CORRESPONDENCE

A note on the occurrence of marine animal remains in a Lancashire coal ball (Westphalian A)

(Plate 1)

SIR – Ever since Hooker & Binney (1854) described structurally preserved plants in coal balls from the Lower Coal Measures of Lancashire these permineralized peats have aroused the interest of both geologists and botanists, as a source of structural and ecological data on British Coal Measure plants (e.g. Williamson, 1872–93). The origin and formation of coal balls was the subject of a major contribution by Stopes & Watson (1908) that has remained substantially unchallenged to the present day. New discoveries in North America (Mamay & Yochelson, 1962) of marine animals in coal balls supported the conclusion that the formation of coal balls may be directly related to overlying marine waters supplying the calcium and magnesium carbonate of the coal-ball matrix. Recent interest in coal balls in the U.S.A. has concerned palaeooecological as well as botanical and geological studies (Perkins, 1976; Phillips, 1979; Eggert & Phillips, 1979). In their paper Mamay & Yochelson stated (p. 194) that ‘it may be that animal remains simply do not occur in coal balls in Europe or England’.

We should like to draw attention to the discovery by one of us (J.H.) of a coal ball (U.S.T.M.B 139) containing marine animal remains found at Rowley tip, Burnley, Lancashire, associated with otherwise ‘normal’ coal balls. The coal ball, measuring 15 cm across (Pl. 1a) is generally of the ‘heterogeneous’ type of Mamay & Yochelson (i.e. with patches of purely plant or purely marine sediment) but a true mixing of plant and animal material occurs in part. The animals consist mainly of goniatites (Pl. 1b) but we have seen other as yet unidentified fauna including bone fragments. The coal ball is composed mainly of plant fragments only some of which are identifiable. Lycopsods, both stems and stigmatic rootlets, are the most abundant plants in the coal ball but the flora also includes Calamites (Pl. 1b), Botryopteris, Achlamydocarpon, fern sporangia and megaspores including Cystosporites. Coprolites containing plant material also occur. The outer zone is pyritic and pyrite has permineralized some of the plant fragments as well as being incorporated into goniatite shells (Fig. 1b). The coal ball is surrounded by a coaly matrix showing that it truly occurred within the seam and was not a roof nodule. Details of the preservation awaits further study but this discovery further illustrates the probable common process of formation of American and British coal balls.

Of the 2000 or so coal balls from Burnley investigated during the present study only one such marine coal ball has been found. Roof nodules containing abundant goniatites with isolated fragments of plant material are well known, however (Stopes & Watson, 1908). Coal balls are known in Britain only from the Westphalian A and their absence from higher Coal Measure horizons has not been fully explained but it may be due to the lack of marine influence following peat formation. This alone, however, may not be the full explanation.

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References


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Explanation of Plate

Plate 1. (a) Etched surface of sliced coal ball. Surrounded by coal (arrowed) and containing goniatites as well as abundant plant fragments. About natural size.
Plate 1. (b) Detail of Plate 1 (a) showing association of goniatites (G), Calamites stem (C), Stigmaria (S) and a lycopod stele (L); In addition there is unidentified animal remains, possibly bone (B). × 3.
Plate 1. Marine remains in a Lancashire coal ball.