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14. OLDEST CRETACEOUS PLANKTONIC FORAMINIFERS FROM HOLE 700B[1]

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ABSTRACT

The oldest Cretaceous sediments in the subantarctic region were recovered from ODP Hole 700B in the East Georgia Basin. Planktonic foraminifers from the deepest indurated limestones could be attributed to the *Marginotruncana schneegansi* Zone of late Turonian age.

INTRODUCTION

This study deals with the oldest Cretaceous planktonic foraminifers recovered from the bottom sediments of Ocean Drilling Program (ODP) Hole 700B (Fig. 1), in which the last core, 114-700B-54R, ended at 489 m below seafloor (mbsf).

Hole 700B was drilled in the western region of the East Georgia Basin on the northeastern slope of the Northeast Georgia Rise in a water depth of 3598 m. The 465-m-thick sedimentary sequence consists of pelagic carbonate sediments rich in planktonic foraminifers, ranging in age from late Turonian to late middle Eocene, capped by 25 m of Pliocene-Pleistocene diatom ooze. The induration of the deepest pelagic sediments, pink to light brown limestones, prevents disaggregation. Therefore, the 4-m interval from the 9.5 m recovered in Core 114-700B-54R had to be studied in thin section.

RESULTS

The fossiliferous content of the studied samples from the bottom to the top of the cored interval is as follows (Table 1).

Sample 114-700B-54R-CC, 22–24 cm: micrite very rich in planktonic foraminifers and radiolarians. Minor components are few benthic foraminifers (*Lenticulina*, other lagenids, *Gavelinella*, and *Osangularia*) and echinoid fragments.

Planktonic foraminifers are commonly silicified and/or infilled with silica. Radiolarians are moderately preserved. The planktonic foraminiferal fauna contains abundant small hedbergellids, common *Globigerinelloides* and *Heterohelix*, few marginotruncanids and whiteinellids, and rare dicarinellids. The identified species are *Marginotruncana pseudolinneiana* (Pl. 1, Figs. 4 and 5) (common), *Marginotruncana coronata* (rare), a single specimen of *Praeglobotruncana gibba* (Pl. 1, Fig. 1), few *Dicarinella hagni* (Pl. 1, Fig. 2), *Dicarinella imbricata* (rare), *Whiteinella brittonensis* (Pl. 1, Fig. 3) (few), *Whiteinella baltica* (Pl. 1, Fig. 6) (few), *Globigerinelloides bentonensis* (Pl. 1, Fig. 8) (frequent), *Globigerinelloides caseyi* (common), *Hedbergella planispira* (common to frequent), *Hedbergella hoelzli* (few), and *Heterohelix reussi* and *Heterohelix moremani* (common).

Sample 114-700B-54R-CC, 20–22 cm: micrite rich in planktonic foraminifers and radiolarians. Planktonic foraminifers commonly are infilled with silica. Radiolarians are moderately to poorly preserved and some appear as a ghosts. Benthic foraminifers are rare and include agglutinated forms and a single *Lenticulina*. Rare *Inoceramus* prisms and more common echinoid fragments are present.

The planktonic foraminifers are dominated by the hedbergellids associated with common *Heterohelix* and *Globigerinelloides* and few marginotruncanids, whiteinellids, and dicarinellids. Identified species are *M. pseudolinneiana* (few to common), *M. coronata* (Pl. 1, Fig. 7) (few), *Marginotruncana marginata* (rare to few), *W. brittonensis* (rare), *W. baltica* (rare), *D. hagni* (rare to few), *D. imbricata* (rare), *H. planispira* (common), and *H. reussi* and *H. moremani* (frequent). Rare forms possibly belong to *Archaeoglobigerina*.

Sample 114-700B-54R-3, 39–41 cm (small thin section): more clayey micrite. Planktonic foraminifers are very abundant and radiolarians are rare. Echinoid fragments are common, and benthic foraminifers (*Osangularia*) are rare.

The planktonic foraminiferal assemblage is dominated by the hedbergellids associated with common *Globigerinelloides* and *Heterohelix*. The other forms are rare. The identified species are *M. pseudolinneiana* (few), *M. coronata* (rare), *W. brittonensis* (rare), *W. baltica* (rare), *D. hagni* (rare), *D. imbricata* (rare), *G. bentonensis* (common), *G. caseyi* (few), *H. planispira* (Pl. 1, Fig. 9), *H. reussi* and *H. moremani* (common), and a possible *Archaeoglobigerina blowi* (Pl. 1, Fig. 9).

Sample 114-700B-54R-2, 98–100 cm: very micritic with planktonic foraminifers largely dissolved, rare benthic foraminifers (*Lenticulina* and other rotaliforms), rare radiolarians, and phosphatic remains.

The planktonic foraminiferal fauna is rich in hedbergellids and *Globigerinelloides*, with less common *Heterohelix*. Keeled forms are rare. The identified species are *M. pseudolinneiana*, *M. coronata*, *Marginotruncana schneegansi*, and *Marginotruncana renzi*?, all of which are represented by one or two specimens except for *M. pseudolinneiana*, associated with *D. hagni* (rare), *D. imbricata* (rare), *G. bentonensis* (common), *G. caseyi* (few), *H. planispira* (common), and *H. hoelzli* (rare). One specimen may belong to *Hedbergella flandrini*. No *Whiteinella* were positively identified.

Sample 114-700B-54R-1, 70–71 cm (small thin section): micrite with abundant, well-preserved planktonic foraminifers, few benthic foraminifers, and echinoid fragments. Radiolarians seem to be absent.

The planktonic foraminiferal fauna is still dominated by the hedbergellids, *Heterohelix* and *Globigerinelloides*. Keeled forms are very rare, whereas the whiteinellids are few and *Archaeoglobigerina* is apparently common. The identified species are *M. marginata* (one?), *D. imbricata* (very rare), *W. baltica* (few), *W. brittonensis* (one), *H. planispira* and *Hedbergella simplex* (common), *H. reussi* and *H. moremani* (common to frequent), and *A. blowi* (few to common).

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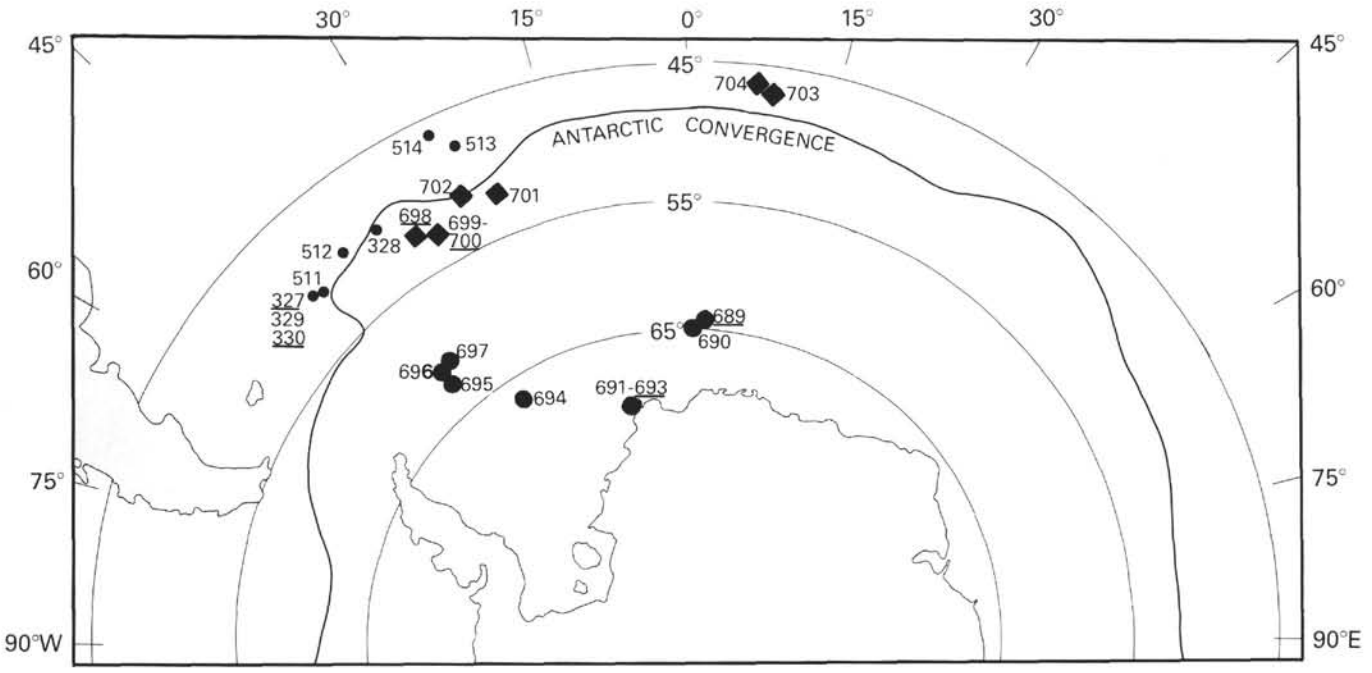

Figure 1. Location of Site 700 and other sites in the subantarctic South Atlantic. Contour interval = 1500 m.

Biostratigraphic Remarks

Based on the species distribution the most important events are as follows.

1. *Praeglobotruncana gibba*, which occurs in Sample 114-700B-54R-CC, 22–24 cm, has not been recorded above the *Marginotruncana schneegansi* Zone. Its presence in the absence of *Helvetoglobotruncana helvetica* would suggest that the bottom of the hole is within the *M. schneegansi* Zone and is late Turonian in age. The last occurrence of *Dicarinella hagni* in Sample 114-700B-54R-2, 98–100 cm, would constrain the age to the early late Turonian; thus, the interval from Section 114-700B-54R-CC up to Sample 114-700B-54R-2, 98–100 cm, should belong to the lower to middle part of the *M. schneegansi* Zone.

2. Accordingly, the first occurrence of *Archaeoglobigerina* in Sample 114-700B-54R-1, 70–71 cm, seems to occur earlier than known in the literature.

3. The first convincing identification of *Hedbergella flandrini* in the overlying Sample 114-700B-53R-4, 110–112 cm, along with *Hedbergella hoelzli*, would suggest that the top of Core 114-700B-54R is older and does not belong to the top part of the *M. schneegansi* Zone. Accordingly, all of Core 114-700B-54R is late Turonian in age.

The marginotruncanids are well represented in the subantarctic region. However, this study records a dominance of *Marginotruncana pseudolinneiana*, followed in importance by *Marginotruncana coronata* and by very rare *Marginotruncana marginata*. The other marginotruncanids are rare or absent. The total absence of representatives of the *Marginotruncana sigali* group in this interval is remarkable. Moreover, the dicarinellids are represented by *Dicarinella hagni* in the lower part of Core 114-700B-54R, where it occurs in nearly all of the samples.

Overall species diversity is relatively high but relies on groups other than the keeled forms. *Heterohelix reussi* is always very abundant and unusually large. Among the whiteinellids very rare specimens may belong to *Whiteinella archaeocretacea*, whereas *Whiteinella brittonensis* and *Whiteinella baltica*, if not common, occur with regularity throughout the studied interval.

The subantarctic assemblages show some similarities with those described from central California by Douglas (1969). The same interval containing similar planktonic foraminiferal faunas was recovered at Deep Sea Drilling Project Site 511 on the Falkland Plateau (= Maurice Ewing Bank) (see Krasheninnikov and Basov, 1983, 1986). In both these areas, late Turonian planktonic faunas consist mainly of hedbergellids, whiteinellids, and much rarer marginotruncanids. Among the latter the *M. sigali* group was not recorded. This absence makes the similarity with the subantarctic faunas more striking.

Species List

Archaeoglobigerina blowi Pessagno, 1967
Dicarinella hagni (Scheibnerova), 1962
Dicarinella imbricata (Mornod), 1950
Hedbergella flandrini Porthault, 1970
Hedbergella hoelzli (Hagn and Zeil), 1954
Hedbergella planispira (Tappan), 1940
Hedbergella simplex (Morrow), 1934
Heterohelix reussi (Cushman), 1938
Heterohelix moremani (Cushman), 1938
Marginotruncana coronata (Bolli), 1945
Marginotruncana marginata (Reuss), 1845
Marginotruncana pseudolinneiana Pessagno, 1967
Marginotruncana renzi (Gandolfi), 1942
Marginotruncana schneegansi (Sigal), 1952
Praeglobotruncana gibba Klaus, 1960
Whiteinella archaeocretacea Pessagno, 1967
Whiteinella baltica Douglas and Rankin, 1969
Whiteinella brittonensis (Loeblich and Tappan), 1961

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Robaszynski, F., and Caron, M. (Eds.), 1979. *Atlas de Foraminifères Planctoniques du Crétacé Moyen (Mer Boréal et Téthys).* Cah. Micropaleontol., 1979.

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Table 1. Distribution of planktonic foraminifers in Core 114-700B-54R (late Turonian).

Species[a]	Core 114-700B-54R- (section, interval in cm)				
	CC, 22–24 (485.45 mbsf)	CC, 20–22 (483.45 mbsf)	3, 39–41 (481.95 mbsf)	2, 90–100 (480.50 mbsf)	2, 70–71 (480.20 mbsf)
Praeglobotruncana gibba	1	1			
Globigerinelloides bentonensis	F	C	C	C	C
Globigerinelloides caseyi	C	f to C	f	f	f
Hedbergella hoelzli	f	r	f	r	
Hedbergella planispira	C to F	C	F	C	C
Heterohelix moremani	C	F	C	C	C to F
Heterodelix reussi	C	F	C	C	C to F
Dicarinella hagni	f	r to f	r	r	
Dicarinella imbricata	r	r	r	r	vr
Marginotruncana coronata	r	f	r	vr	
Marginotruncana pseudolinneiana	C	f to C	f	vr	
Whiteinella baltica	f	r	r		
Whiteinella brittonensis	f	r	r		f
Marginotruncana marginata		r to f	?		1
Archaeoglobigerina sp.		r			?
Marginotruncana schneegansi				vr	
Marginotruncana renzi				?	
Hedbergella flandrini				?	
Hedbergella simplex					C
Archaeoglobigerina blowi					f to C
Hedbergellids	A	A	A	A	A
Globigerinelloides	C	C	C	F	C
Heterohelix	C	C	C	C	C
Marginotruncanids	f	f	r	r	vr
Whiteinellids	f	f	r		f
Dicarinellids	r	f	r	r	vr
Archaeoglobigerinids					C
Planktonic foraminifers	A	A	VA	f	A
Benthic foraminifers	f	r	r	r	f
Radiolarians	A	A	r	r	
Echinoid fragments	f	f	C		f

Note: VA = very abundant; A = abundant; F = frequent; C = common; f = few; r = rare; vr = very rare.

[a] For generic attribution and species identification see Robaszynski and Caron (1979).

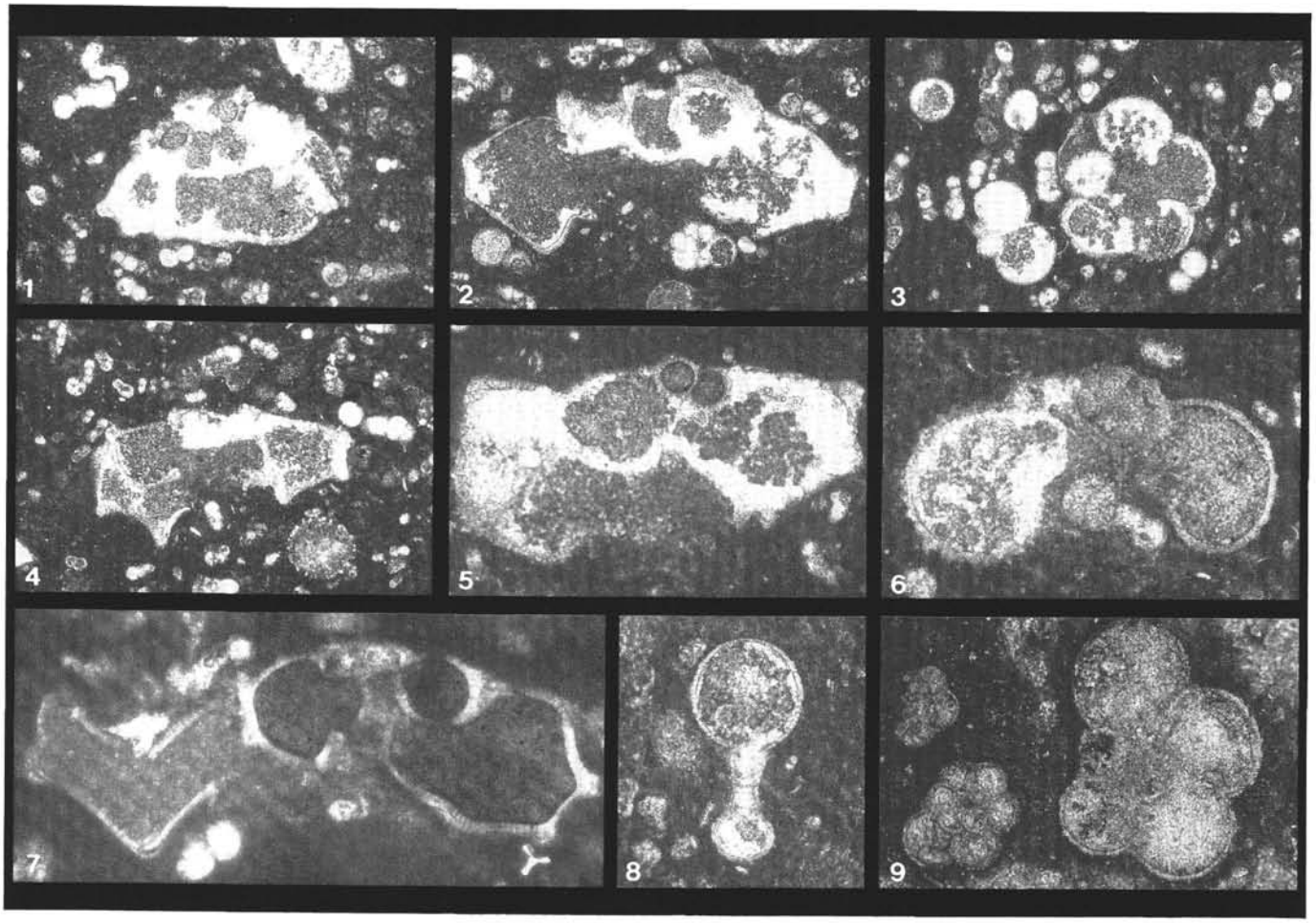

Plate 1. Figs. 1–4, 75×; Figs. 5–9, 150×. **1.** *Praeglobotruncana gibba*, Sample 114-700B-54R-CC, 22–24 cm. **2.** *Dicarinella hagni*, Sample 114-700B-54R-CC, 22–24 cm. **3.** *Whiteinella brittonensis*, Sample 114-700B-54R-CC, 22–24 cm. **4** and **5.** *Marginotruncana pseudolinneiana*, Sample 114-700B-54R-CC, 22–24 cm. **6.** *Whiteinella baltica*, Sample 114-700B-54R-CC, 22–24 cm. **7.** *Marginotruncana coronata*, Sample 114-700B-54R-CC, 20–22 cm. **8.** *Globigerinelloides bentonensis*, Sample 114-700B-54R-CC, 22–24 cm. **9.** *Hedbergella planispira* and *Archaeoglobigerina blowi*?, Sample 114-700B-54R-3, 39–41 cm.