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## Spywood and Aldress dingles

[SO 276 957]–[SO 281 966] and [SO 284 961]

### Introduction

Spywood and Aldress dingles expose an almost continuous succession, in fossiliferous strata and without structural complications, through the lower Caradoc Series from the base of the Aurelucian well into the Burrellian Stage of Fortey *et al.* (1995) (the Llandeilo to Caradoc of earlier writers, e.g. Williams *et al.*, 1972). The sequence exposes much of the Rorrington Formation, the whole thickness of the Spy Wood and Aldress formations, and the base of the Hagley Volcanic Formation. It is a prime reference section for the Caradoc rocks and the faunal succession of the Shelve area and of particular importance in regional correlations between the historical type Caradoc area and the contemporaneous basinal graptolitic succession.

The stratigraphy has been summarized in several papers (listed by Whittard, 1931), and details of the section appear in Whittard (1979, pp. 48–51, figs 30, 32), who gave brief descriptions and sketch maps. The present account draws on a synthesis by Cave and Haim (in press) describing the geology of the Shelve and Montgomery areas (British Geological Survey, 1991, 1994b).

### Description

Spywood Dingle extends obliquely across the strike of the Rorrington Formation (Figure 10.7) and (Figure 10.8), from close to its contact with the Meadowtown Formation at [SO 285 962] to the base of the Spy Wood Formation [SO 2819 9581]. It then extends WNW across the Spy Wood Formation and most of the Aldress Formation, to join Aldress Dingle at [SO 279 960]. Aldress Dingle exposes a section, mainly along strike, in the upper part of the Aldress Formation and exposes the Hagley Volcanic Formation near its junction with Marrington Dingle.

The Rorrington Formation consists of dark-grey mudstones dipping steeply (about 60°) west. Outcrop is discontinuous, and the middle parts are less readily examined (Dr R. Bettley, pers. comm., March 1998). Towards the base the mudstones are blocky, soft and very dark-grey, with a brown streak. Above the middle of the formation the rock is less dark, slightly silty, finely micaceous and locally faintly colour-banded, and higher in the formation black mudstones again dominate the succession. Bioturbation is generally absent.

The fauna includes shelly fossils, mainly brachiopods, trilobites, ostracods, orthoconic cephalopods and numerous graptolites. The brachiopod fauna is dominated by unguulate forms, articulate genera being represented by scarce juvenile valves. Whittard (1955–1967) described 14 species of trilobite from the Rorrington Formation, of which *Spirantyx calvarina* and *Primaspis whitei* are from Spywood Dingle. Jones (1987) recorded three new ostracod species from the Rorrington Formation in Spywood Dingle: *Bullaeferum llandeiloense*, *Laterophores elevatus* and *Pariconchoprimitia oscillata*. Hughes (1989, fig. 12a) recorded several graptolites, including *Dicellograptus geniculatus* Bulman, *D. salopiensis* Elles and Wood, *Hustedograptus* [*Glyptograptus*] cf. *teretiusculus* (Hisinger), *Leptograptus validus* Elles and Wood, *Nemagraptus gracilis* (Hall), and *Pseudoclimacograptus modestus* (Ruedemann). *Dicellograptus geniculatus*, which occurs low in the succession below the range of the *N. gracilis*, indicates the upper part of the *teretiusculus* Zone, whilst the presence of *N. gracilis* through the rest of the formation indicates the *gracilis* Zone (Hughes, 1989).

The Spy Wood Sandstone Formation is a well-bedded, grey calcareous sandstone about 40 m thick, exposed in Spy Wood Brook at [SO 2818 9582]. The sandstone beds range up to 0.20 m thick and are separated by beds of grey silty mudstone. The sandstones are bioclastic and thicken upwards in the basal 5 m, becoming thinner at the top of the formation and forming transitional boundaries with the mudstone formations above and below. Typically the sandstones are composed mainly of angular quartz grains with mica flakes, cemented with calcite.

The fauna of the formation is dominantly shelly. Williams (1974) recorded 21 taxa of brachiopods, including the genera *Bicuspina*, *Bystromena*, *Dalmanella*, *Glyptorthis* and *Sowerbyella*. Whittard (1955–1967) recorded 12 trilobite taxa, all rare apart from *Platycalymene duplicata* (Murchison) and species of *Marrolithus*, and his record of the Costonian species *Costonia ultima* (Bancroft) from the upper part of the formation is particularly important for correlation. Ostracods are common and include *Harperopsis bicuneiformis* (Harper), *Histina xanios* Jones, *Ogmoopsis* (*Quadridigitalis*) *siveteri* Jones, and *Piretopsis* (*Protallinnella*) *salopiensis* (Harper) (Jones, 1986–1987). Of the graptolites, the commonest is *Orthograptus uplandicus* Wiman sp. (Strachan, 1986), which Hughes (1989) considered likely to be identical to *O.* cf. *apiculatus* Elles and Wood. The discovery of *Nemagraptus gracilis* near the middle of the formation (Cave and Haim, in press) is valuable for correlation. Fragmentary bryozoa and crinoids are abundant and plates of the machaeridian *Lepidocoleus* occur.

The Aldress Shale Formation is about 300 m thick and consists mainly of finely micaceous shaly mudstone, usually grey or olive grey-green in colour. There are sporadic interbeds of fine-grained, usually feldspathic, non-laminated volcanogenic sandstone (Figure 10.8). A massive fine-grained feldspathic sandstone several metres thick is exposed in Aldress Dingle [SO 2810 9645].

The faunas from Spy Wood Dingle and Aldress Dingle contain numerous graptolites, including *Amplexograptus leptotheca* (Bulman) (= *A. fallax* Bulman, according to Hughes, 1989, but not Strachan, 1986), *Climacograptus* cf. *antiquus* Lapworth, *Dicranograptus* cf. *furcatus minimus* Lapworth, *D. spinifer* Elles and Wood, *Diplograptus foliaceus* (Murchison), *Lasiograptus costatus* Lapworth and *Orthograptus* cf. *amplexicaulis* (Hall), together with the dendroid *Dictyonenza fluitans* Bulman. Shelly fossils include lingulate brachiopods, various bivalves and other mollusca, and the trilobite *Dionide euglypta quadrata* Whittard. At Ox Wood Dingle, north of the present site, volcanogenic sandstones in the upper part of the formation have yielded dalmanellid brachiopods and *Sowerbyella* cf. *sericea permixta* (Williams, 1974), together with the trilobites *Salterolithus caractaci* (Murchison) and *Broeggerolithus broeggeri* (Bancroft), which give an early Soudleyan age.

The Hagley Volcanic Formation is composed of feldspathic sandstones, volcanic conglomerates and breccias, with thinner cross-bedded sandstones and minor rhyolitic tuffs. The base rests on the Aldress Formation in Aldress Dingle, 200 m east of the junction with the River Camlad [SO 2770 9587]. A roadside section [SO 2760 9580] shows more than 25 m of massive greenish-grey sandstones, with sedimentary breccia horizons containing siltstone clasts up to 100 mm long. Sole markings are common and some beds are clearly load-cast into the underlying sediments. No fossils are recorded from the Hagley Volcanic Formation at this locality, but *Broeggerolithus broeggeri* and *Salterolithus caractaci*, recorded elsewhere in the formation by Whittard (1955–1967, p. 306), indicate an early Soudleyan age. Graptolites from the formation include *Climacograptus antiquus*, *C. bicornis* (Hall), *Diplograptus foliaceus* and *Pseudoclimacograptus scharenbergi* (Lapworth) and are referable to the *multidens* Zone.

## Interpretation

The dark-coloured laminated mudstones of the Rorrington Formation, generally lacking bioturbation and with a limited benthic fauna but with a rich graptolitic fauna, are considered to have accumulated in a basinal setting with poorly oxygenated waters at the sea floor. These conditions obtained during the later part of the *teretiusculus* Zone and the greater part of the *gracilis* Zone, which was a time of marine transgression (Brenchley, in Bevens *et al.*, 1992).

The Spy Wood Sandstone represents a phase of high-energy influxes of sand and bioclasts from a shallow, well-oxygenated sea, transported by frequent storm events into an existing low-energy muddy environment. It is likely that the marginal sea was formed by rapid marine inundation of the existing basin-margin in the neighbourhood of the Long Mynd, for the Caradoc area to the east was inundated at exactly this time: the Hoar Edge Grits and Coston Beds, which rest unconformably on Cambrian and Precambrian rocks, are identical with the Spy Wood Sandstone in yielding respectively *Nemagraptus gracilis* and *Costonia ultima*, allowing their close correlation (Whittard, 1966, p. 283). The ostracods and articulate brachiopods of the Spy Wood Sandstone also permit correlation with Costonian strata in parts of Wales, e.g. at Bryn-banc Quarry, Lampeter Velfrey (Jones, 1986–1987; see site report for Bryn-banc).

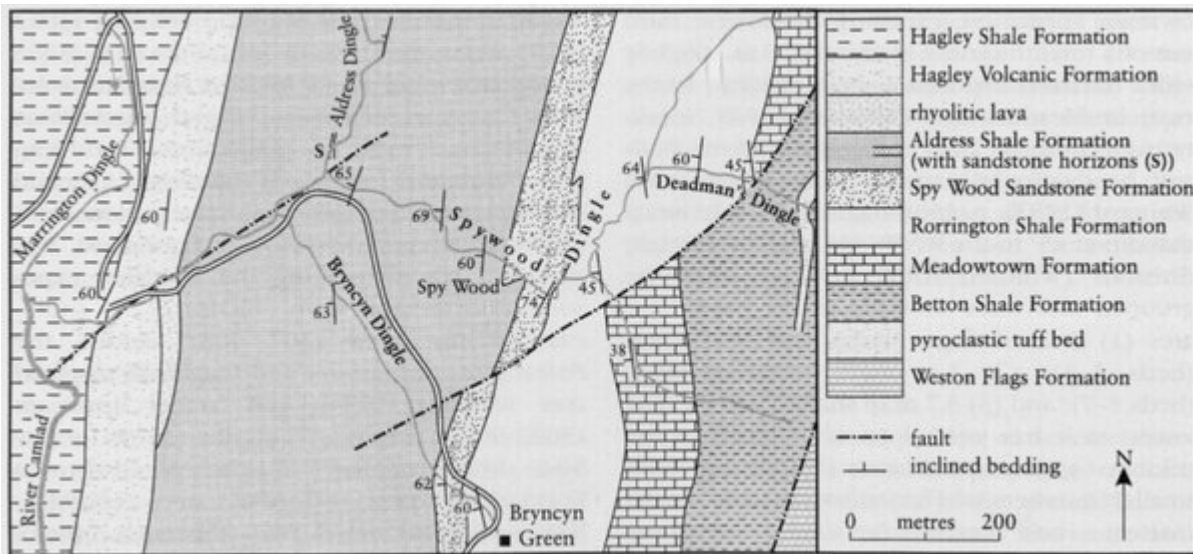
The Aldress Shale Formation represents a return to deposition of graptolitic mud but differs from the Rorrington Formation in lacking fine lamination and in being pervasively bioturbated. Although the formation accumulated in a slightly more oxic environment, the articulate brachiopods are not in the mudstones but are confined to the volcanogenic sandstone beds (Williams, 1974, p. 21) and seem to have been transported into the basin. The trilobites from the higher beds indicate an early Soudleyan age, but there is no evidence of a stratigraphical break above the Spy Wood Sandstone, and the lower part of the formation presumably belongs to the Harnagian Substage.

The Hagley Volcanic Formation represents the reworked remains of an explosive volcanic centre. Some lines of evidence — the lack of sorting of many of the conglomerates, the range of maturity in the clast shapes and the fact that in some beds the clasts are mud-matrix supported — suggest that much of the detritus was transported in high-density turbidity flows and mass-flows. Allochthonous brachiopod debris in the sandstones indicates a shallow marine source. The thinner and finer interbedded sandstones may be low-density turbidites formed during the waning of high-energy activity. Cross-bedding, flute casts and groove casts indicate turbidity flow from the NNE.

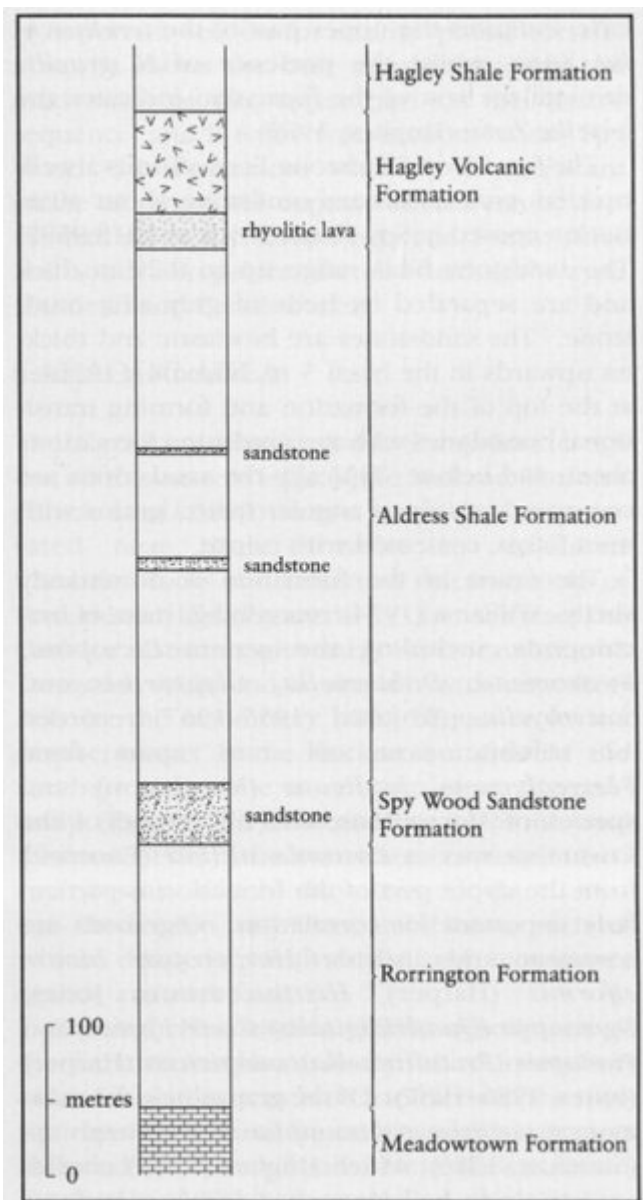
## Conclusions

The Spy Wood and Aldress section is a nationally important section for stratigraphical correlation. It shows the best transect through the mudstones of the upper part of the Shelfe sequence, and it is the type section for the Spy Wood Grit Formation, which is a significant phase of sandstone deposition, containing fossils that allow correlation between South Wales and south Shropshire, thereby linking the type Llandeilo and Caradoc areas.

## References



(Figure 10.7) Geological map of Spywood and Aldress dingles and the adjoining dingles, from a map prepared by Dr R. Cave.



(Figure 10.8) Vertical section exposed in the Spy Wood and Aldress areas, prepared by Dr R. Cave.