

## CORRELATION OF THE TRIASSIC AND JURASSIC SUCCESSIONS PROVED IN THE LYME REGIS (1901) BOREHOLE WITH THOSE EXPOSED ON THE NEARBY DEVON AND DORSET COASTS



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The Lyme Regis (1901) Borehole was one of numerous coal-exploration boreholes drilled in southern England during the late 19th and early 20th centuries. It is one of the few deep boreholes (>200 m depth) in the east Devon-west Dorset area and, unlike more recent hydrocarbon-exploration boreholes, was continuously cored. The borehole was sited [NGR SY 3364 9297] on the floodplain of the River Lim on the outcrop of the Jurassic Blue Lias Formation, and was continuously cored to a final depth of 396.85 m within the Triassic Mercia Mudstone Group. Selected samples and some of the cores were examined by the Geological Survey geologists Jukes-Browne and Woodward who were working in the area at the time of drilling. The former published a description of the succession based on his and Woodward's notes and the driller's log, and correlated it with the succession of Triassic and Jurassic rocks that are almost wholly exposed in the cliffs between Sidmouth and Lyme Regis. A recent revision of the stratigraphy of the coastal successions has enabled that proved in the borehole to be reassessed and placed more accurately into its regional stratigraphical context.

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### INTRODUCTION

The Lyme Regis (1901) Borehole was drilled in an "endeavour to find coal at a place where no geologist would have recommended the attempt" (Jukes-Browne, quoted in Woodward and Ussher, 1911, p. 20). It is one of the few deep boreholes (>200 m depth) in the east Devon-west Dorset area and, unlike more recent hydrocarbon-exploration boreholes, was continuously cored. The borehole was sited [NGR SY 3364 9297] on the floodplain of the River Lim on the outcrop of the Jurassic Blue Lias Formation. It was continuously cored from just below ground level to a final depth of 396.85 m (1302 ft) within the Triassic Mercia Mudstone Group.

Selected samples were examined at the time of drilling by Jukes-Browne, and some of the cores were seen on site by Woodward. Jukes-Browne (1902) provided a description of the succession based on his and Woodward's notes and the driller's log, and correlated it with the succession of Triassic and Jurassic rocks that are almost wholly exposed in the cliffs between Sidmouth and Lyme Regis (Figure 1). The cores were broken up and dispersed to various interested parties. Fifty of the surviving specimens, now in museums in Exeter, Dorchester, Lyme Regis, Taunton and Torquay, were examined by Warrington and Scrivener (1980) who correlated the succession with that exposed on the coast, and 24 of these were sampled for palynomorphs by Warrington (1997).

The recent geological resurvey of the Sidmouth district (BGS 1:50k Sheets 326 and 340, England and Wales) included the first detailed measurements of the Triassic and Jurassic successions (Edwards and Gallois, 2004). The principal aim of the present account is to revise the correlation of the borehole succession with that exposed on the coast. The succession is described here in descending stratigraphical order.

### SUPERFICIAL DEPOSITS

The borehole was sited at about 15 m above Ordnance Datum on a veneer of alluvium (<1.5 m thick) resting on Head deposits, sand and gravel rich in chert and flint derived from the Upper Greensand Formation and the Clay-with-flints. Up to 1.5 m of

this material is exposed in the river bank adjacent to the borehole site, and up to 5 m of the same material crops out below Horn Bridge [NGR SY 3372 9276], 220 m south of the site, where the stream is more deeply incised. Jukes-Browne (1902) described the highest beds in the borehole as 3.25 m of "gravel, flint and valley deposits": these are interpreted here as predominantly Head deposits.

### JURASSIC ROCKS

#### *Blue Lias Formation*

The lower slopes of the Lim Valley and the river bed between Uplyme [NGR SY 329 934] and Jericho Weir [NGR SY 3397 9258] are underlain by Head deposits. At both localities, alternating mudstones and limestones of the Blue Lias Formation are exposed in the stream bed (Figure 2). In the intervening area the junction of the formation with the overlying Charmouth Mudstone Formation is obscured by landslip and Head deposits. There is, however, field and borehole evidence to suggest that the Blue Lias Formation subcrops beneath drift deposits along the floor of the Lim Valley everywhere between Lyme Regis and Uplyme, and that the base of the Charmouth Mudstone Formation lies at about 10 m above the valley floor at the borehole site. In the nearest complete cliff sections at Devonshire Head [NGR SY 334 914], 1.6 km SSW of the borehole, the Blue Lias Formation is about 29 m thick. This suggests that the base of the formation should be at about 19 m depth in the borehole. Jukes-Browne (1902) recorded interbedded limestones and mudstones of typical Blue Lias aspect at 3.25 to 7.21 m depth in the borehole, but no marked change in lithology between there and the base of the 'White Lias' at 28.98 m depth (see below).