Little Don

Highlights

Little Don is the international stratotype for the base of the Langsettian (Westphalian A *auct.*) Stage (Figure 2.9).

Introduction

The banks of the River Little Don, 1 km east of Langsett and 20 km north-west of Sheffield, South Yorkshire [SE 222 004], includes this internationally recognized stratotype-section. It lies near the southwestern edge of the Yorkshire Coalfield, and thus is near the middle of the Pennine Basin. Non-marine bivalves from here were described by Eagar (1953a), and Love (1965) investigated pyrite diagenesis in the shales. The earliest description of the stratigraphy is by Calver (1967). Intensive investigations on the site started in the 1970s, when it became the leading contender for the stratotype of the Langsettian Stage (Westphalian A, as was). This has led to a series of detailed accounts of the site (Calver and Owens, 1977; Ramsbottom, 1981; Owens *et al.,* 1985).

Description

Lithostratigraphy

About 3.5 m of strata are exposed here (Figure 2.10). The very basal bed is a coarse sandstone, representing the top of the Rough Rock. This is overlain by a thick seat earth, which in turn is overlain by a 14 cm thick coal known as the Pot Clay Seam, named after the use to which the seat earth has been put. The succeeding 2 m of strata are mudstones.

Biostratigraphy

Marine bands

Marine fossils occur in a 66 cm thick interval of mudstones, which lies 24 cm above the Pot Clay Seam (locally known as the Pot Clay Marine Band). According to Owens *et al.* (1985), the marine band has yielded a rich assemblage of ammonoids, including *Gastrioceras subcrenatum* (Frech), *Gastrioceras* sp. nov. ('with coarse lirae') and *Homoceratoides divaricatus* Cope. This clearly indicates the Subcrenatum Marine Band, in the classification introduced by Ramsbottom *et al.* (1978). The assemblage is typical of the deep-water *Gastrioceras–pectinoid* facies of Calver (1968).

Non-marine bivalves

Eagar (1953a) described bivalves from a 9 cm thick mudstone immediately overlying the Pot Clay Seam here. The assemblage consists of *Carbonicola lenisulcata* (Trueman), *C. bellula* (Bolton), *C.* aff. *fallax* Wright, *C.* aff. *limax* Wright, *C.* aff. *protea* Wright and *Naiadites hibernicus* Eagar. The assemblage is clearly of the lower *C. lenisulcata* Zone (*C. protea–C. fallax* Subzone). Although assemblages of this type are well known in the upper Namurian, Trueman and Weir (1948) placed the base of this zone at the Subcrenatum Marine Band. However, this diminishes the value of the zone as a purely biostratigraphical unit, and there seems no good reason for assigning assemblages, such as this one from above the Pot Clay Seam, to the base of the *C. lenisulcata* Zone.

Other animal fossils

Ramsbottom (1981) recorded ostracods (*Carbonita, Geisina*) and fish scales (*Elonichthys, Rhadinichthys, Rhabdoderma*) from the mudstones between the Pot Clay Seam and the Subcrenatum Marine Band.

Palynology

Pollen and spores from 20 levels within the section are identified in Ramsbottom (1981). According to Owens *et al.* (1977), the boundary between the *Triquitrites sinani–Cirratriradites saturnii* and *Raistrickia fulva–Reticulatisporites reticulatus* zones occurs in Britain at about the level of the Subcrenatum Marine Band. According to Owens *in* Ramsbottom *et al.* (1979), this boundary is marked by the appearance of significant numbers of *Triquitrites* and *Ahrensisporites.* Unfortunately, Ramsbottom (1981) does not give quantitative data, but it may be significant that two species of *Ahrensisporites* appear in the seat earth below the Pot Clay Seam. One of the other indices for the zonal boundary is the base of the range of *Florinites mediapudens* (Loose) Potonié, and this was found in most samples from the seat earth upwards. It would seem, therefore, that the base of the *T. sinani–C. saturnii* Zone here occurs a little way below the Subcrenatum Marine Band.

Chronostratigraphy

The base of the Langsettian Stage is defined 'at the base of the Subcrenatum Marine Band, which overlies the Pot Clay Coal' (Ramsbottom, 1981).

Interpretation

The Westphalian A was proposed as a substage in 1927 (Jongmans, 1928), and was only later upgraded to a stage (George and Wagner, 1972). This promotion also required a change of name for the interval, which is now called the Langsettian, following Owens *et al.* (1985). In its 1927 form, the effective stratotype was the Sarnsbank Marine Band in the Ruhr Coalfield. This is only seen in underground workings, however, and so it was decided to find an alternative surface exposure in another coalfield. After investigating a number of sites in Britain (Calver and Owens, 1977), the SCCS Westphalian A, B and C Working Group proposed the Little Don as the stratotype (Owens *et al.,* 1985). Both the name Langsettian and the stratotype were ratified by the SCCS in 1989, although they have yet to be ratified by the IUGS.

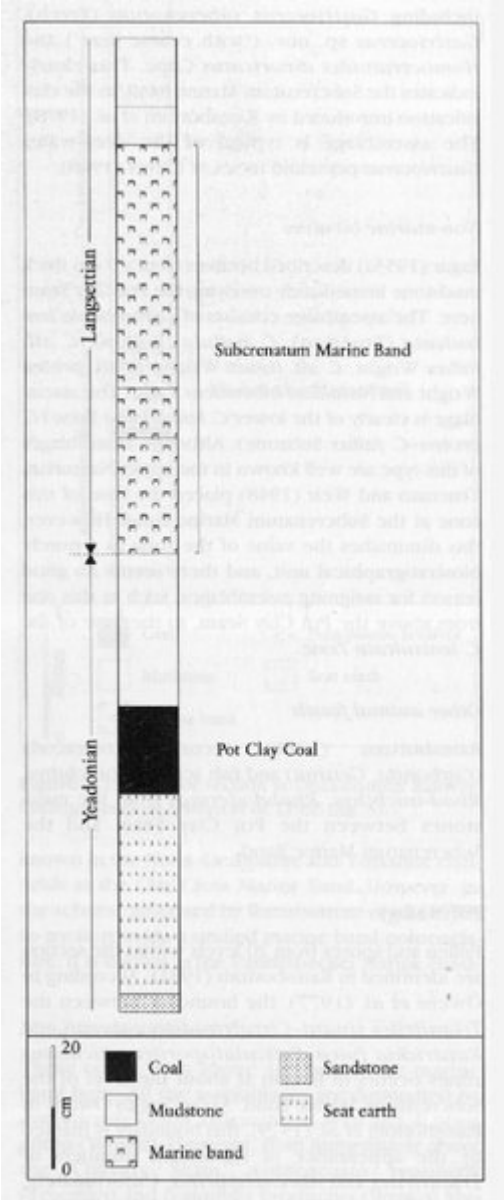
The Subcrenatum Marine Band is one of the most widely occurring marine bands in Britain; only in Scotland has it not been identified. According to Calver (1968), it is most fully developed in Lancashire and Yorkshire, at least in the areas north of St. George's Land. However, it has not been subject to the same sort of detailed investigation as has been done in South Wales, such as at the Vale of Neath (see Chapter 4), and so a detailed comparison with the areas north and south of St George's Land is impossible.

Conclusion

Little Don is an internationally recognized standard for defining a time plane, 315 million years before the present, and marking the start of what has become known as the Langsettian Age (and thereby the Westphalian Epoch).

References

(Figure 2.9) Little Don GCR site. International stratotype for the Yeadonian–Langsettian stage boundary. Photographed during the visit to the site by the IUGS Subcommission on Carboniferous Stratigraphy, August 1981. (Photo: W.A. Wimbledon.)



(Figure 2.10) Log of section at Little Don. Based on Owens et al. (1985, fig. 2).