County Durham's place in the development of geological science

An appreciation of the evolution and development of geological understanding is an important element in an area's geological heritage and thus its geodiversity.

Geological science developed in large part from the observations and deductions made by practical miners, quarrymen and civil engineers, concerned with profitable mineral extraction and construction projects. Their observations and deductions relate to geological sites and features, some of which are still visible today.

The word 'geology' can trace its origins back to Durham in the 14th century (see Conserving Geodiversity).

Centuries of successful mineral extraction within the county have been possible only by the skilful application of hypotheses developed by systematic observation of countless unknown and forgotten miners and quarrymen. The need to develop a sound understanding of the local rocks and geological structures was of particular importance in the lead mining areas of the Durham dales and the coalfield. By the early 19th century several local figures emerge in the annals of contemporary scientific literature as significant leaders in the emerging science of geology.

Notable figures in the lead mining areas include Westgarth Forster, William Wallace and Thomas Sopwith. Although, as may be expected, many of their hypotheses are now outdated, and in some instances discredited, their contributions to the development of understanding of Northern Pennine geology are undeniable, and stand as important milestones in the wider development of geological science.

As one of Great Britain's longest worked coalfields, the Durham Coalfield contributed much to the development of mining practices and techniques. One of the most significant of these was the work to develop a safe method of mine lighting, prompted by the loss of 92 lives in a methane explosion in May 1812 at Felling Colliery, then in County Durham. Prompted by this, the latest in a long history of such disasters, a committee was appointed to improve ventilation and lighting of coal mines. One of the outcomes was the development of the flame safety lamp. Although this came to be known as the 'Davy Lamp' after Sir Humphrey Davy who conducted much research on the problems of methane, it is known that George Stephenson, of locomotive fame, was also pursuing a similar line of investigation contemporaneously with Davy.

Until the early years of the 19th century coal mining in the county was limited to the area of the exposed coalfield. Indeed, until then it was generally supposed that coal deteriorated in quality when followed beneath the limestone. It was William Smith, often dubbed the 'Father of English Geology', who at the invitation of Colonel Braddyll a County Durham coal owner, concluded that the Magnesian Limestone rested unconformably upon the Coal Measures and that workable coal was very likely to be present in substantial quantities. His ideas culminated in the successful sinking of Hetton Colliery to the Hutton Seam in 1820, heralding a new and extremely profitable era for coal mining in the county. Such sinkings were far from easy as they involved penetrating the water-bearing Permian 'Yellow Sands'. Techniques developed here to deal with such difficult and dangerous ground have influenced mining and civil engineering worldwide.

Throughout subsequent years the area has been a fertile source of inspiration for research. Although it is impossible to name all of the significant players, mention must be made of the seminal work of Sir Kingsley Dunham (1910–2001). It was he, together with research colleagues such as Martin Bott, who developed the hypothesis of a buried granite beneath the Pennines to explain the origins and nature of the mineral veins of the Northern Pennines. The proving of this granite in the Rookhope Borehole was to prove a major milestone in the evolution of thinking on ore-forming processes worldwide. The great international importance of the Permian rocks of County Durham, and their part in influencing the development of the North Sea oil and gas fields, owes much to the work of D.B. Smith.

It is also important to recall that the North of England has given geological science one of its most familiar terms. To the Northern Pennine miner a 'sill' was any more or less horizontal body of rock. The name 'whin', meaning hard, black and intractable, was applied to one particular unit. When, in the 19th century the intrusive igneous nature of the Whin Sill was recognised, the term sill was soon adopted worldwide for intrusive bodies of this sort. It is not known exactly where in

northern England the term Whin Sill was first used by miners and quarrymen, though the Northern Pennines, including County Durham, seems highly probable.

Selected references

Challinor, 1971; Dunham, 1990; Forster, 1809, 1883; Hutton, 1831; Jevons, 1915; Galloway, 1882; Sedgwick, 1829; Sopwith, 1833; Smith, 1994; Smith and Francis, 1967; Wallace, 1861.

Photographs

(Photo 87) Sir Kingsley Dunham (1910–2001). BGS, ©NERC, 2004. Photo 88. Thomas Sopwith with a selection of his wooded models of geological structures. BGS, ©NERC, 2004.

Full references

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