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## Gasworks Lane

[SM 9568 1557]–[SM 9585 1528]

### Introduction

This site comprises exposures on New Road and alongside the lane leading to Fortune's Frolic, opposite the gasworks in Haverfordwest, Pembrokeshire. Cantrill and Jones (in Strahan *et al.*, 1914) established the Llandovery succession in the area, naming six units, the Basement Beds, the Cartlett Beds, the Gasworks Mudstone, the Gasworks Sandstone, the Uzmaston Beds and the Canaston Beds. The nomenclature was revised by Cocks and Price (1975), who renamed the Basement beds as the Portfield Formation, combined the Cartlett Beds and the Gasworks Mudstone into the Haverford Mudstone Formation, and united the Uzmaston and Canaston beds as the Millin Mudstone Formation. The Gasworks Lane locality provides intermittent exposures of the upper part of the Haverford Mudstone Formation and the contact with the Gasworks Sandstone Formation, which is displayed opposite to the gasworks entrance; these are the best-available exposures of the local lower Silurian. Cocks and Price (1975) gave the total thickness of the Haverford Mudstone Formation as 350–390 m, whereas Cocks *et al.* (1992) gave a figure of 300 m; the Gasworks Sandstone Formation is 85 m thick. The marine fauna of the Haverford Mudstone Formation is well known as one of the richest in the Rhuddanian of Britain, containing numerous brachiopods, trilobites, corals, bryozoans, crinoids, orthocones, ostracods and tentaculitids. Most of the recorded fossils come from the section along Gasworks Lane, and this is a key site for the study of lower Silurian stratigraphy and biotas.

The Llandovery succession in this area is typical of that north of the Variscan Front in Pembrokeshire, and offers a contrast with the very different succession found at the Marloes Sands site some 20 km to the south-west (Figure 3.18).

### Description

The buff silty mudstones at this site show no sedimentary structures to give evidence of wave or current agitation. The fauna is extremely diverse; a list was provided by Strahan *et al.* (1914, pp. 90–1), and includes numerous brachiopod species together with trilobites, tabulate and rugose corals, orthocones, tentaculitids, a cystid and the dendroid *Dictyonema*. Many of these taxa are in need of revision, but Temple (1975) has reviewed the trilobites and redescribed several species. Several workers have examined the brachiopods, including Williams (1951), Cocks (1968, 1970), who revised the strophomenids, and Temple (1987). The brachiopods include *Stricklandia lens lens* and indicate a Rhuddanian age (Cocks and Price, 1975; Cocks *et al.*, 1992). Cocks and Price (1975) recognized three main brachiopod assemblages in the upper beds of the Haverford Mudstone Formation in the Haverfordwest area, with the assemblage found in the exposures opposite the gasworks entrance being most variable and diverse. In this fauna *Eoplectodonta duplicata*, *Resserella llandoveryana*, *Leangella scissa*, *Eopholidostrophia sefinensis ellisae*, and *Katastrophomena scotica* are common. Other characteristic fossils include the trilobites *Dekalymene crassa*, *Acernaspis* sp. and *Encrinurus* sp., corals, bryozoans, gastropods, pelmatozoan columnals, including the crinoids *Pisocrinus*, *Macrostylocrinus*, *Dimerocrinites* and *Floricolumnus*, and the calcareous green alga *Cyclocrinites favus* (Cocks and Price, 1975; Siveter *et al.*, 1989; Donovan and Clark, 1992).

The site is the type locality for several fossil species, including the trilobite *Dekalymene crassa* (Shirley, 1936) and the brachiopods *Katastrophomena scotica* (Bancroft, 1949), *Leptaena haverfordensis* Bancroft, 1949, *Dolerorthis sowerbyiana* (Davidson, 1869), *Leptostrophia antecedens* Williams, 1951, *Leptostrophia reedi* (Bancroft, 1949), *Eopholidostrophia sefinensis ellisae* Hurst, 1974, *Strophonella* (*Eostrophonella*) *eother* Bancroft, 1949, *Fardenia* (*Saughina*) *geoffreyi* Bancroft, 1949, and *Leangella scissa* (Davidson, 1871).

### Interpretation

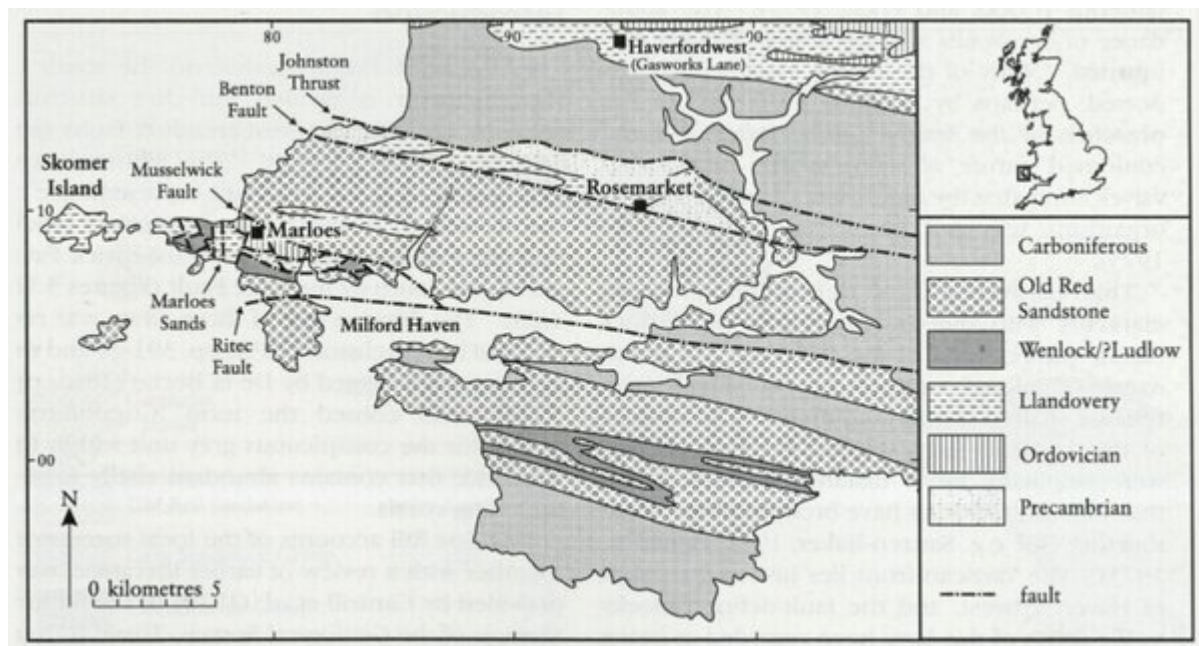
The sediments and fauna suggest that the deposition of the Haverford Mudstone Formation took place in an offshore shelf area where silty background sedimentation dominated. Sandstones within this unit and in the overlying Gasworks Sandstone Formation show upward grading, sharp erosive bases, sole marks and slump structures and were interpreted to be the products of turbidity flows by Sanzen-Baker (1972). The benthic assemblage appears to be assignable to the *Clorinda* Community, although *Clorinda* itself is absent, as are other pentamerids (Cocks and Price, 1975). The abundance of bryozoans and calcareous algae is also unusual. Many of the fossils have been transported, perhaps by turbidity currents, but the presence of the fragile *Cyclocrinites* and the conjoined nature of many of the brachiopod valves imply that the amount of disruption of the organisms was not great (Cocks and Price, 1975).

This environment of deposition contrasts markedly with that in the region of Marloes Sands, where strata of the same age are dominantly of volcanic origin, with occasional interspersed shallow-marine sediments. The severity of this contrast suggests that the two regions were originally more distantly separated and that Variscan tectonics have brought them closer together (see e.g. Sanzen-Baker, 1972; Hancock, 1973). The Variscan front lies just to the south of Haverfordwest, and the fault-defined blocks to the south of this have been regarded as being to varying degrees allochthonous, thrust from the south (Sanzen-Baker, 1972; Hancock *et al.*, 1981). The tectonic history of these blocks records early Palaeozoic N–S extension along the basin-bounding faults, which were then reactivated as thrusts during Variscan north–south crustal shortening and inversion (Powell, 1987).

## Conclusions

This site displays the best exposures of lower Silurian strata in the Pembrokeshire area north of the area significantly deformed by late Carboniferous tectonics (marked by the Variscan Front). The siltstones and sandstones of the Haverford Mudstone Formation and Gasworks Sandstone Formation in Gasworks Lane contrast with the coeval volcanic succession in the Marloes block just 20 km to the south-west, and the two areas were probably more distantly separated at the time of deposition. The rocks at Gasworks Lane and the very rich biota they contain provide evidence for an offshore shelf environment of deposition invaded by occasional distal turbidity flows. The site is very important for early Silurian fossils in the Welsh Basin, and is the type locality for several species, especially of brachiopods.

## References



(Figure 3.18) The geology of southern Pembrokeshire, showing the major structural blocks, the important faults, and the network localities at Gasworks Lane (Haverfordwest) and Marloes Sands; modified after Sanzen-Baker (1972).