thin band of dark shale which contains an abundance of the bivalve *Edmondia punctatella.* Beneath this is a coal, the Broadlie Coal, which was mined from an adit a short distance below Linn Spout.

The limestones and, to a greater extent, the calcareous shales contain a fauna dominated by brachiopods and crinoid fragments but in which, significantly, a diversity of other forms have also been recorded, including small solitary and colonial rugose corals, bivalves, cephalopods, bryozoans, foraminifera, sponges, conodonts and trilobites.

Interpretation

The characteristics of the Upper Linn Limestone are consistent with its having been deposited in an open marine, shallow-shelf environment. Wilson (1967) noted that in the Calmy Limestone the faunas were more varied in the Central Coalfield than in Midlothian and East Fife. The diversity of the fauna of the Upper Linn Limestone suggests that this trend may also extend into North Ayrshire and that it would repay further palaeoecological investigation.

The brachiopods recorded from the site include productoid, spiriferoid, terebratulid and rhynchonellid forms; in addition, Brand (1972) recorded *Leptagonia* and McIntosh (1974) recorded the orthotetoid *Brochocarina wexfordensis.* Several epifaunal pteriomorph bivalves have been recorded as well as infaunal bivalves such as *Cypricardella, Parallelodon* and *Sanguinolites,* and the three palaeotaxodont species, *Nuculopsis gibbosa, Pbestia attenuata* and *Palaeoneilo laevirostrum* (Murdoch, 1904). The band of the bivalve *Edmondia punctatella* at the base of the sequence is a characteristic feature of this horizon in North Ayrshire and the Central Coalfield, but is less common and developed differently in Midlothian and East Fife (Wilson, 1958, 1967).

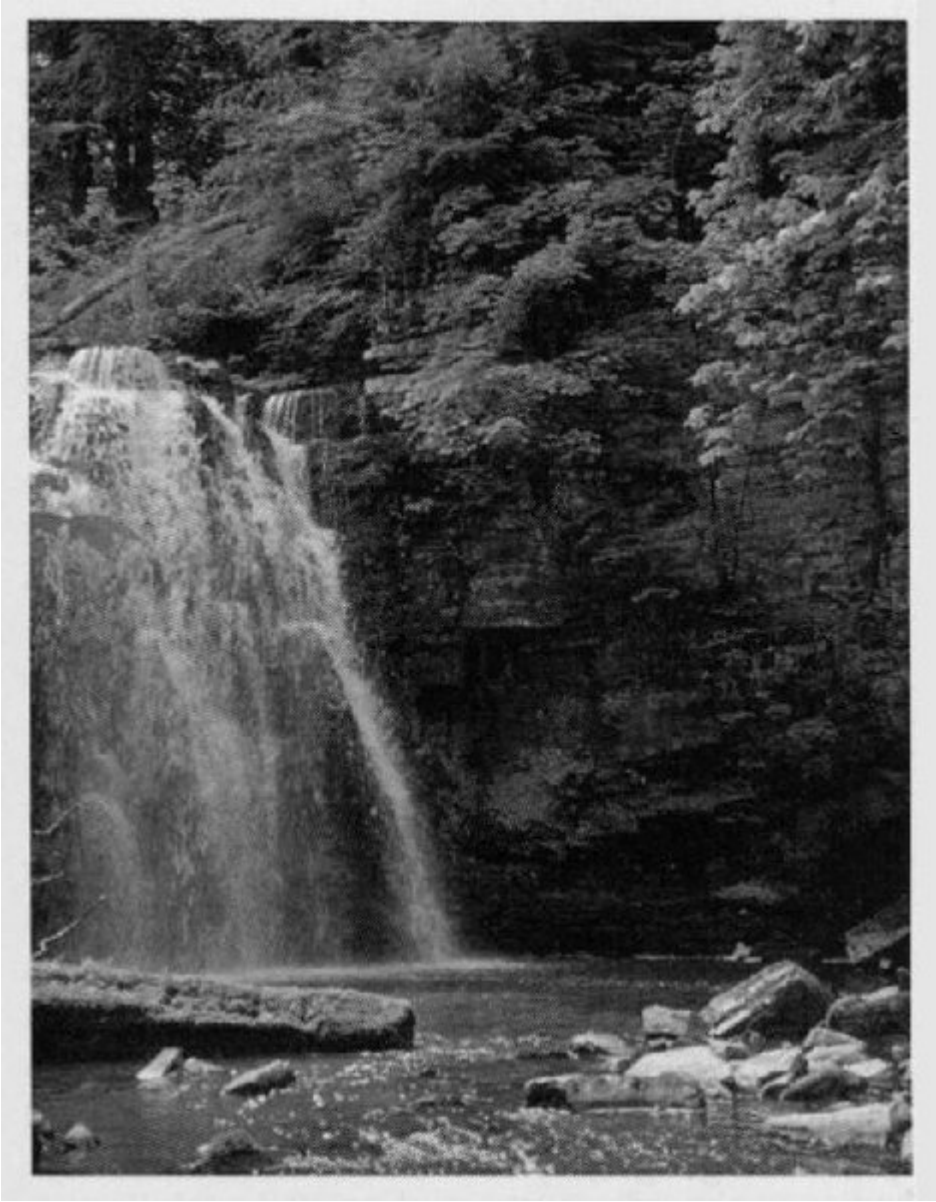
It is, however, other fossil groups that have attracted most attention. Hinde (1887–1912) based several sponge descriptions on material from the Upper Linn Limestone, and Smith (1900) recorded conodonts from this locality in his pioneering studies of Scottish Carboniferous conodonts. Material from Linn Spout was included by Currie (1954) in the specimens on which she based both the genotype of the goniatite *Cluthoceras, C. truemani,* and a second new species *C. neilsoni.* Later, however, Riley (1996) demonstrated that this genus is a junior synonym of *Beyrichoceratoides.* Linn Spout is the type locality for the trilobite subspecies *Paladin eichwaldi paralis* (Reed, 1943; Osmólska, 1970). The limited rugose coral fauna (which includes the type material of *Dibunophyllum linnense*) *is* also significant as one of the youngest faunas of its kind in the British succession. Hill (1938–1941, 1948) attached considerable importance to this and considered that the Upper Limestone Formation corals formed a distinct group, which she referred to her Coral Zone 4

(Hill, 1938–1941). The colonial species found at Linn Spout, *Aulina rotiformis,* has also been recorded from China (Hill, 1938–1941) and is particularly important for understanding coral palaeobiogeography and evolution (Hill, 1948).

Conclusions

The sequence at Linn Spout provides an outstanding section of the richly fossiliferous Upper Linn (Calmy) Limestone (Arnsbergian Upper Limestone Formation), a marine unit with a fauna of Immense taxonomic and palaeo-ecological significance. It is the type locality for a variety of invertebrate fossil taxa (genera and species) including sponges, conodonts, trilobites and cephalopods, and also contains interesting brachiopod, bivalve, bryozoan and foraminiferan faunas. Species present are of great value in palaeogeographical reconstructions for this part of the Carboniferous System, both on a regional and on an international scale.

References



(Figure 2.37) Waterfall section of the Upper Linn (Calmy) Limestone (Upper Limestone Formation, Clackmannan Group, Arnsbergian) at Linn Spout, near Dairy. (Photo: C. MacFadyen.)