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PRELIMINARY NOTE ON THE MICROPALAEONTOLOGY OF THE DINANTIAN DUBLIN BASIN, IRELAND (*)

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(4 fig. et 4 planches dans le texte)

ABSTRACT

The microfossils from two coastal sections within the Dublin Basin have been examined and preliminary results are presented. The Malahide succession contains a lower fauna of Tournayellids and an upper fauna characterised by *Spinotournayella* ? aff. *michoti*, both of Upper Tournaisian age. The Loughshinny succession has a fauna ranging from lowest Viséan to low middle Viséan age; the former containing *Spinotourneyella* ? *michoti* and *Endothyranopsis* ex gr. *staffelliformis* and the latter *Koninckopora sahariensis* and early Archaediscidae.

RÉSUMÉ

Les microfossiles de deux coupes situées sur la côte, dans le Bassin de Dublin, font l'objet de cette note préliminaire. La coupe de Malahide contient une faune inférieure à Tournayellides et une faune supérieure caractérisée par *Spinotournayella* ? aff. *michoti*; les deux appartiennent au Tournaisien supérieur. La coupe de Loughshinny présente des associations s'étendant du Viséen inférieur le plus ancien à la partie inférieure du Viséen moyen; sa base renferme *Spinotournayella* ? *michoti* et *Endothyranopsis* ex gr. *staffelliformis*, sa partie supérieure *Koninckopora sahariensis* et des Archaediscidae primitifs.

INTRODUCTION

The Dinantian Dublin Basin lies between the Lower Palaeozoic rocks of the Balbriggan massif to the north and the Caledonian Leinster granite to the south (fig. 1). Studies by Matley and Vaughan (1906, 1908) and Smyth (1915, 1920) led to the establishment of a stratigraphical succession for part of the region but emphasised the difficulties of zonal correlation. Their biostratigraphy was expressed in terms of Vaughan's (1905) coral-brachiopod zones of southwest England and comparisons were made with the faunal sequence erected by Garwood (1912) for northwest England.

Particular difficulties arise in the recognition of Vaughan's C_1 and C_2S_1 zones away from the type sections; it is with rocks in the Dublin region to which these zonal symbols have been attached that this paper is concerned.

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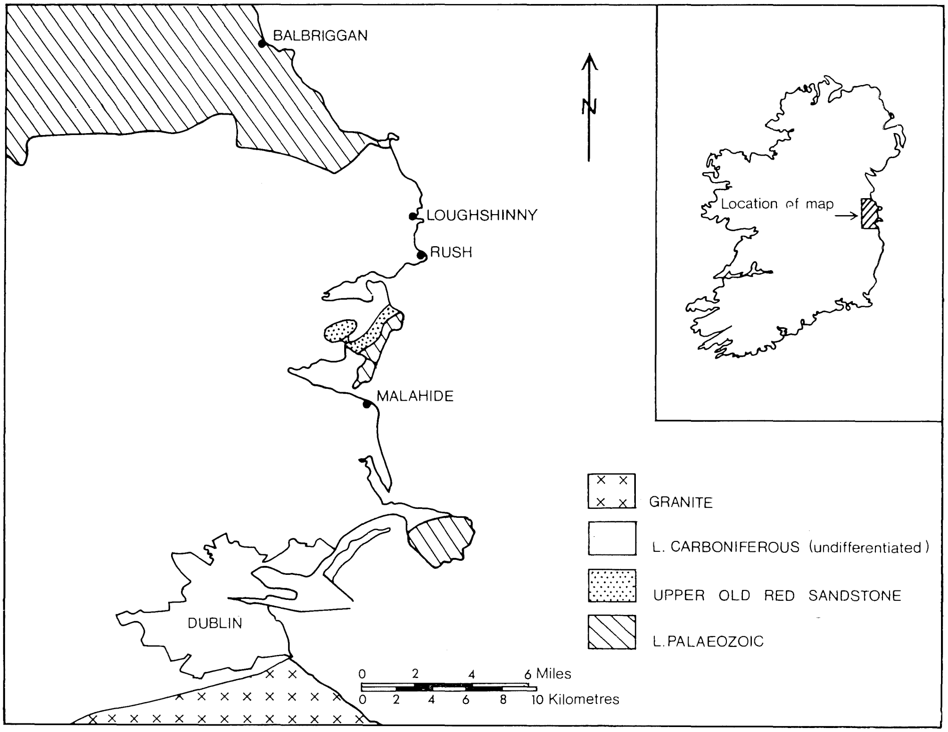


Fig. 1. — Simplified geological map of the Dublin region showing the localities mentioned in the text.

MALAHIDE

The coastal section lies approximately 15 kilometres N.E. of Dublin and two kilometres S.E. of the village of Malahide. Smyth (1920) described the section dividing it into fault-bounded blocks which he denoted by the letters E, F, G, H, from north to south respectively (see fig. 2). The fauna described here comes from the northern block E to which Smyth assigned a ZC_1 age from the evidence of the macrofauna.

Block E consists of 123, 5 meters of interbedded argillaceous and non-argillaceous bioclastic limestones (dominantly biomicrites) with beds of oobiosparite between 85 m and 100 m. The lower part of the succession is extensively but irregularly which affects the preservation of the microfauna.

Two foraminiferal faunas have been recognised at Malahide. The lower fauna (Samples 32-37; pl. I, figs. 1-5) spanning 16 meters is dominated by Tournayellids particularly *Tournayella discoidea* Dain and *Tournayella gigantea* Lipina var. *minoris* Lipina. (See fig. 3 for full faunal list). This fauna is similar to that reported by Conil (1973) from the top of the Formation du Bocq and the base of the Formation du Petit-Granit du Bayard at Yvoir, Belgium. In Belgium and in Czechoslovakia (Dvorak and Conil, in press) this fauna has a very restricted range in upper Tournaisian times.

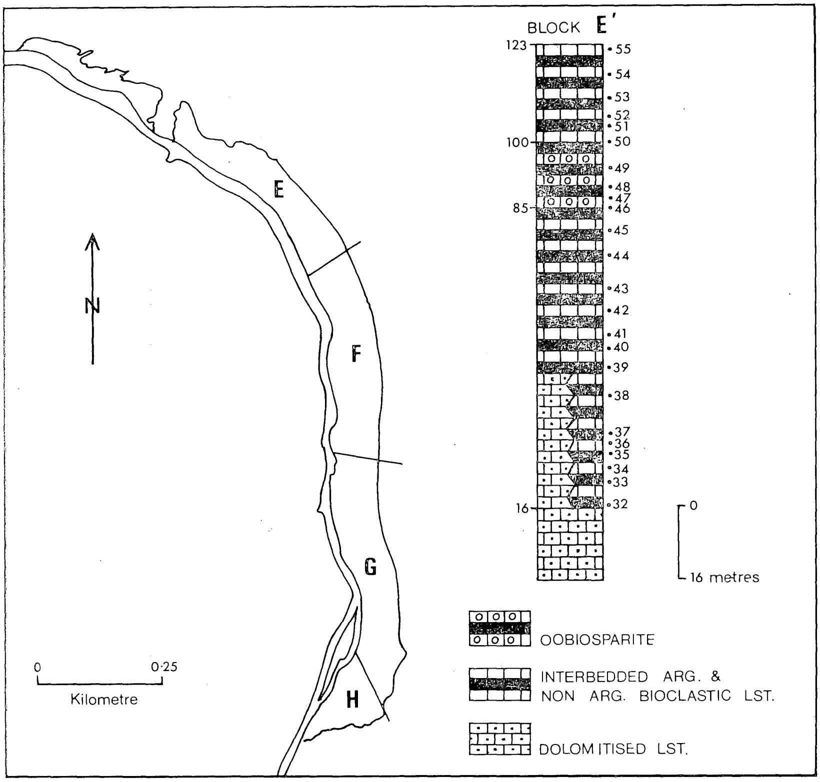


Fig. 2. — Map of the Malahide coastal exposure (after Smyth, 1920) with a vertical section of Block E showing the sampled horizons.

Fig. 3 Algae and foraminiferans found in the Malahide and Loughshinny coastal sections	Malahide 32-37	Malahide 38-46	Lane 31-43	Holmpatrick 57-64	Holmpatrick 65-68	Holmpatrick 69-73
Girvanella ducii Wethered			×	×	×	×
Girvanella wetheredi Chapman			×			
Girvanella sp.			×			
Koninckopora mortelmansi Mamet						×
Koninckpora sahariensis Chanton					×	×
Koninckopora sp.				×	×	×
Stacheoides sp.						×
Archaesphaera bulla (Conil & Lys)				×		
Archaesphaera inaequalis (Derville)	×	×	×	×	×	×
Pachysphaerina pachysphaerica (Pronina)				×		×

Algae and foraminiferans found in the Malahide and Loughshinny coastal sections	Malahide 32-37	Malahide 38-46	Lane 31-43	Holmpatrick 57-64	Holmpatrick 65-68	Holmpatrick 69-73
Pseudolituotuba gravata (Conil & Lys)						×
Earlandia elegans (Rauser & Reitl.)				×	×	
Earlandia minor (Rauser)		×	×	×	×	×
Earlandia vulgaris (Rauser & Reitl.)			×	×	×	×
Brunsia spirillinoides (Grozd. & Gleb.)					×	×
Brunsia sp.				×	×	
Archaediscus (*Archaediscus*) *stilus* Grozd. & Lebed.						×
Ammarchaediscus (*Rectodiscus*) *rotundus* var. *inflata*						×
(Conil & Lys)						
Ammarchaediscus (*Rectodiscus*) *rotundus* var. *elongata*						×
(Conil & Lys)						×
Tetraxis sp.			×	×		×
Tournayellidae	×	×	×	×	×	×
Tournayella gigantea Lipina var. *minoris* Lip.	×					
Tournayella kisella Malakhova		×				
Tournayella sp.	×	×	×			
Septaglomospiranella sp.	×					
Spinotournayella ? *michoti* (Conil & Lys)			×			
Spinotournayella ? aff. *michoti* (Conil & Lys)		×				
Palaeospiroplectammina diversa (N. Tchern).			×	×		×
Palaeospiroplectammina sp.			×			
Pseudolituotubella sp.			×	×	×	×
Forschiella sp.			×			
Endothyra agathis (Conil & Lys)					×	
Endothyra cf. *laxa* (Conil & Lys)				×		
Endothyra sp.	×	×	×	×	×	×
Endothyranopsis ex gr. *staffelliformis* (N. Tchern.)			×			
cf. *Haplophragmella*			×			
Eoparastaffella simplex Vdovenko				×	×	
Eoparastaffella sp.			cf.	×	×	×
Eostaffella sp.			cf.	×	×	×

The upper fauna (samples 37-46; pl. I, figs. 6-10) spanning 75,5 m is characterised by smaller Tournayellids, such as *Tournayella kisella* Malakhova, accompanied by forms which resemble *Spinotournayella* ? *michoti* (Conil & Lys) and are recorded as *Spinotournayella* aff. *michoti* (Conil & Lys). This fauna has not been described from Belgium; however it is thought to be of upper Tournaisian age for the following reasons.

1. The sampled beds follow those containing the lower fauna without apparent stratigraphical disconformity.

2. The conodonts from the same beds include forms transitional between *Pseudopolygnathus multistriatus* Mehl & Thomas and specimens of « *Polygnathus* » with a widely flaring basal cavity similar to those identified by Rhodes, Austin and Druce (1969) as *Polygnathus lacinatus* Huddle.

3. The coral-brachiopod fauna has been correlated by Smyth (1920, p. 12) with the Upper Tournaisian Petit-Granit des Ecaussinnes of Belgium.

The foraminiferal faunas from the highest part of this section (samples 47-55) are poor and inconclusive.

LOUGHSHINNY

The Lane Limestone, Lane Conglomerate and Holmpatrick Limestone are exposed on the foreshore approximately 800 m north of Loughshinny village (see fig. 4) and

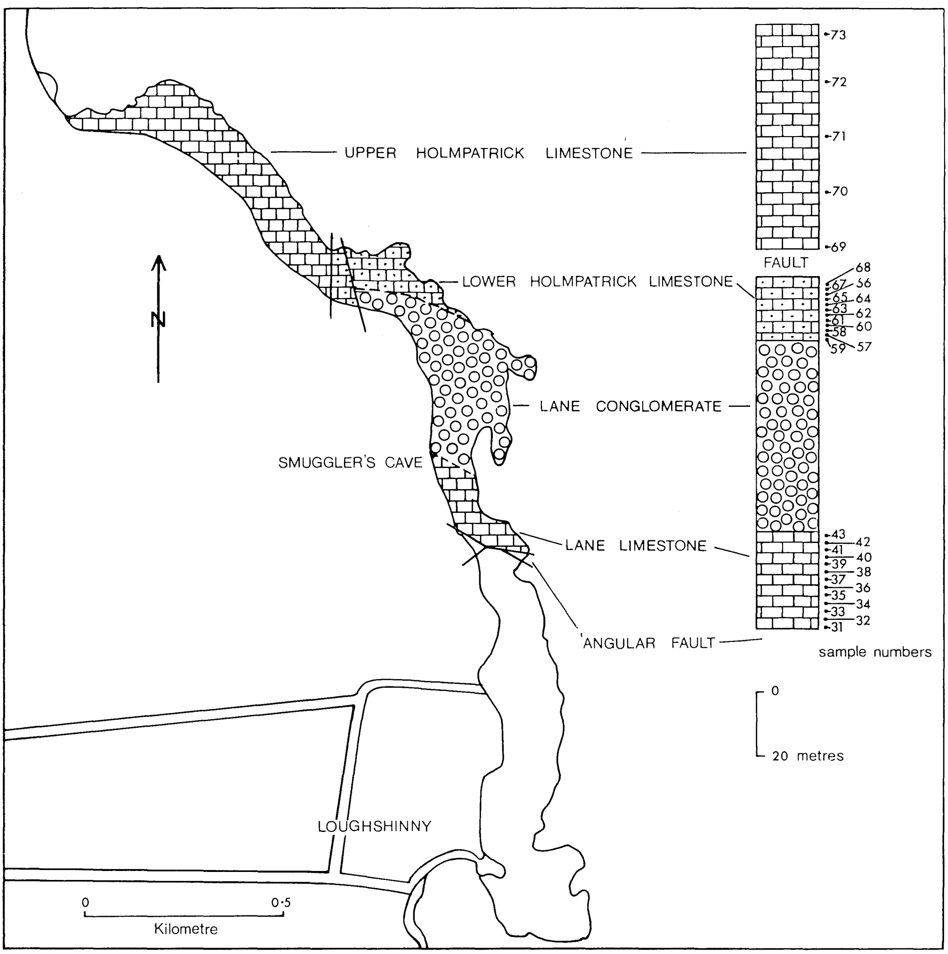


Fig. 4. — Map of the Loughshinny coastal exposure (after Matley 1908) north of the « Angular fault » with a simplified vertical section showing the sampled horizons.

occur on the northern limb of a major syncline. Vaughan (Matley and Vaughan 1908) considered the Lane and Holmpatrick Limestones to be faunally continuous and, with some hesitation, assigned the macrofauna to the D Zone. Smyth (1915), after more detailed examination of the macrofauna, considered the Lane Limestone to be equivalent to C_1 and the Holmpatrick Limestone to C_2S_1. Matley's names for the rock units of the Loughshinny succession do not accord with current standards of stratigraphical nomenclature but they are retained here for comparison with previously published work. They will be redefined in a later publication on the stratigraphy of the Dublin Basin.

LANE LIMESTONE (Samples 31-43; pl. II, III, IV, figs. 27-30).

The Lane Limestone consists of 30 m of well-washed biosparites : 9 m above its base thin quartz pebble bands occur and the unit becomes increasingly sandy towards its top. The section shown in fig. 4 was measured between the « Angular Fault » and the Smuggler's Cave where it is unconformably overlain by the Lane Conglomerate. Further north higher beds of the Lane Limestone are preserved beneath the unconformity.

PLATE I

Magnification × 75

All figured specimens are lodged in the Museum, Department of Geology, Trinity College, Dublin 2, Ireland.

MALAHIDE BLOCK E

Tournayella sp.

Fig. 1. — Mal 35, TCD 12375.
Fig. 2. — Mal 37, TCD 12376.

Tournayella discoidea Dain, 1953 forma *maxima*

Fig. 3. — Mal 33, TCD 12374.

Tournayella cf. *discoidea* Dain, 1953

Fig. 4. — Mal 33, TCD 12374.

Tournayella gigantea Lipina, 1955 var. *minoris* Lipina

Fig. 5. — Mal 33, TCD 12374.

Spinotournayella ? aff. *michoti* (Conil & Lys), 1964

Fig. 6. — Mal 45, TCD 12381.
Fig. 8. — Mal 38, TCD 12378.
Fig. 9. — Mal 43, TCD 12380.
Fig. 10. — Mal 39, TCD 12379.

Tournayellidae (cf. *Brunsiina*)

Fig. 7. — Mal 39, TCD 12379.

LANE LIMESTONE

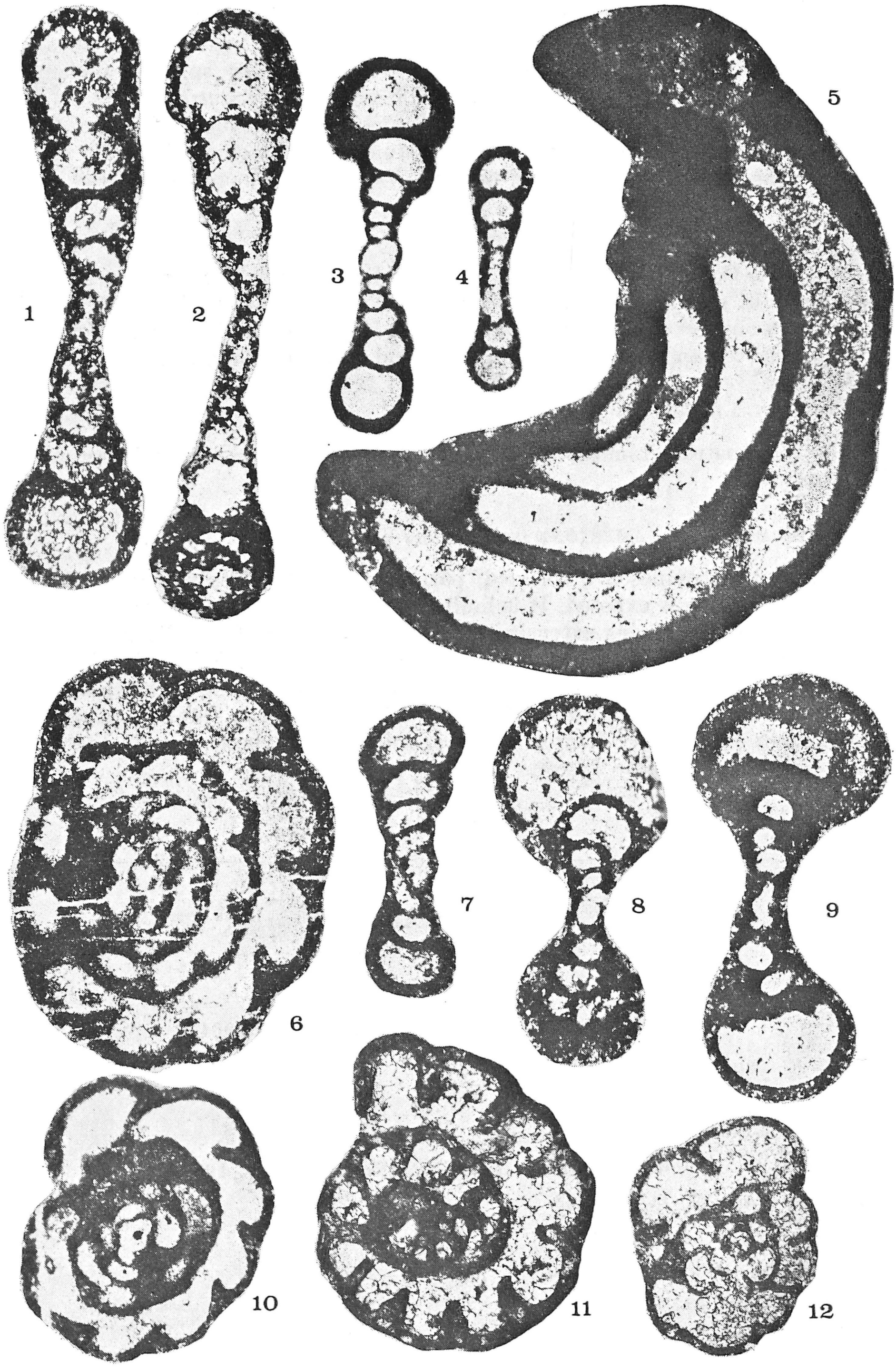
Endothyranopsis sp.

Fig. 11. — Lane 43, TCD 12389.

Spinotournayella ? cf. *michoti* (Conil & Lys), 1964

Fig. 12. — Lane 31, TCD 12382.

PLATE I



The foraminiferal fauna is well preserved and diverse (see fig. 3) and is characterised by *Spinotournayella*? *michoti*, (Conil & Lys), *Endothyanopsis* ex gr. *staffelliformis* (N. Tchern.) and primitive fusulinids. The higher beds referred to above contain poorly preserved foraminiferans and *Koninckopora* sp. These elements suggest a lowermost Visean age. Smyth (1915) recorded *Levitusia humerosa* (J. de C. Sowerby) (= *Productus* cf. *sublaevis* de Koninck, see revision in Hudson, Clarke and Sevastopulo 1966) from the Lane Limestone; this brachiopod also is characteristic of the lowermost Visean of Belgium (Conil, Mortelmans and Pirlet 1971).

Lane Conglomerate

The Lane Conglomerate is a coarse poorly bedded, boulder conglomerate. The clasts range in size from pebbles to large boulders (50 cm in diameter), and are lithologically similar to the Lower Palaeozoic greywackes of the Balbriggan massif to the north. It is approximately 60 m thick and is non fossiliferous.

Holmpatrick Limestone

The Holmpatrick Limestone of Matley is here divided into a lower and an upper unit.

Lower Holmpatrick Limestone (samples 57-68; pl. IV, figs. 31-36).

This unit is composed of bedded, partly recrystallised oobiosparite of which approximately 20 m is exposed. It is faulted against the Upper Holmpatrick Limestone; the fault plane being extensively dolomitised. It contains a diversified microfauna and flora with *Koninckopora* sp., *Eoparastaffella simplex* Vdovenko, *Eostaffella* sp., but lacks the primitive Archaediscidae characteristic of the higher part of the lower Viséan in Belgium. However in sample 65 (12 m above the base of the unit) *Koninckopora sahariensis* Chanton appears which, in Belgium, is indicative of the lowest part of the middle Visean.

PLATE II

Magnification X 75

LANE LIMESTONE

Spinotournayella ? *michoti* (Conil & Lys), 1964

Fig. 13. — Lane 39, TCD 12386.
Fig. 14. — Lane 43, TCD 12391.
Fig. 16. — Lane 37, TCD 12384.
Fig. 19. — Lane 39, TCD 12386.

Spinotournayella ? cf. *michoti* (Conil & Lys), 1964

Fig. 15. — Lane 32, TCD 12383.

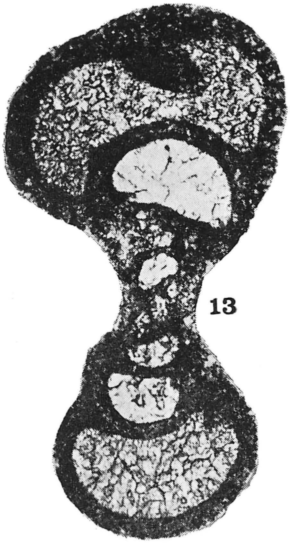
Endothyra sp.

Fig. 17. — Lane 39, TCD 12386.

Endothyra sp.

Fig. 18. — Lane 39, TCD 12386.

PLATE II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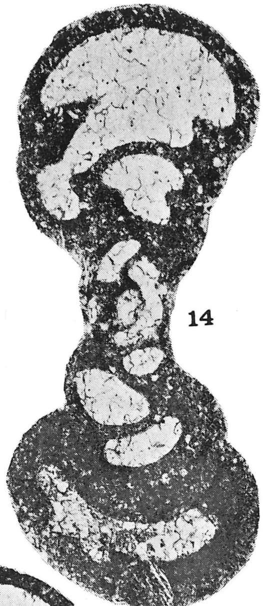
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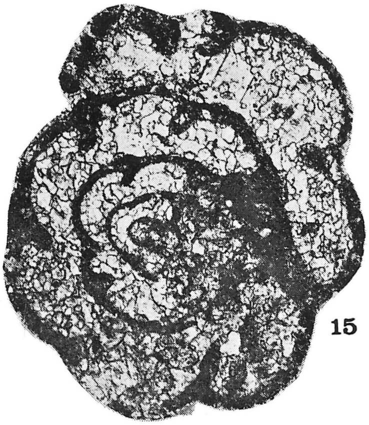
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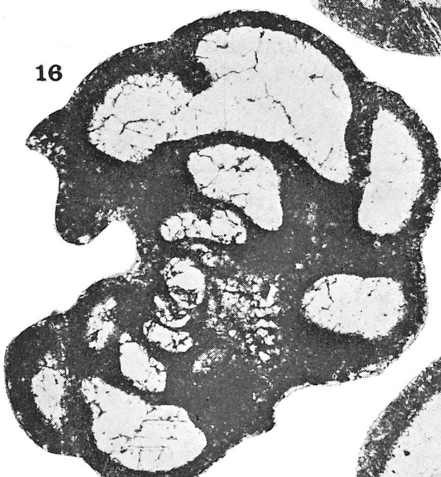
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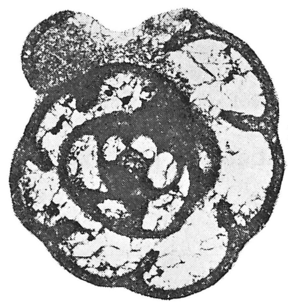
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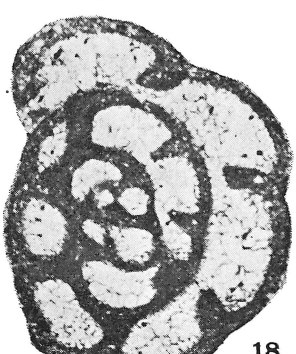
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UPPER HOLMPATRICK LIMESTONE (samples 69-73; pl. IV, fig. 37).

This unit consists of uniformly bedded biomicrites and biosparites, approximately 70 m being exposed. Much of the lower part is affected by the dolomitisation associated with the fault. The fauna is characterised by early Archaedisicidae in the form of *Archaediscus* (*Archaediscus*) *stilus* Grodz. & Leb., *Ammarchaediscus* (*Rectodiscus*) *rotundus inflata* (Conil & Lys), with *Koninckopora sahariensis* Chanton. This assemblage occurs throughout the unit; in Belgium it is characteristic of lower middle Viséan rocks.

STRATIGRAPHICAL IMPLICATIONS

These new results allow a measure of correlation between the succession north of Loughshinny and that to the south at Rush (see fig. 1). Mamet (1969) has established that at least part of the Rush Conglomerate contains Archaediscidae which suggests that sedimentation of the Rush Conglomerate continued after the end of the deposition of the Lane Conglomerate; previously (Matley & Vaughan 1908; Smyth 1915) these two conglomerates had been thought to occupy the same stratigraphical level.

The results also show that the well developed erosion surface overlain by the Lane Conglomerate at Loughshinny and the subsequent transgression, signalled by the onset of deposition of the lower Holmpatrick Limestone, were formed at roughly the same time as similar features indicating regression and subsequent transgression in Britain (the Cycle 2/Cycle 3 boundary of Ramsbottom, 1973).

PLATE III

Magnification × 75

LANE LIMESTONE

Endothyra sp.

Fig. 20. — Lane 40, TCD 12387.

Endothyra sp.

Fig. 21. — Lane 39, TCD 12386.

Spinotournayella ? *michoti* (Conil & Lys), 1964

Fig. 22. — Lane 43, TCD 12389.

Forschiella sp.

Fig. 23. — Lane 40, TCD 12387.

Endothyra sp. (compare with Conil & Lys 1964, fig. 632)

Fig. 24. — Lane 38, TCD 12385.

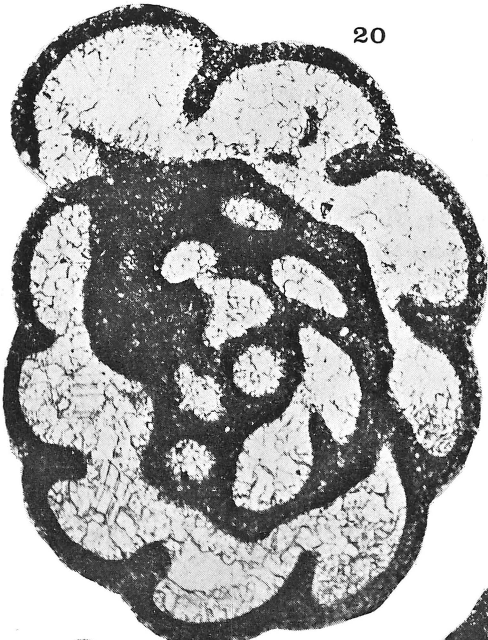
Endothyra sp.

Fig. 25. — Lane 40, TCD 12387.

Endothyra sp.

Fig. 26. — Lane 43, TCD 12390.

PLATE III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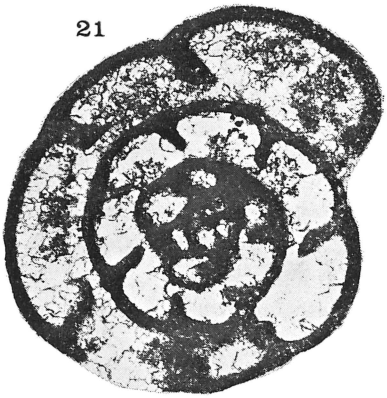
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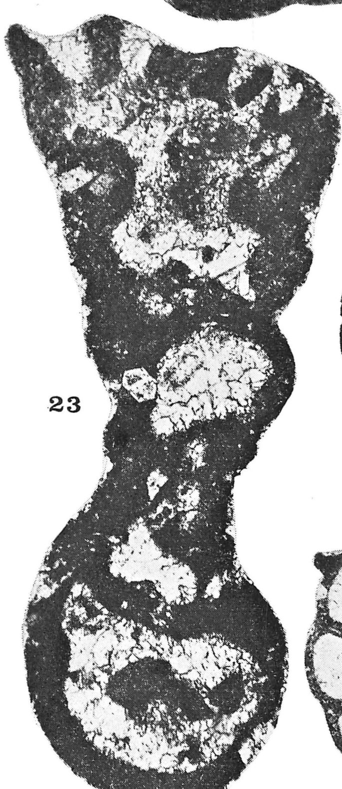
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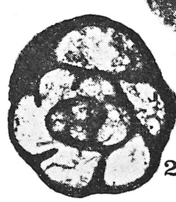
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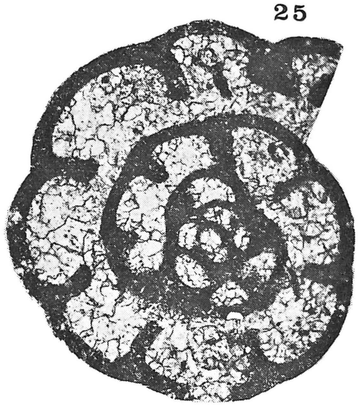
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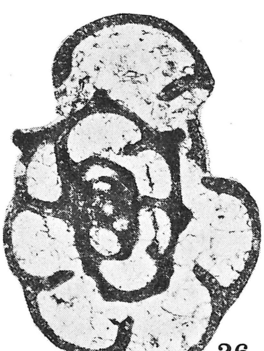

26

SYSTEMATIC PALAEONTOLOGY

Family TOURNAYELLIDAE Dain, 1953

Genus SPINOTOURNAYELLA Mamet, 1970

Spinotournayella? *michoti* (Conil & Lys), 1964
Pl. II, figs. 13, 14, 16, 19; pl. III, fig. 22

1964. *Plectogyra michoti* Conil & Lys, p. 194; pl. XXXI, fig. 621.
1971. *Endothyra michoti* (Conil & Lys) *spinata* Michelsen, pp. 59-60; pl. XI, figs. 1-6; pl. XII, fig. 1.
1973. *Spinotournayella*? *michoti* (Conil & Lys); Malpica, pp. 225-6; pl. I, figs. 1-4.

PLATE IV

LANE LIMESTONE

Pseudolituotubella sp.

Fig. 27. — Lane 43, TCD 12388. × 50.

Endothyranopsis sp.

Fig. 28. — Lane 43, TCD 12388. × 75.

Endothyranopsis ex gr. *staffelliformis* (N. Tchern.), 1948

Fig. 29. — Lane 43, TCD 12390. × 75.
Fig. 30. — Lane 43, TCD 12389. × 75.

LOWER HOLMPATRICK LIMESTONE

Palaeospiroplectammina diversa (N. Tchern.)

Fig. 31. — Holm. 59, TCD 12392. × 75.

Eoparastaffella simplex Vdovenko

Fig. 32. — Holm. 60, TCD 12390. × 75.
Fig. 33. — Holm. 62, TCD 12394. × 75.

Endothyra sp.

Fig. 34. — Holm. 67, TCD 12395. × 75.

Eoparastaffella sp.

Fig. 35. — Holm. 68, TCD 12396. × 75.

Pseudolituotuba gravata (Conil & Lys)

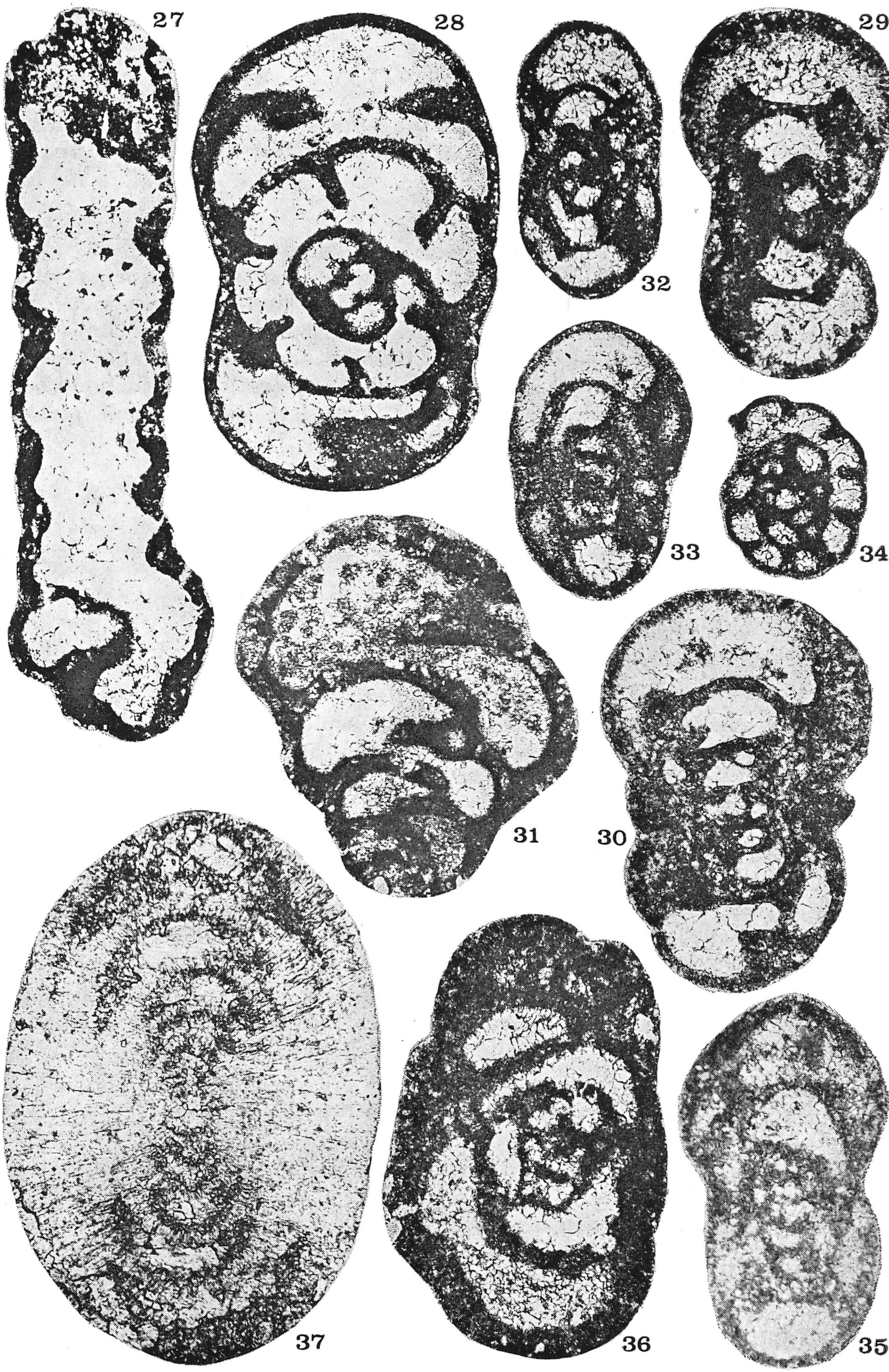
Fig. 36. — Holm. 68, TCD 12396. × 75.

UPPER HOLMPATRICK LIMESTONE

Ammarchaediscus (*Rectodiscus*) *rotundus inflata* (Conil & Lys) 1964

Fig. 37. — Holm. 69, TCD 12397. × 140.

PLATE IV



Diagnosis

Diameter : 750-1150 μ.

No. of chambers in last whorl : 7-8.

No. of whorls : 4-5.

Supplementary deposits : thickening of the septa with corner fillings; frequently with basal nodes which are projected into a spine in the last chamber.

Remarks

The generic name of this species remains in doubt as the Endothyrid-like Tournayellidae are in need of revision. Rather than confuse the taxonomic position, Malpica's usage of *Spinotournayella* Mamet 1970 is retained. The specimens from the Lane Limestone compare well with those described by Conil & Lys (1964), Michelsen (1971) and Malpica (1973) from Belgium and Denmark and thus are considered to be of lowest Visean age. This species has recently been found in basal Visean Limestones at Oughterard, Co. Galway in western Ireland (Conil, personal communication).

Spinotournayella? aff. *michoti* (Conil & Lys 1964)
Pl. I, figs. 6, 8-10

Diagnosis

Diameter : 540-800 μ.

No. of chambers in last whorl : 7-9.

No. of whorls : 4-5.

Supplementary deposits : thickening of the septa with corner fillings; basal nodes which are sometimes projected into a spine in the last chamber.

Remarks

These specimens come from the upper part of Block E at Malahide. They are smaller, with less well developed supplementary deposits, than the typical *S.*? *michoti*, but they show the characteristic rapid increase in size of the last whorl and in their other diagnostic features are very similar to the holotype.

The Malahide forms suggest that *S.*? *michoti* may have evolved from upper Tournaisian Tournayellidae and that this evolutionary line cannot be observed in Belgium as the depositional environment in upper Tournaisian times was unfavourable for foraminiferans.

ACKNOWLEDGEMENTS

Much of the work embodied in this paper was carried out while the author was on a visit to the University of Louvain. The hospitality of the members of the Institute of Geology and particularly the guidance of Professor R. Conil, is gratefully acknowledged. Special thanks are due to Dr G. D. Sevastopulo (Trinity College, Dublin) for his continuing advice and encouragement and for his critical reading of the manuscript. The photographs were prepared by Ph. Bertrand (Louvain) and the text figures were drawn by Ms. I. Goodwin (Trinity College Dublin).

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