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Late Cretaceous foraminifera from the area around Stonehenge

Internal Report IR/04/080

BRITISH GEOLOGICAL SURVEY

INTERNAL REPORT IR/04/080

Late Cretaceous foraminifera from the area around Stonehenge

Ian P. Wilkinson

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Summary

Foraminifera from the suite of samples from the area around Stonehenge vary in age between the late Cenomanian and the Santonian (foraminiferal zones BGS4 to BGS18).

1 Introduction

A suite of samples from the area around Stonehenge was examined for calcareous microfossils (foraminifera) in order to provide a biostratigraphical framework for the chalk of the area. Foraminiferal zones are based on Wilkinson (2000) summarised in figure 1.

2 Biostratigraphical conclusions

2.1 MPA52037 ARF1024 SU1273 4238

Foraminifera:

Lingulogavelinella arnagerensis

Reussella kelleri

Stensioeina exsculpta exsculpta

Stensioena granulata polonica

Age: The concurrent range of *Stensioena granulata polonica* and *Lingulogavelinella arnagerensis* is within foraminiferal zone BGS17i or the very base of BGS17ii (although taxa commonly found in BGS17ii were not present in the sample). BGS17i is the more likely age for the assemblage. A position between a point immediately below the Bedwell Columnar Flint Band (and lateral equivalents) and immediately above the Whitaker 3" Flint (and lateral equivalent) is indicated.

Lithostratigraphy: The fauna suggests the 'middle' to upper (but not uppermost) part of the Seaford Chalk.

2.2 MPA52038 ARF1025 SU1245 4221

Foraminifera:

Lingulogavelinella arnagerensis

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Age: Foraminifera are rare and poorly preserved. The concurrent range of *Stensioeina exsculpta exsculpta* and *Lingulogavelinella arnagerensis* places the fauna in BGS15 to 17i.

Lithostratigraphy: Between a position between Upper East Cliff Marl and Hope Point Marl (and lateral equivalents) to as high as immediately above Whitaker's 3" Flint (and lateral equivalents) of the Seaford Chalk

2.3 MPA52039 ARF1026 SU1262 4214

Foraminifera:

Gavelinella cristata

Gavelinella stelligera

Reussella szajnochae praecursor

Stensioeina granulata granulata

Stensioeina granulata perfecta

Age: *Gavelinella cristata* and *Stensioeina granulata perfecta* are indicative of BGS18ii. *Bolivinooides* spp, which appear in the late *socialis* zone (BGS18iii) were not present.

Lithostratigraphy: From immediately below Peake's Sponge Bed to a position between Peake's Sponge Bed and the *Echinocorys elevata* Band (and lateral equivalents) in the Newhaven Chalk.

2.4 MPA52040 ARF1027 SU1280 4221

Foraminifera:

Cibicides beaumontianus

Cibicides cf ribbingi

Loxostomum eleyi

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Age: Foraminifera are very rare and generally long-ranging. Radiolaria are frequent in the somewhat indurated sample. A questionable BGS17 zonal age is suggested on the basis of the concurrent range of *Cibicides beaumontianus* and *Stensioeina exsculpta exsculpta* and the absence of *Gavelinella cristata*, which becomes abundant above Peake's Sponge Bed. The presence of *Cibicides cf ribbingi*, if correctly identified, suggests a position stratigraphically no older than BGS 17ii.

Lithostratigraphy: Upper Seaford Chalk

2.5 MPA52041 ARF1028 SU1281 4211

Foraminifera:

Eponides concinna

Gavelinella stelligera

Loxostomum eleyi

Stensioeina granulata granulata

Stensioeina granulata polonica

Age: *Gavelinella stelligera* and *Stensioeina granulata polonica* places the assemblage in the uppermost BGS17iii or lowermost 18i. BGS17iii is the more likely as *Gavelinella cristata* is not present.

Lithostratigraphy: Stratigraphically no higher than Peake's Sponge Bed and no lower than immediately above Barrois Sponge Bed (and lateral equivalents). Upper Seaford Chalk.

2.6 MPA52042 ARF1029 SU1217 4187

Foraminifera:

Cibicides ribbingi

Gavelinella cristata

Gavelinella stelligera

Stensioeina granulata perfecta

Stensioeina granulata granulata

Age: The presence of *Gavelinella cristata* and *Stensioeina granulata perfecta* together with the absence of *Bolivinoidea* spp, places the assemblage within BGS18ii, immediately below to a little above Peake's Sponge Bed

Lithostratigraphy: Lower Newhaven Chalk

2.7 MPA52043 ARF1030 SU1247 4198

Foraminifera:

Eponides concinna

Gavelinella cristata

Gavelinella stelligera

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Stensioeina granulata perfecta

Age: As for MPA52042 ARF1029. A BGS18ii age is indicated.

Lithostratigraphy: Upper Newhaven Chalk

2.8 MPA52044 ARF1031 SU1283 4191

Foraminifera:

Reussella kelleri

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Stensioeina granulata polonica

Age: The appearance of *Stensioeina granulata polonica* marks the base of BGS17. The presence of *Reussella kelleri* and *Stensioeina granulata granulata*, together with the absence of *Lingulogavelinella arnagerensis*, *Gavelinella stelligera* and *Reussella szajnochae praecursor* is indicative of BGS 17ii.

Lithostratigraphy: A position between Whitaker's 3" Flint and Barrois Sponge Bed (and lateral equivalents) is indicated. Upper Seaford Chalk.

2.9 MPA52045 ARF1032 SU1266 4185

Foraminifera:

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Age: A very low diversity and poorly preserved fauna occurred in the sample. Few conclusions can be drawn. The assemblage is no older than BGS15. *Stensioeina granulata granulata* ranges as high as the *testudinarius* Zone, but taxa characteristic of BGS 18 and BGS19 were not observed.

Lithostratigraphy: ?Seaford Chalk

2.10 MPA52046 ARF1033 SU1257 4166

Foraminifera:

Cibicides ribbingi

Loxostomum eleyi

Reussella kelleri

Reussella szajnochae praecursor

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Stensioeina granulata polonica

Age: *Reussella szajnochae praecursor* and *Stensioeina granulata polonica* places the assemblage into BGS17iii.

Lithostratigraphy: A position between Barrois and Peake's sponge beds (and lateral equivalents) is indicated. Upper Seaford Chalk

2.11 MPA52047 ARF1034 SU1287 4168

Foraminifera:

Cibicides beaumontianus

Reussella cf. *szajnochae praecursor*

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Stensioeina granulata polonica

Age: The presence of *Stensioeina granulata polonica* places the assemblage in BGS17 and the presence of *Reussella* cf. *szajnochae praecursor*, if correctly identified, suggests ?BGS17iii.

Lithostratigraphy: Upper Seaford Chalk

2.12 MPA52048 ARF1035 SU1168 4147

Foraminifera:

Gavelinella cristata

Gavelinella stelligera

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Age: The fauna listed indicates BGS18i. The absence of *Stensioeina granulata perfecta* suggests the assemblage does not belong to BGS18ii.

Lithostratigraphy: Probably Newhaven Chalk, but the uppermost Seaford Chalk, immediately below the Peake's Sponge Bed (and lateral equivalents) cannot be ruled out.

2.13 MPA52049 ARF1036 SU1129 4156

Foraminifera:

Cibicides beaumontianus

Reussella kelleri

Reussella szajnochaе praecursor

Stensioeina exsculpta exsculpta

Stensioeina granulata polonica

Age: *Reussella szajnochaе praecursor* and *Stensioeina granulata polonica* places the fauna in BGS17iii

Lithostratigraphy: Between Barrois and Peake's Sponge beds (and lateral equivalents). Upper Seaford Chalk

2.14 MPA52050 ARF1037 SU1041 4101

Foraminifera:

Lingulogavelinella arnagerensis

Stensioeina granulata polonica

Age: The concurrent range of the two species listed places the assemblage within BGS17i.

Lithostratigraphy: Between the Chartham Flint and immediately above Whitaker's 3" Flint. 'Middle' Seaford Chalk

2.15 MPA52051 ARF1038 SU1354 4140

Foraminifera:

Gavelinella cristata

Gavelinella stelligera

Reussella kelleri

Reussella szajnochaе praecursor

Stensioeina granulata perfecta

Age: *Stensioeina granulata perfecta* and *Gavelinella cristata* together with the absence of *Bolivinoidea* spp indicates BGS18ii.

Lithostratigraphy: A position between Peake's Sponge Bed and the *Echinocorys elevata* Band (and lateral equivalents) is indicated. Lower Newhaven Chalk

2.16 MPA52052 ARF1039 SU1218 3858

Foraminifera:

Reussella kelleri

Reussella szajnochaе praecursor

Stensioeina granulata polonica

Stensioeina exsculpta exsculpta

Age: The concurrent range of *Reussella szajnochaе praecursor* and *Stensioeina granulata polonica* places the assemblage in BGS17iii

Lithostratigraphy: Between Barrois and Peake's sponge beds (and lateral equivalents). Upper Seaford Chalk

2.17 MPA52053 ARF1040 SU1161 3980

Not examined herein

2.18 MPA52054 ARF1041 SU1073 3997

Not examined herein

2.19 MPA52055 ARF1042 SU1182 3785

Foraminifera:

Gavelinella arnagerensis

Stensioena granulata polonica

Age: The concurrent range of the two species listed places the assemblage within BGS17i.

Lithostratigraphy: Between the Chartham Flint and immediately above Whitaker's 3" Flint. 'Middle' Seaford Chalk

2.20 MPA52056 ARF1043 SU1013 3552

Foraminifera:

Gavelinella stelligera

Reussella szajnochae praecursor

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Age: Foraminifera are rare and poorly preserved. *Reussella szajnochae praecursor* and *Gavelinella stelligera* and the absence of *Gavelinella cristata* indicates a position high in BGS17iii.

Lithostratigraphy: Between Barrois and Peake's sponge beds (and lateral equivalents). Seaford Chalk

2.21 MPA52057 ARF1044 SU1132 3744

Foraminifera:

Marginotruncana sinuosa

Osangularia cordieriana

Reussella kelleri

Stensioeina sp cf *S. levis*

Whiteinella baltica

Age: *Marginotruncana sinuosa* indicates a position in lowermost BGS14. *Osangularia cordieriana* suggests a position stratigraphically no lower than the East Cliff Marls (and lateral equivalents). However *Stensioeina granulata* and *S. exsculpta* are not present, suggesting a position below the Upper East Cliff Marl (and lateral equivalents), i.e. older than BGS14. A specimen tentatively assigned to *Stensioeina levis* was also present; this species is exceedingly rare in Britain and has only been recorded in the Lewes Chalk. An uppermost BGS13-lowermost BGS14 is the best fit

Lithostratigraphy: The assemblage is difficult to interpret, but appears to be from approximately the East Cliff Marls and lateral equivalents).

2.22 MPA52058 ARF1045 SU1020 3780

Foraminifera:

Marginotruncana pseudolinneata

Osangularia cordieriana

Stensioeina granulata granulata

Stensioeina sp cf *S. levis*

Age: The presence of *Stensioeina granulata granulata* and *Osangularia cordieriana* indicates BGS14. The absence of *Stensioeina exsculpta exsculpta*, which marks the base of BGS15 was not present. A specimen of *Stensioeina* sp cf *S. levis* was again present.

Lithostratigraphy: Lower Seaford Chalk

2.23 MPA52059 ARF1046 SU0368 4049

Not examined herein

2.24 MPA52060 ARF1047 ST9677 2547

Foraminifera:

Gavelinella thalmani

Marginotruncana pseudolinneata

Valvulineria lenticularis

Age: Foraminifera are rare, especially planktonic taxa. Most are long ranging and it is only possible, very tentatively to suggest a basal BGS14 age. Key taxa are absent.

Lithostratigraphy: ?Seaford Chalk

2.25 MPA52061 ARF1048 SU1369 4272

Not examined herein

2.26 MPA52632 ARF1249 SU 0308 3235

Not examined herein

2.27 MPA52633 ARF1250 SU 0002 2522

Foraminifera:

Gavelinella lorneiana

Gavelinella pertusa

Globorotalites michelinianus

Gyroidinoides nitidus

Osangularia cordieriana

Valvulineria lenticularis

Whiteinella baltica

Age: Foraminifera are rare in this sample and comprise generally long ranging species of limited biostratigraphical importance. The first occurrence of *Osangularia cordieriana* is between the upper and lower East Cliff Marl (and lateral equivalents), however, the absence of species of *Stensioeina* suggests the fauna is not as high as foraminiferal zone BGS14 or BGS15 (basal coranguinum Zone) found in the basal Seaford Chalk.

Lithostratigraphy: The uppermost Lewes Chalk is suggested.

2.28 MPA52634 ARF1251 SU 0202 3446

Not examined herein

2.29 MPA52635 ARF1252 SU 0179 3273

Not examined herein

2.30 MPA52636 ARF1253 SU 0282 3247

Foraminifera:

Arenobulimina cf anglica

Gavelinella berthelini

Gavelinella intermedia

Rotalipora cushmani

Tritaxia macfadyeni

Tritaxia pyramidata

Age: The presence of *R. cushmani* indicates a position no lower than foraminiferal subzone BGS4iii (*acutus* macrofaunal subzone). Taken as a whole, the fauna is no younger than the top of the Cenomanian. However, the single specimen tentatively identified as *A. anglica*, suggests a position no younger than lower part of foraminifera zone BGS4. However, this specimen may be reworked.

Lithostratigraphy: Middle to Upper Zigzag Chalk Formation is suggested.

2.31 MPA52637 ARF1254 SU 0495 3460

Foraminifera:

Gavelinella cf stelligera

Gavelinella lorneiana

Loxostomum eleyi

Reussella kelleri

Stensioeina exsculpta exsculpta

Stensioeina polonica

Stensioeina granulata granulata

Valvulineria lenticularis

Age: The presence of *Stensioeina polonica* indicates the foraminiferal zone BGS17 (late coranguinum zone) and the occurrence of a poorly preserved specimen of *Gavelinella cf*

stelligera, if correctly identified, suggests a possible position as high as foraminiferal subzone BGS17iii. The absence of *Lingulogavelinella arnagerensis* precludes BGS17i.

Lithostratigraphy: The top Seaford Chalk Formation is indicated.

2.32 MPA52638 ARF1255 SU 0431 3348

Not examined herein

2.33 MPA52639 ARF1256 SU 9910 2600

Foraminifera:

Gavelinella lorneiana

Globorotalites michelinianus

Gyroidinoides nitidus

Osangularia cordieriana

Valvulineria lenticularis

Age: The foraminiferal fauna comprises almost entirely long ranging species. *Stensioeina* species are not present, but *O. cordieriana* was found. The assemblage appears to be essentially similar to MPA52633 (ARF1250). and

Lithostratigraphy: a similar stratigraphical position as MPA52633 (ARF1250) is indicated.

2.34 MPA52640 ARF1257 SU 9944 2529

Not examined herein

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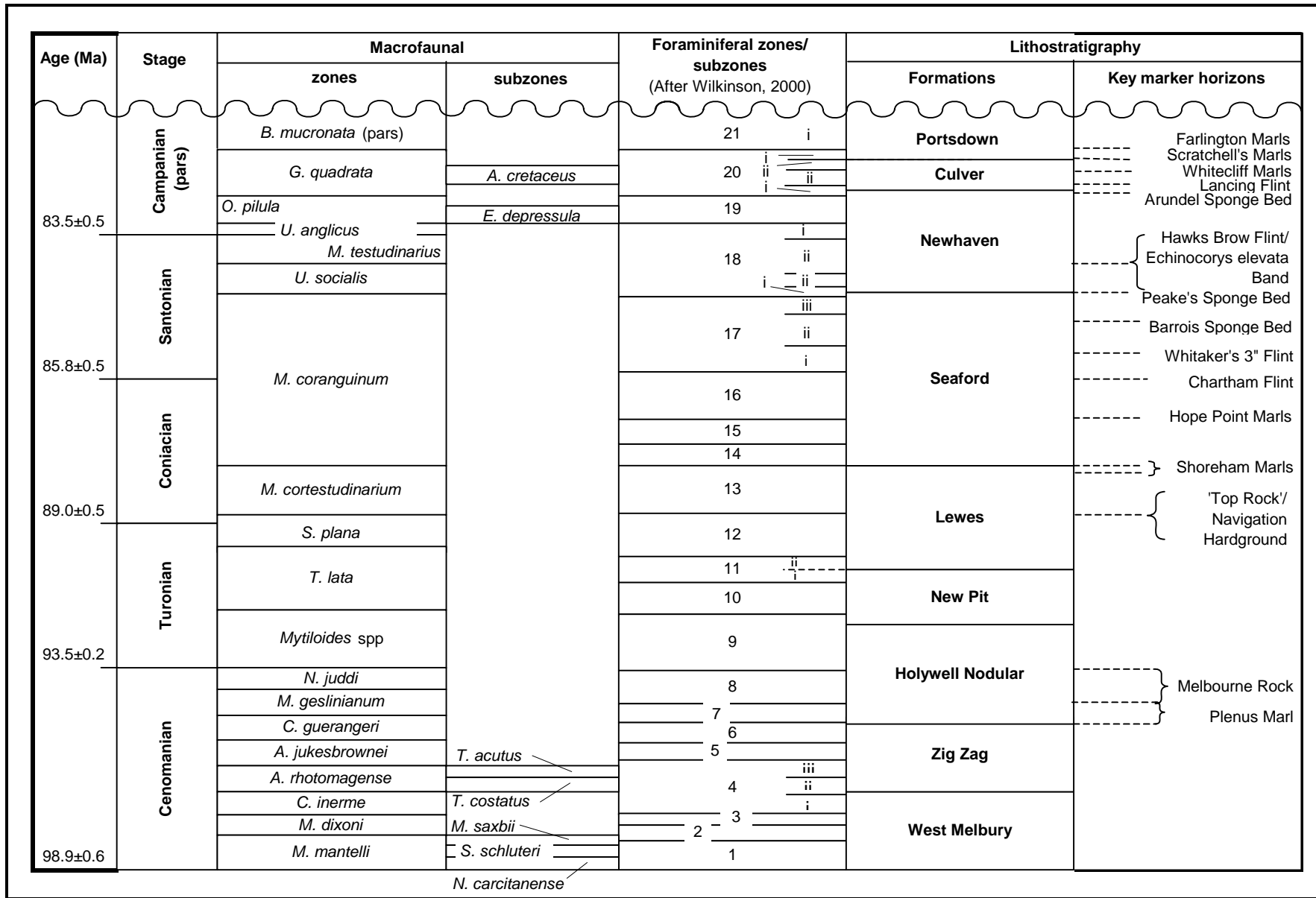


Figure 1. The foraminiferal zonation scheme of the Late Cretaceous, related to macrofaunal zones, lithostratigraphy and chronology.