Betton Dingle

[SJ 317 019]–[SJ 320 011]

Introduction

Betton Dingle is the type locality for the Betton Shale Formation and shows some of the best exposures in the upper part of the Abereiddian Stage as developed in the Shelve area, ranging from the higher part of the Hope Shale Formation (*artus* Zone) through the Weston Flags Formation to the Betton Shale Formation (both *murchisoni* Zone).

The Betton Shale Formation was introduced by Lapworth and Watts (1910, p. 752) as the Tenon' or *Didymograptus murchisoni* Shales'. Although the Weston Flags Formation, introduced by Lapworth (1887, p. 662) as the 'Weston Group', has its type locality to the south, at Priestweston (Whittard, 1960, p. 281), its most fossiliferous development is to be found in Betton Dingle. The stratigraphical nomenclature in the Shelve area has undergone many modifications since Lapworth's (1887) original scheme (see Whittard, 1979, fig. 3). The nomenclature used by the British Geological Survey (1991, 1994b) is used here, being an updated version of that proposed by Whittard (1979).

Betton Dingle has featured in most stratigraphical descriptions of the Shelve succession, as the type locality for the Betton Shale Formation and also as a source of fossils: trilobites (Whittard, 1955–1967), brachiopods (Williams, 1974), graptolites (Strachan, 1986) and crinoids (Ramsbottom, 1961; Donovan, 1986–1995).

Description

The section is described working downstream and upwards through the succession. Northeast of Ganderbeach the stream follows the line of a fault, which controls its course along the western flanks of Bromlow Callow (Figure 10.6). Along this stretch [SJ 3204 0114] there are exposures of andesitic lavas and tuffs of the Stapeley Volcanic Member of the Hope Shale Formation, dipping WNW at 35°. Immediately north of the footpath [SJ 3201 0119], soft shales of the highest part of the Hope Shales (formerly termed the Stapeley Shales) crop out in the stream and yield trilobites including *Ogygiocaris seavilli* Whittard, *Protolloydolithus neintianus* Whittard and *Platycalymene tasgarensis* Shirley and the graptolites *Didymograptus artus* Elles and Wood and *Acrograptus acutidens* (Elles and Wood). This outcrop of Hope Shales is in faulted contact with the Stapeley Volcanic Member to the south-east and is locally faulted against the Weston Flags Formation to the north-west. The latter comprises massive flagstones and siltstones with subordinate shale horizons, one of which is exposed in the angle between two streams to the east of Lyde Cottage [SJ 3180 0147] and has yielded the richest fauna known from the Weston Flags: the trilobites *Ogyginus corndensis* (Murchison) and *Platycoryphe vulcani* (Murchison), the brachiopods *Pseudolingula granulata* (Phillips) (= *spatula* Williams) and *Tissintia prototypa* (Williams), the graptolite *Didymograptus murchisoni* (Beck) and the crinoid *Iocrinus shelvensis* Ramsbottom (type locality), together with cephalopods and numerous bivalves.

Some 120 m south-east of the road bridge at Lyde, the Weston Flags Formation passes upwards into the Betton Shale Formation (Figure 10.6), a sequence of micaceous, rusty weathering, blue-hearted shales. The most extensive outcrops occur over a distance of 400 m north of the bridge at Lyde [SJ 3164 0159], where the stream runs northwards, more-or-less along strike; the beds dip WNW at about 55°. This section is separated from that south of the bridge by a fault. The shales are very fossiliferous and have yielded a mixed trilobite-graptolite fauna that includes the trilobites *Ogyginus corndensis, Ogygiocaris bettonensis* Whittard (type locality), *Bettonolithus chamberlaini* (*Elles*) (*=Bettonia frontalis* Whittard) and *Trinucleus acutofinalis* Whittard and the graptolites *Didymograptus murchisoni* and *Gymnograptus?* sp..

Interpretation

Betton Dingle affords one of the best sections through the upper part of the Abereiddian Stage in the Shelve succession. Even though much of it is drift-covered and exposure is discontinuous, there are sufficient exposures to demonstrate the typical lithologies and faunas of the upper part of the Hope Shale, Weston Flags and Betton Shale formations.

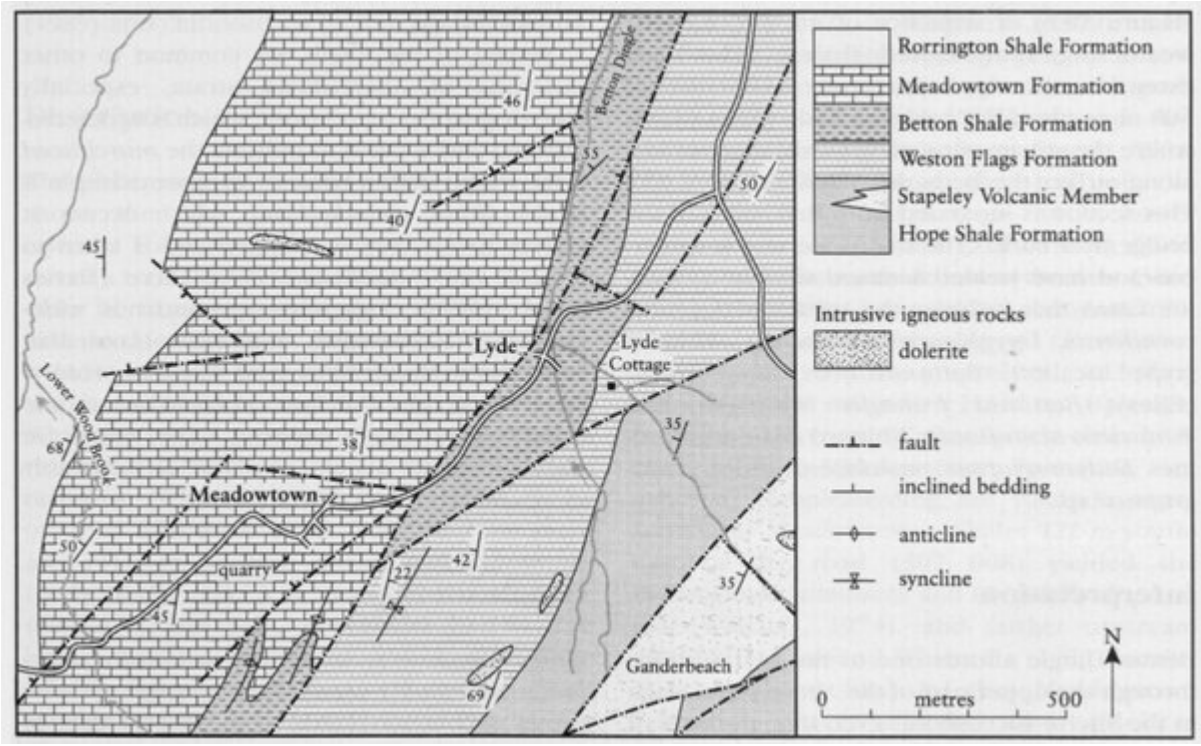
Faunally there are changes from the atheloptic *Ampyx–Protolloydolithus–Stapeleyella* faunas of the higher Hope Shales to the *Platycoryphe–Ogyginus–Tissintia–bivalve* fauna of the Weston Flags, which is akin to the *Neseuretus* biofacies, and the *Bettonolithus–Trinucleus–Ogygiocaris–Didymograptus* fauna of the Betton Shales, which is of intermediate character. The whole sequence is a markedly shallower-water facies than that of the lower Hope Shales (see Hope Valley site report), which is in a cyclopygid biofacies. The Weston Flags Formation in particular has been interpreted as being extremely shallow-water, even estuarine, in origin (Whittard, 1979, p. 38), with fossiliferous horizons containing rich, bivalve-dominated faunas; the presence of brachiopods, trilobites and crinoids attests to fully marine conditions prevailing, at least during deposition of the shale horizons. The mixed, more 'normal' trilobite-graptolite faunas in the silty shales of the Betton Shale Formation suggest a return to slightly deeper, more offshore conditions and seem to herald a general deepening in the succeeding Meadowtown Formation and Rorrington Shale Formation of Llandeilian–Aurelucian age.

Several of the fossils are common to other outcrops of Abereiddian strata, especially *Didymograptus murchisoni,* which is widely distributed and is taken to indicate the *murchisoni* Zone in the Betton Shales. Another example is *Bettonolithus chamberlaini,* which occurs at Howey Brook (see site report) and is taken to indicate the *murchisoni* Zone there (Davies *et al.,* 1997). *Ogyginus corndensis* is widespread in Abereiddian and early Llandeilian rocks in the Builth Inlier, and *Tissintia prototypa* characterizes the later Abereiddian in the Llandeilo and Builth districts. Other forms are peculiar to the Shelve area and are probably more closely facies-controlled.

Conclusions

Betton Dingle is an important section for interpreting the Shelve area. The graptolite–trilobite faunas enable correlation of the Abereiddian of the Shelve sequence with areas elsewhere and allow an interpretation of the changing environments of deposition.

References



(Figure 10.6) Geological map of the area of Betton Dingle and Meadowtown, from the British Geological Survey (1991).