

M. J. Fisher (*).—UPPER CRETACEOUS FORAMINIFERA FROM THE IBERIAN CONTINENTAL MARGIN.

In the summer of 1958, as part of a programme of geophysical and oceanographic surveys of Galicia Bank, a flat-topped, non-magnetic seamount off the western coast of Spain, a fragment of soft chalky limestone was dredged from the top of the seamount at a depth of between 650 and 700 metres and at 42° 36' N: 11° 35' W. This small piece of rock was found to contain an admixture of Maestrichtian and Lower Tertiary coccoliths (BLACK, HILL, LAUGHTON & MATTHEWS 1964). Subsequent examination also revealed the presence of a rich assemblage of benthonic and planktonic foraminifera (FISHER 1969, FUNNELL, FRIEND & RAMMSAY 1969).

The planktonic foraminifera (see Table 1), which comprise 95% of the assemblage, are all considered to be diagnostic of the Upper Maestrichtian. The benthonic assemblage however, whilst containing many forms which are common components of Upper Cretaceous microfaunas, also includes some species which previously have only been recorded from the Paleocene (see Table 2). The coccolith and planktonic foraminiferal assemblages also contain post-Cretaceous forms whose presence is attributed to introduction via burrows or borings, but none of potentially Paleocene age.

TABLE 1

PLANKTONIC FORAMINIFERA FROM GALICIA BANK AND THEIR RECORDED RANGES

HETEROHELICIDAE

<i>Heterohelix globulosa</i> (Ehrenberg).	Santonian - U. Maestrichtian
<i>H. striata</i> (Ehrenberg).	U. Campanian - U. Maestrichtian.
<i>H. ultimatumida</i> (White).	Campanian - U. Maestrichtian.
<i>Planoglobulina acervulinoides</i> (Egger).	Maestrichtian
<i>Pseudotextularia elegans</i> (Rzehak).	Santonian - U. Maestrichtian.
<i>Pseudoguembelina costulata</i> (Cushman).	Campanian - U. Maestrichtian.
<i>P. excolata</i> (Cushman).	U. Campanian - U. Maestrichtian.
<i>Racemiguembelina fructicosa</i> (Egger).	U. Campanian - U. Maestrichtian.

GLOBOTRUNCANIDAE

<i>Abathomphalus mayaroensis</i> (Bolli).	U. Maestrichtian.
<i>A. intermedia</i> (Bolli).	M. - U. Maestrichtian.
<i>Globotruncana arca</i> (Cushman).	U. Campanian - U. Maestrichtian.
<i>G. conica</i> (White).	Santonian - U. Maestrichtian.
<i>G. contusa</i> (Cushman).	?U. Campanian - U. Maestrichtian.
<i>G. falsostuarti</i> (Sigal).	Campanian - U. Maestrichtian.
<i>G. gansseri</i> (Bolli).	L.-U. Maestrichtian.
<i>G. havanensis</i> (Voorwijk).	Campanian - U. Maestrichtian.
<i>G. stuarti</i> (de Lapparent).	U. Campanian - U. Maestrichtian.
<i>G. stuarti stuartiformis</i> (Dalbiez).	U. Campanian - U. Maestrichtian.
<i>G. cf. aspera</i> (Hofker).	
<i>Rugoglobigerina pustulata</i> (Brönnimann).	Maestrichtian.
<i>R. rotundata</i> (Brönnimann).	Campanian - Maestrichtian.
<i>R. scotti</i> (Brönnimann).	M. - U. Maestrichtian.

(*) Robertson Research C. Ltd. Abergale. (Inglaterra).

TABLE 2

BENTHONIC FORAMINIFERA FROM GALICIA BANK
(Percentage of benthonic population, 354 specimens, in brackets).

a. Upper Cretaceous Species

<i>Anomalinoides hyphalus</i> Fisher	(21.5%)
<i>Brizalina incrassata</i> (Reuss)	(8%)
<i>Heterostomella mexicana</i> Cushman	(8%)
<i>Lenticulina pseudovortex</i> (Marie)	(-1%)
<i>Pseudovigerina cristata</i> (Marsson)	(-1%)
<i>P. rugosa</i> Brotzen	(-1%)
<i>Pyramidina szajnochae</i> (Grzybowski)	(-1%)
<i>Verneuilina convexa</i> Olszewski	(-1%)

b. Upper Cretaceous - Paleocene Species

<i>Anomalinoides velascoensis</i> (Cushman)	(7%)
<i>Aragonia ouezzanensis</i> (Rey)	(-1%)
<i>Arenobulimina frankei</i> (Brotzen)	(-1%)
<i>Bolivina oedumi</i> Brotzen	(-1%)
<i>Dorothia trochoides</i> (Marsson)	(2%)
<i>Gavelinella vombensis</i> (Brotzen)	(3%)
<i>Guttulina communis</i> (D'Orbigny)	(1.5%)
<i>Gyroidinoides girardanus</i> (Reuss)	(-1%)
<i>G. globosus</i> (Hagenow)	(2.5%)
<i>G. octocamaratus</i> (Cushman & Hanna)	(3%)
<i>Lagena apiculata</i> (Reuss)	(-1%)
<i>Lamarckina rugulosa</i> Plummer	(-1%)
<i>Lenticulina navicula</i> (D'Orbigny)	(1%)
<i>L. rotulata</i> (Lamarck)	(2%)
<i>Neoflabellina rugosa</i> (D'Orbigny)	(1%)
<i>Nonionella robusta</i> Plummer	(-1%)
<i>Osangularia velascoensis</i> (Cushman)	(-1%)
<i>Praebulimina reussi</i> (Morrow)	(-1%)
<i>Pullenia jarvisi</i> Cushman	(-1%)
<i>Rotalia hermi</i> Hillebrandt	(1%)
<i>Spiroplectammina dentata</i> (Alth)	(-1%)
<i>Stensioina esnehensis</i> Nakkady	(4.5%)
<i>Valvalabamina lenticula</i> (Reuss)	(3.5%)
<i>Verneuilina karreri</i> Said & Kenawy	(-1%)

c. Paleocene and ?Lower Tertiary *Species

<i>Aragonia monilifera</i> (Galloway & Morrey)	(-1%)
* <i>Buliminella grata</i> Parker & Bermudez	(1.5%)
<i>Eponides lotus</i> (Schwager)	(-1%)
<i>Gaudryina limbata</i> Said & Kenawy	(-1%)
<i>Martinottiella alabamensis</i> (Cushman)	(1%)
<i>Neoeponides hillebrandti</i> Fisher	(-1%)
<i>Valvalabamina aegyptiaca</i> (Le Roy)	(1%)
<i>V. scrobiculata</i> (Schwager)	(4%)

d. Species recorded only from Galicia Bank.

<i>Nuttallides galiciensis</i> Fisher	(4.5%)
<i>Nuttallinella lusitanica</i> Fisher	(6%)

If the nominally Paleocene benthonic species are also contaminants in an Upper Maestrichtian assemblage, the apparent absence of Paleocene planktonic foraminifera and coccoliths could be produced by the rarity of these forms in the vicinity, leaving only benthonic foraminifera to contaminate the previously deposited Maestrichtian. Credence to this postulation is afforded by evidence from the Upper Cretaceous - Lower Tertiary succession in Guipuzcoa where planktonic foraminifera are extremely rare at the Maestrichtian - Paleocene boundary, whilst benthonic species persist.

An alternative explanation for this association of Maestrichtian and Paleocene species is that the ranges of the nominally Paleocene foraminifera recorded from Galicia Bank should be extended to include the uppermost Maestrichtian. That the Maestrichtian species themselves may be contaminants in a Tertiary assemblage appears improbable when the ratio of exclusively Paleocene to potentially older individuals is considered.

The total foraminiferal assemblage of Galicia Bank compares closely with those of contemporary flysch sediments (e. g. from the Tampico Embayment; the Reichenhall - Salzburg Basin; the Guipuzcoa coast section) not only in terms of benthonic: planktonic ratios, but also in terms of the number of species in common. Some of the factors that determined the components of flysch microfaunas may have been operative in the area of Galicia Bank during the deposition of the Maestrichtian chalk. It would appear however, that the sedimentological histories were dissimilar and that the Galicia Bank assemblage is representative of an essentially «Tethyan» calcemarl facies, but under the influence of an open ocean environment.

BLACK, M., HILL, M. N., LAUGHTON, A. S. & MATTHEWS, D. H. (1964).—Three non-magnetic seamounts off the Iberian Coast. *Q. Jl. geol. Soc. Lond.*, 120, 477-517, pl. 37-44.

FISHER, M. J. (1969).—Benthonic Foraminifera from the Maestrichtian Chalk of Galicia Bank, west of Spain. *Palaeontology*, 12, 189-200.

FUNNELL, B. M., FRIEND, J. K., & RAMSAY, A. T. S. (1969).—Upper Maestrichtian planktonic Foraminifera from Galicia Bank, west of Spain. *Palaeontology*, 12, 19-41, pl. 1-5.

L. C. García de Figuerola (*) y M. Martín Calvo ().—FILITAS CON RUTILO AUTIGENO Y CLORITOIDE EN EL PANTANO DE NAVIA (ASTURIAS).**

La carretera comarcal núm. 630 de Pola de Allande a Lugo, y desde antes de llegar a Berducedo hasta después de pasar Grandas de Salime, atraviesa uno de los más potentes tramos de pizarras de Asturias. Estratigráficamente son superiores a la serie de Los Cabos por lo que deben pertenecer, cuando menos en parte, al Ordovícico superior. Falta por establecer una cartografía dentro de ellas. A simple vista la uniformidad es bastante grande.

(*) Dpto. de Petrología de la Universidad de Oviedo. Este trabajo se ha realizado gracias a la ayuda de la J. E. N.

(**) J. E. N. Madrid.