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THE CARBONIFEROUS CORAL *ORIONASTRAEA* IN IRELAND

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Abstract

A new record of the Carboniferous rugose coral genus *Orionastraea,* only the third from Ireland, is described from County Kilkenny. Other known occurrences of this coral, from Counties Clare and Tyrone, are re-examined in the light of new material. The specimens belong to two species, *O. placenta* (M'Coy) and *O. rete* Hudson, both new to Ireland, and indicate a Brigantian age (P_{1d} zone).

Introduction

The rugose coral genus *Orionastraea* Smith (1917), a frequent and characteristic member of late Dinantian (Lower Carboniferous) faunas in both England and Wales, and a useful zonal indicator, has proved elusive in Ireland. Clarke (1966, p. 177) recorded a single corallum from County Clare which he thought was the first discovery of the genus from Ireland, but Fowler (1953, p. 47) and Fowler & Robbie 1961, pp. 15, 16, 18, 78) had already recorded a specimen, collected by the latter, from County Tyrone. Both the Clare and Tyrone specimens were identified as *O. phillipsii* (M'Coy 1849) and prior to this study were the only known examples of Irish *Orionastraea.* Clarke's specimen has since gone missing.

Recently, however, I have collected additional specimens of *Orionastraea,* both from Clarke's locality in the Burren district of north County Clare, and from a new locality on the edge of the Slieveardagh coalfield in County Kilkenny. For the purpose of comparison I re-examined the specimen from County Tyrone and discovered that the Kilkenny, Clare, and Tyrone colonies belong to two different species of *Orionastraea,* neither of which is *O. phillipsii.* These species are therefore both new to Ireland and their occurrences have important stratigraphical implications.

Specimens are housed in the Institute of Geological Sciences, Leeds (IGSL) and in the Geological Museum of Trinity College, Dublin (TCD).

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Description of specimens

O. placenta (M'Coy) Fig. 1

The specimen from County Tyrone (IGSL NIR1363, 1364), recorded by Fowler *(ibid.)*, was found in a large block of limestone on the floor of Lisneight Quarry (townland of Killymurphy), 1033 m at 10° from Stewartstown church and 1.2 km southwest of Brigh Meeting House (Irish Nat. Grid Ref. H857 717; Tyrone 6″ Sheet 39).

The corallum is in two small pieces (2 × 4 cm, 2 × 3 cm) and its weathered distal surface reveals an astraeoid/thamnastraeoid mode of growth (septa continuous between corallites)

Fig. 1. *Orionastraea placenta* (M'Coy). Lisneight Quarry, Stewartstown, County Tyrone. Transverse section X4. IGSL PL407.

and exposes several calices in which there appears to be a prominent axial columella. These features led the late Stanley Smith to identify the coral as *O. phillipsii* which is unique amongst astraeoid/thamnastraeoid *Orionastraea* in possessing a columella. However, I have prepared a transverse section from this specimen (IGSL PL407) and out of twelve corallites visible in the section (Fig. 1) only two show any evidence of an axial structure; this is not a true dilated columella, but merely an extension of one of the major septa into the tabularium; in most corallites the axial region is empty. The Stewartstown specimen also differs from *O. phillipsii* in its smaller size (tabularium diameter of 2.0 mm, compared with 2.5-3.0 mm in the lectotype of *O. phillipsii*) and in possessing fewer septa (maximum number counted was 28 [in total], compared with 36 in *O. phillipsii*). These features suggest that the Stewartstown specimen should be identified with *O. placenta* originally described from Derbyshire (M'Coy 1849, p.124), which is also astraeoid/thamnastraeoid, but which differs in being smaller and non-columellate.

O. rete Hudson Fig. 2

The specimen from County Kilkenny TCD 19640) was found in McEwan's Quarry, 300 m north of Black Castle (townland of Killaree), which is 6.4 km northwest of Kilkenny City (Irish Nat. Grid Ref. S455 610; Kilkenny 6″ Sheet 14). It was collected from beds cropping out on the grassy slope above the west face of the quarry, 73 m at 113° from the nearby building.

In transverse section this specimen is similar to *O. placenta* in being non-columellate and is of even smaller size (tabularium diameter 1.5 mm, maximum septa 21). However, it differs significantly from both *O. placenta* and *O. phillipsii* in possessing an aphroid growth habit, with the septa retreating peripherally and not extending from one corallite to another (Fig. 2). Instead, the intervening areas between coral-

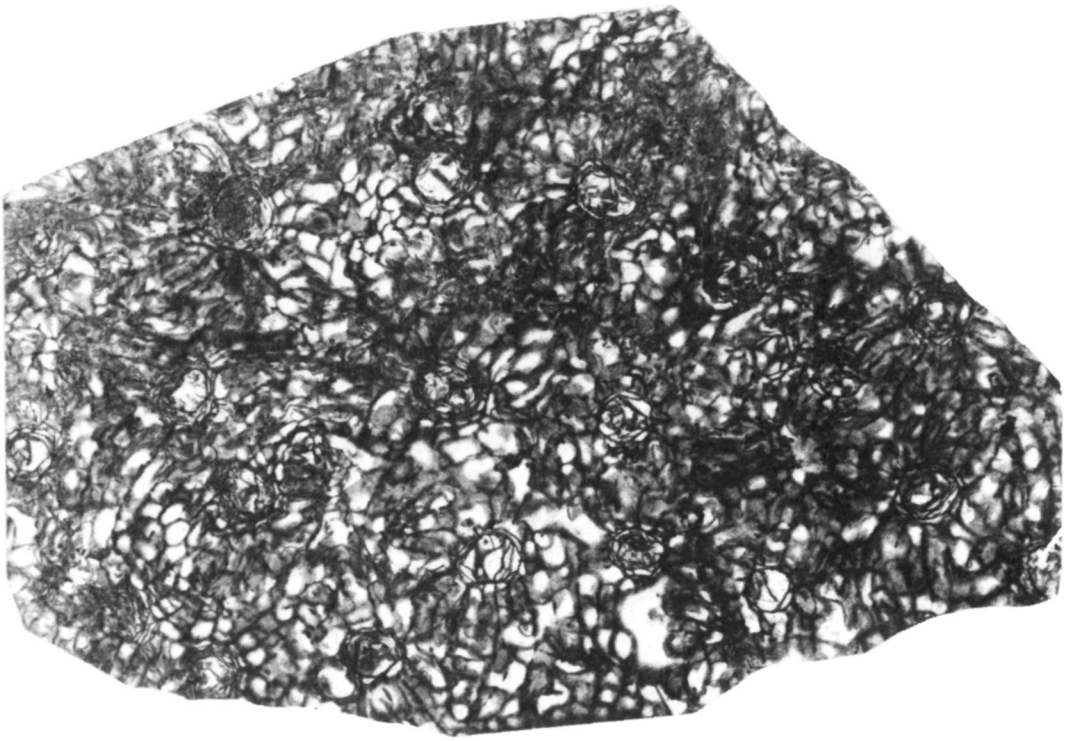

Fig. 2. *Orionastraea rete* Hudson. McEwan's Quarry, Black Castle, County Kilkenny. Transverse section X4. TCD 19640c.

lites are filled with large irregular dissepiments, a feature seen in very few species of *Orionastraea*. The size and septal numbers of these specimens identifies them with the smallest aphroid species, *O. rete,* described originally from Yorkshire (Hudson 1929, p.448).

The specimens from County Clare (TCD 19627, 19628) were collected from the highest bed exposed in Clare County Council roadstone Quarry (townland of Ballyinsheen More), 1.6 km north of Lisdoonvarna on the Ballyvaughan road (Irish Nat. Grid Ref. R150 995; Clare 6″ Sheet 8). The top surface of this bed, which forms the upper platform of the quarry, exposes several coralla which are easily recognisable as they have been selectively replaced by yellow dolomite. Only two coralla were removed; the remainder have been left *in situ*.

It has been difficult to elucidate the structure of this coral as a large amount of micrite has become trapped within the skeleton. However, clear patches reveal this specimen to be similar to that from Kilkenny in corallite size (tabularium diameter 1.00 mm), in number of septa (maximum 22), and in being non-columellate. Again the septa are discontinuous between corallites, and the aphroid habit is even more obvious as the corallites are spaced farther apart; this specimen also belongs to *O. rete*. To my knowledge these are the first records of this species outside its type area of North Yorkshire.

Stratigraphical implications

The two *Orionastraea* species represented in Ireland are members of a much larger group of *Orionastraea* species, which occurs in southwest England, Derbyshire, North Wales and most prolifically in North Yorkshire (Hudson 1929). These species are all confined to the Brigantian Stage of the Dinantian Subsystem. In North Yorkshire, and indeed over most of northern England, the Brigantian successions are characterised by a series of cyclothems and the exact stratigraphical ranges of the various *Orionastraea* species within these Brigantian cyclothems have recently been elucidated (Nudds 1975). Many species are confined to just one or two of the limestone members of the cycles and are therefore extremely valuable zonal indicators. Their discovery in the Irish Carboniferous allows precise correlations to be made with the known successions in northern England.

Figure 3a shows the succession of Brigantian cyclothems on the Askrigg Block of North Yorkshire and the ranges of the commoner *Orionastraea* species within this succession. The biostratigraphical goniatite zones of Bisat (1924) are added in their refined form from Ramsbottom (1974, fig. 25) against the Yorkshire column. From this it is apparent that

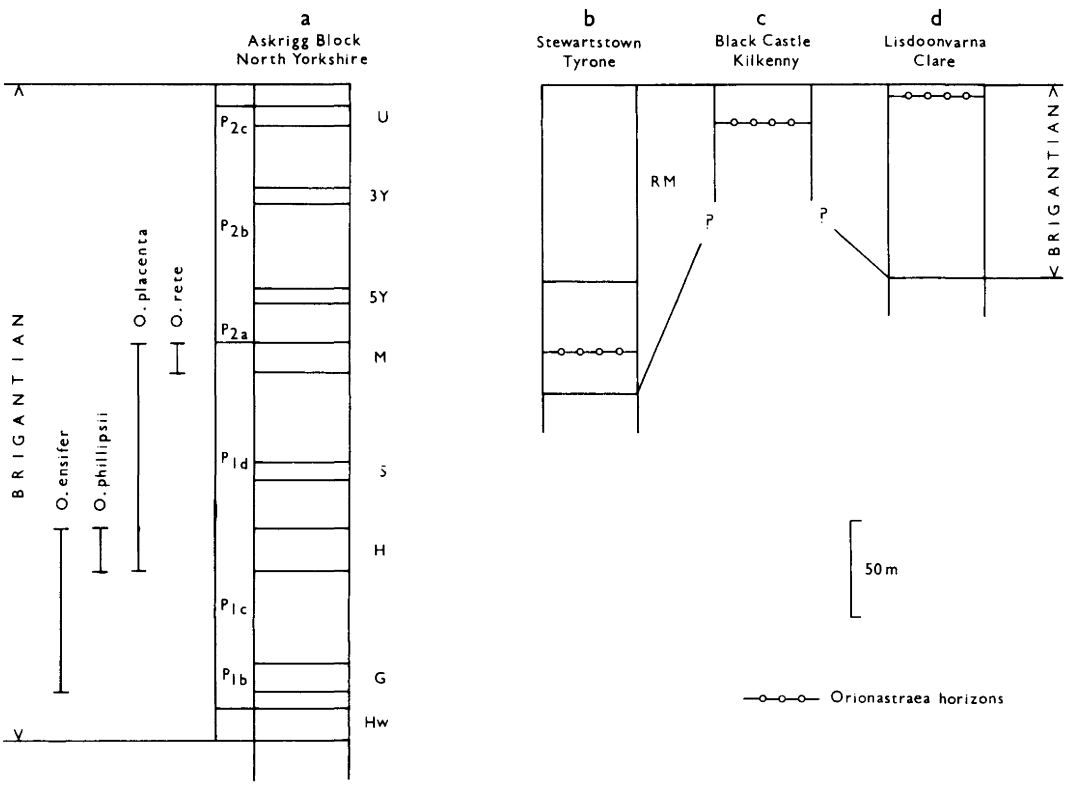

Fig. 3. Brigantian successions in (a) North Yorkshire, (b) Tyrone, (c) Kilkenny, and (d) Clare, showing Bisat's (1924) goniatite zones and the ranges of the commoner *Orionastraea* species against column 'a'. U = Undersett, 3Y = Three Yard, 5Y = Five Yard, M = Middle, S = Simonstone, H = Hardraw, G = Gayle, Hw = Hawes. (Names refer to cyclothem limestones). RM = Rossmore Mudstones. Column (a) after Ramsbottom (1974, fig. 25), (b) after George *et al.* (1976, fig. 16), (d) *fide* C.V. MacDermot.

both the Irish representatives of *Orionastraea (O. placenta* and *O. rete)* are confined in Yorkshire to the P_{1d} zone. Their occurrence in Counties Tyrone, Kilkenny, and Clare would therefore indicate a similar P_{1d} age for the beds from which they were collected (Fig. 3b-d).

The younger Brigantian succession of P_{2a-c} is represented in the Stewartstown area (Tyrone) by about 140 m of strata mostly comprising the thick Rossmore Mudstone (Fig. 3b). In the Black Castle area (Kilkenny) no measured sections through the Brigantian are available: apart from Nevill's (1957) record of *Diphyphyllum* cf. *fasciculatum* from near Ballysloe (about 20 km to the southwest) this is the only confirmation of a Brigantian age for these limestones. However, A.G. Sleeman (personal communication, 1979) has undertaken preliminary mapping in this area and from his results (and assuming a local dip of approximately 5°) I have estimated that the base of the Namurian probably lies about 20 m above the *Orionastraea* horizon at Black Castle, the intervening strata again representing P_{2a-c} (Fig. 3c). In Lisdoonvarna (Clare), however, there are only 6 m of strata separating the bed containing *Orionastraea* and the base of the Namurian, which rests on an erosional surface (Fig. 3d). Douglas(1909, p.563) recognised that there might be a 'slight local unconformity' above the limestone in the Lisdoonvarna area and Hodson (1954, p.263) sugested that this represented a 'considerable non-sequence'; he argued on faunal evidence that the upper beds of the Brigantian were missing in this region. This was later supported on lithological grounds by Hodson & Lewarne (1961, p.308).

The presence of *O. rete* just 6 m below the base of the Namurian would suggest that Hodson was correct and that much of P_{2a-c} is missing. However, an alternative hypothesis is that the Brigantian sequence above the *Orionastraea* horizon is complete, but is extremely condensed. The presence of granules and nodules of phosphate in these uppermost Brigantian limestones (C.V. MacDermot, personal communication, 1978) indicates slow deposition and lends some support to the latter hypothesis.

In conclusion it is possible that *Orionastraea* will eventually prove to be more common in Ireland than has hitherto been thought; it should in fact be expected in any relatively clean Brigantian shelf limestones, especially in association with cerioid *Lithostrotion.*

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