
Illing's Trenches, Hartshill Hayes

[SP 3240 9423]

Introduction

Illing's Trenches are the type locality for the Abbey Shales Formation and are the only place where practically the full thickness of the formation has been examined. The strata contain a rich fauna and this site is internationally important, being the type locality for over 20 taxa of trilobites. The succession of trilobites is the best-documented for the mid St David's Series in Britain, making this an important biostratigraphical site.

Wing (1916) distinguished the Abbey Shales as a succession of variegated, mainly grey, shaly mudstones, sometimes pyritous, that differ in their darker colour and greater fissility from the underlying Purley Shale Formation and from the overlying division, now known as the Mancetter Shale Formation. Although the Abbey Shale Formation is very poorly exposed, Illing was able to map the outcrop from Atherstone in the north-west to near Stockingford in the southeast, and recent mapping has confirmed his work, with minor adjustments near Stockingford (British Geological Survey, 1994a). Along the outcrop the thickness of the formation varies from about 10 m to 40 m. General accounts of the geology are given by Bridge *et al.* (1998) and by Taylor and Rushton (1972), who also described part of the succession seen in Merevale No. 3 Borehole. Cook (1977) described a temporary exposure of Abbey Shale Formation near Stockingford.

Description

As there are no significant natural exposures of the Abbey Shale Formation, Illing caused trenches about 40 m long to be dug across the outcrop at Hartshill Hayes, where the formation is about 30 m in thickness and dips south-west at around 60°. The basal beds were not revealed, but a subsidiary section at Purley Park Lane (SP3101 9610) showed the lowest 3 m of the formation and the passage down into the Purley Shale Formation.

Illing (1916, p. 391) described the lithological succession minutely, and the overgrown state of the trenches at present is such that nothing further can be added. The 'calcareous glauconitic conglomerate' at the top of the succession is poorly visible where it is overlain by smooth, greenish-grey, micaceous mudstones of the Mancetter Shale Formation.

Illing recorded 22 fossil-bearing horizons, which yielded sponge spicules, brachiopods including *Linnarssonina*, hyolithids, *Stenotheca*, and more than 50 species of trilobites, including 32 of Agnostoidea (e.g. Figure 5.2) c. He described all the trilobites and tabulated their occurrences bed by bed (Illing, 1916, pp. 402–403). Rushton (1979) reviewed the agnostid fauna and Lake (1906–1946) revised most of the other taxa.

Interpretation

The Abbey Shale Formation is thought to have been deposited on a fairly shallow marine shelf during a period of relatively low oxygenation of the sea floor, when dark pyritous muds could accumulate. There were periods, however, when the influence of tidal currents (Allen, 1968, p. 35) deposited thin beds of glauconitic sandstone. The varying bottom-conditions led to colonization by a diversity of benthic trilobites.

Illing grouped the successive assemblages of trilobites into six faunas, which Rushton (1979) correlated approximately with the Scandinavian zonal succession (Table 5.1).

This succession of faunas formed an important component of the biostratigraphical synthesis by Thomas *et al.* (1984, fig. 3) and has been used as a standard for correlation with other successions, such as those of the St David's area in South Wales (Ming, 1916, p. 38), St Tudwal's Peninsula in North Wales (Nicholas, 1916; Young *et al.*, 1994) and Manuel's Brook in south-east Newfoundland (Howell, 1925). Although the succession at Porth-y-rhaw is better exposed, the faunal succession revealed by Illing's Trenches was documented in greater detail. Illing (1916, p. 401) showed that part of the

fauna was facies-controlled and mentioned one example, but other instances (Ming 1916, p. 450) were never described.

The site of Illing's Trenches is the type locality for at least 22 taxa of trilobites. Ming had 12 new species or subspecies of agnostid, to which two subspecies have since been added, and he described five new polymerid species, to which Lake added three more. Even though some synonyms have been detected, the Abbey Shales fauna exceeds 50 valid taxa. Illing (1916, p. 397) recorded the presence of juvenile forms of several species, but, with minor exceptions (Rushton, 1979, p. 56), these remain undescribed.

Illing's Trenches are not only a key site for the contributions that their faunas make to understanding the biostratigraphy of the mid-part of the Middle Cambrian in Britain and the Acado-Baltic realm: they also hold potential for onto-genetic studies of certain trilobites and the analysis of benthic faunas in relation to fluctuating environments in a Cambrian shelf sea.

(Table 5.1) The trilobite faunas recognized by Illing, correlated with Scandinavian zonal succession (Rushton, 1979)

Horizons	Faunas	Biozones
G1–G3	Upper <i>Paradoxides davidis</i> Fauna	<i>Ptychagnostus punctuosus</i>
F1–F3	Lower <i>Paradoxides davidis</i> Fauna	<i>Hypagnostus parvifrons</i>
E1–E3	<i>Hartshillia</i> (passage) Fauna	?
D1–D3	Upper <i>Paradoxides hicksii</i> Fauna	
B1–C3	Lower <i>Paradoxides hicksii</i> Fauna	<i>Tomagnostus fissus</i>
A4	<i>Paradoxides aurora</i> Fauna	<i>Ptychagnostus gibbus</i>

Conclusions

Illing's Trenches are the only place in England where the rich trilobite assemblages of the mid-part of the Middle Cambrian Period has been seen. They are the type locality for several trilobite species. The succession of trilobite zones is used as a standard for precise dating of rocks of similar age elsewhere in Britain and abroad.

References

Horizons	Faunas	Biozones
G1–G3	Upper } <i>Paradoxides</i>	<i>Ptychagnostus punctuosus</i> <i>Hypagnostus parvifrons</i>
F1–F3	Lower } <i>davidis</i> Fauna	
E1–E3	<i>Hartshillia</i> (passage) Fauna	?
D1–D3	Upper } <i>Paradoxides</i>	<i>Tomagnostus fissus</i>
B1–C3	Lower } <i>hicksii</i> Fauna	
A4	<i>Paradoxides aurora</i> Fauna	? <i>Ptychagnostus gibbus</i>

(Table 5.1) The trilobite faunas recognized by Ming, correlated with the Scandanavian zonal succession (Rushton, 1979).