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Chalk biostratigraphy around Tilshead and Larkhill, Salisbury Plain MOD training area, Wiltshire

Internal Report IR/04/156

BRITISH GEOLOGICAL SURVEY

INTERNAL REPORT IR/04/156

Chalk biostratigraphy around Tilshead and Larkhill, Salisbury Plain MOD training area, Wiltshire

Ian P. Wilkinson

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Summary

This report describes the results of biostratigraphical analyses of 21 samples of chalk from around Tilshead and Larkhill (Salisbury Plain MOD training area), Wiltshire. Foraminiferal zones and subzones between BGS13 and BGS18i were recognised and the upper Lewes, Seaford and basal Newhaven formations inferred.

1 Introduction

Twenty one chalk samples (from within the run MPA52976-53014; ARF1303-1341) were analysed for calcareous microfaunas. Both ostracods and foraminifera were present, but conclusions presented here are based only on the latter, the distribution of which are better known.

Assemblages are related to the foraminiferal zones and subzones defined by Wilkinson (2000).

2 Sample details

Faunas from the following samples were analysed:

MPA52976	ARF1303	SU 0015 4947
MPA52977	ARF1304	SU 0013 4874
MPA52978	ARF1305	SU 0131 4935
MPA52980	ARF1307	SU 0248 4825
MPA52981	ARF1308	SU 0250 5008
MPA52981	ARF1309	SU 0259 4801
MPA52982	ARF1310	SU 0344 4800
MPA52983	ARF1312	SU 0388 4962
MPA52985	ARF1313	SU 0381 4821
MPA52986	ARF1316	SU 0435 4954
MPA52989	ARF1319	SU 0980 4593
MPA52992	ARF1321	SU 1092 4585
MPA52994	ARF1324	SU 1103 4387
MPA52997	ARF1326	SU 1203 4506
MPA53001	ARF1328	SU 1214 4619
MPA53002	ARF1329	SU 1276 4536
MPA53003	ARF1330	SU 1245 4501
MPA53004	ARF1331	SU 1275 4560
MPA53006	ARF1333	SU 1271 4462
MPA52010	ARF1337	SU 1303 4509
MPA53012	ARF1339	SU 1402 4455

3 Biostratigraphical conclusions

Selected species are listed below. The full assemblage are held in the biostratigraphy data sheets centrally filed at BGS, Keyworth.

3.1 MPA52976

Lingulogavelinella arnagerensis
Osangularia cordieriana

The sample yielded a poorly foraminiferal fauna of essentially long-ranging microfossils. The two species listed suggest a position between highest part of foraminiferal zone BGS13 to BGS17i (the Shoreham Marls to immediately above Whitaker's 3" flint and lateral equivalents). However the absence of *Stensioeina* means that there is no evidence of a position higher than upper Shoreham Marl and the Lewes Chalk is likely.

3.2 MPA52977

Lingulogavelinella arnagerensis
Osangularia cordieriana

As for MPA52977

3.3 MPA52978

Gavelinella tourainensis
Globo truncana bulloides

The fauna comprises essentially long-ranging species. Planktonic species are rare. The concurrent range of the two listed species places the assemblage in the upper part of BGS13 (upper cortestudinarium macrofaunal zone). The absence of *Osangularia cordieriana* suggests a position below the Shoreham (=East Cliff) Marls (and lateral equivalents).

3.4 MPA52980

Gavelinella tourainensis
Marginotruncana sinuosa
Globo truncana bulloides
Reussella kellei

The concurrent range of *Gavelinella tourainensis* and *Globo truncana bulloides* places the assemblage in the upper part of BGS13. Elsewhere in southern England, this fauna is present in the upper part of the Lewes Chalk Formation. In addition, *Marginotruncana sinuosa*, which first appears close to the BGS13-BGS14 foraminiferal boundary, is present in very small numbers. *Osangularia cordieriana*, which appears at the Shoreham Marls (and lateral equivalents), and *Stensioeina granulata*, which first occurs at the base of BGS14, were not present.

3.5 MPA52981

Osangularia cordieriana
Lingulogavelinella arnagerensis

Generally long ranging species occur in this sample. *Osangularia cordieriana*, which appears at the Shoreham Marls (and lateral equivalents), is present, but *Stensioeina granulata* and *S exsculpta* were not seen. The highest Lewes Chalk is the best fit.

3.6 MPA52981

Lingulogavelinella arnagerensis
Osangularia cordieriana

The two species listed suggest a position between highest part of foraminiferal zone BGS13 to BGS17i (the Shoreham Marls to immediately above Whitaker's 3" flint and lateral equivalents). However the absence of *Stensioeina* means that there is no evidence of a position higher than upper Shoreham Marl and the Lewes Chalk is, therefore, likely.

3.7 MPA52982

Globo truncana bulloides
Gavelinella pertusa
Lingulogavelinella arnagerensis
Osangularia cordieriana

The species listed suggest a position in the highest part of foraminiferal zone BGS13, the absence of *Stensioeina granulata* and *S. exsculpta* means that there is no evidence of BGS14 or BGS15. A position no higher than upper Shoreham Marl and the Lewes Chalk is inferred.

3.8 MPA52983

Lingulogavelinella arnagerensis
Globotruncana bulloides
Gavelinella pertusa
Neoflabellina baudouinianus

The upper part of BGS13 is indicated, but the absent of *Osangularia cordieriana* and species of *Stensioeina* suggests a position below the Shoreham Marls (and lateral equivalents).

3.9 MPA52985

Stensioeina granulata granulata
Osangularia cordieriana

The presence of *Stensioeina granulata granulata* and absence of *S. exsculpta exsculpta* indicates foraminiferal zone BGS14. Elsewhere in southern England this zone is confined to the basal Seaford Chalk. There is no evidence of stratigraphically higher foraminiferal zones. The sample contained a number of flint chips.

3.10 MPA52986

Lingulogavelinella arnagerensis
Globotruncana bulloides
Gavelinella pertusa
Osangularia cordieriana
Gavelinella tourainensis

Globotruncana bulloides and *Gavelinella pertusa* appear for the first time in the upper part of foraminiferal zone BGS13 and the first occurrence of *Osangularia cordieriana* is within the Shoreham Marls interval. *Gavelinella tourainensis*, which was very rare in the sample, becomes extinct at the top of foraminiferal zone BGS13. This fauna is characteristic of the uppermost part of the Lewes Chalk.

3.11 MPA52989

Gavelinella pertusa
Osangularia cordieriana

The absence of *Stensioeina* (characteristic of BGS 14 and 15) and presence of *O. cordieriana* suggest a position in the upper part of foraminiferal zone BGS13 and the Shoreham Marls (uppermost Lewes Chalk).

3.12 MPA52992

Lingulogavelinella arnagerensis
Neoflabellina praerugosa
Stensioeina granulata granulata
Loxostomum eleyi
Osangularia cordieriana
Stensioeina polonica

Stensioeina exsculpta exsculpta

The concurrent range of *Stensioeina polonica* and *Lingulogavelinella arnagerensis* places the fauna into BGS17i. Elsewhere in southern England this assemblage is characteristic of the Upper Seaford Chalk, between the Chartham Flints and immediately above Whitaker's 3" Flint.

3.13 MPA52994

Osangularia cordieriana
Stensioeina exsculpta exsculpta
Loxostomum eleyi

Although rare, the last named species is the marker for the base of foraminiferal zone BGS16 (the higher zone marked by the occurrence of *Stensioeina polonica* was not recognised). A position at or above the Hope Point Marl (and lateral equivalents) in the 'middle' Seaford Chalk is suggested by comparison with faunas in other areas of southern England.

3.14 MPA52997

Osangularia cordieriana
Stensioeina exsculpta exsculpta
Loxostomum eleyi
Stensioeina granulata granulata

BGS16 is indicated, as for MPA52994

3.15 MPA53001

Stensioeina granulata granulata
Loxostomum eleyi
Osangularia cordieriana
Stensioeina polonica
Stensioeina exsculpta exsculpta
Reussella szajnochae praecursor

The presence of *Stensioeina polonica* and *Reussella szajnochae praecursor*, but absence of *Gavelinella stelligera* and *G. cristata* places the assemblage in foraminiferal zone BGS17iii. The upper Seaford chalk, between Barrois and Peake's sponge beds (and lateral equivalents) is suggested. *Inoceramus* prisms were common in the sample.

3.16 MPA53002

Stensioeina granulata granulata
Loxostomum eleyi
Osangularia cordieriana
Stensioeina polonica
Stensioeina exsculpta exsculpta
Gavelinella cristata
Gavelinella stelligera

The concurrent range of *Gavelinella cristata* (which is rare in this sample) and *Stensioeina polonica* (also rare) is restricted to a thin interval immediately below Peake's Sponge Bed. The presence of *G. cristata* proves the base of foraminiferal subzone BGS18i. Above Peake's Sponge Bed *G. cristata* is generally common or abundant, but below the sponge bed, it is much reduced in numbers. The very highest Seaford Chalk is therefore indicated.

3.17 MPA53003

Osangularia cordieriana
Stensioeina granulata granulata
Lingulogavelinella arnagerensis

Foraminifera are rare in this sample. Foraminiferal zone BGS14 is indicated by the presence of *Stensioeina granulata granulata* (the index for the succeeding zones, *S. exsculpta exsculpta* and *Loxostomum eleyi*, were not found). BGS14 is situated in the basal part of the Seaford Chalk, elsewhere in southern England, immediately overlying the Shoreham Marls.

3.18 MPA53004

Loxostomum eleyi
Stensioeina exsculpta exsculpta
Stensioeina granulata granulata
Gavelinella cristata
Gavelinella stelligera
Cibicides beaumontianus

The occurrence of *G cristata*, but absence of *Stensioeina polonica* places the assemblage above Peake's Sponge Bed, within foraminiferal zone BGS 18. The occurrence of *G stelligera* and absence of *Stensioeina granulata perfecta* places the fauna in subzone BGS18i, rather than BGS18ii. The basal part of the Newhaven Chalk, immediately above Peake's Sponge Bed (and lateral equivalents) is suggested.

3.19 MPA53006

Loxostomum eleyi
Stensioeina exsculpta exsculpta
Stensioeina granulata granulata
Gavelinella cf stelligera
Cibicides beaumontianus
Stensioeina polonica

The presence of *Cibicides beaumontianus* and *Stensioeina polonica* places the fauna in foraminiferal subzones BGS17ii or BGS17iii. Elsewhere in southern England, these subzones are confined to a position between Whitaker's 3" Flint and Peake's Sponge Bed (and lateral equivalents). *Stensioeina polonica*, the index for BGS18, is not present. Although there is some doubt as to which of the two subzones the fauna fits into, a single specimen tentatively assigned to *Gavelinella stelligera* was present. If this is correctly identified, then foraminiferal subzone BGS17iii (and a position above the Barrois Sponge Bed), could be suggested. Rare flint chips were noted in the sample.

3.20 MPA52010

Stensioeina exsculpta exsculpta
Stensioeina granulata granulata
Reussella szajnochae praecursor
Stensioeina polonica
Gavelinella cf stelligera

The presence of *Stensioeina polonica* and absence of *Gavelinella cristata* places the fauna into foraminiferal zone BGS17 and stratigraphically between Chartham Flint and immediately below Peake's Sponge Bed (and lateral equivalents). The occurrence of *Reussella szajnochae praecursor*, however, means that this conclusion can be further refined to foraminiferal subzone

17iii and a position between Barrois and immediately below Peake's sponge beds (and lateral equivalents).

3.21 MPA53012

Loxostomum eleyi

Stensioeina exsculpta exsculpta

Stensioeina granulata granulata

Praebulimina carsayae

Neoflabellina praerugosa

Reussella szajnochae praecursor

The presence of *Loxostomum eleyi* indicates that the assemblage is no older than BGS16 zonal age. *Stensioeina polonica*, the index for foraminiferal zone BGS17 was not found. However, despite the absence of the zonal index, *Praebulimina carsayae* and *Reussella szajnochae praecursor* suggests that the fauna is younger than BGS16. These two species enter the record high in BGS17, the former being characteristic of foraminiferal subzone 17ii and the latter being the index for foraminiferal subzone BGS17iii. The best fit for the assemblage, therefore, is BGS17iii. In southern England, this is situated between the Barrois and Peake's sponge beds, at the top of the Seaford Chalk.

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