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Foraminiferal biostratigraphy of the Chalk Group in the York District

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Foraminiferal biostratigraphy of the Chalk Group in the York District

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Summary

Foraminifera from the Chalk group in Yorkshire are only poorly known. The samples examined for this report add considerably to our understanding of their distribution and their relationship with associations in southern England. Foraminifera prove the age of samples from the Ferriby to Burnham Chalk formations and tie the “Upper Pink Band” and “Lower Pink Band” into the biostratigraphical scheme. Assemblages indicative of foraminiferal zones BGS4 to BGS16 were present. Recrystallisation of several faunas from the Burnham Chalk Formation prevented accurate age determinations.

1 Introduction

Fifteen samples (WMD12703-12717; MPA56517-56531) of chalk were examined for foraminifera. Ostracods were also present, but their distribution is less well known than the foraminifera and therefore ignored. Key taxa are used in the summary herein to determine the foraminiferal zones (sensu Wilkinson, 2000); full species lists are held on file.

2 Biostratigraphical results

2.1 PIT AT HIGH CALLIS WOLD

MPA56517 WMD12703 SE 82877 55938

The following taxa were present: *Osangularia cordieriana*, *Stensioeina exsculpta exsculpta* and *S granulata granulata*. These indicate that the assemblage is no older than foraminiferal Zone BGS15 (equivalent to the lower, but not lowermost, Seaford Chalk Formation in southern England); *Stensioeina exsculpta exsculpta* appears just below Hope Point Marl and lateral equivalents (not base of formation). In terms of the macrofaunal zonal scheme, the inception is a little above the base of the coranguinum zone. Index species for higher zones were not seen, although a specimen of *Stensioeina granulata granulata* appeared to be transitional with *Stensioeina polonica* a species that, in its strict definition, appears stratigraphically much higher (Wilkinson, 2000). Placing this in the context of the Yorkshire stratigraphy, this implies the fauna came from the Upper Burnham Chalk Formation.

2.2 MILLINGTON ESTATE PIT

MPA56518 WMD12704 SE 83959 55720

Stensioeina exsculpta exsculpta *Loxostomoides eleyi* and *Lingulogavelinella arnagerensis* were present. The inception of *Loxostomoides eleyi* marks the base of BGS16 and the extinction of *Lingulogavelinella arnagerensis* is within foraminiferal Zone BGS17. In terms of southern England, this fauna is characteristic of the middle Seaford Chalk Formation, above Hope Point Marl ("middle" coranguinum). Index species for BGS17 were not seen. A position very high in the Burnham Chalk Formation is suggested although the basal Flamborough Chalk cannot be ruled out entirely.

2.3 PIT AT LOW CALLIS WOLD

MPA56519 WMD12705 SE 82737 55235

The occurrence of *Stensioeina exsculpta exsculpta* indicates a position no lower than foraminiferal Zone BGS15 (indices for BGS16, such as *Loxostomum eleyi*, and stratigraphically higher zones were not found). As in MPA56517, one specimen of *Stensioeina granulata granulata* appeared to be transitional with *Stensioeina polonica*. The best fit for the fauna is in Upper Burnham Chalk Formation.

2.4 WARREN FARM, NEAR MILLINGTON

MPA56520 WMD12706 SE 84023 51946

Foraminifera are rare and poorly preserved, although *Osangularia cordieriana* was present. No species of *Stensioeina* were found, suggesting a position very low in Seaford Chalk Formation equivalent. In southern England *O. cordieriana* appears in the very highest Lewes (highest BGS13; highest cortestudinarium Zone) at the Shoreham Marls. This interpretation places the sample in the “middle” Burnham Chalk Formation, but the fauna is so poor that this result may be inaccurate due to sample failure.

2.5 LITTLE GIVENDALE FARM

MPA56521 WMD12707 SE 82414 53002

Gavelinella tourainensis and *Lingulogavelinella globosa* were observed. The former is a Lazarus species; it is present in the late Cenomanian (*naviculare* zone) of southern England, disappears just below the top of the *labiatus* Zone, only to be resurrected again in *planus-cortestudinarium* zones. *L. globosa* appears at the same time as *tourainensis* and becomes extinct in the upper part of “middle” *labiatus*. A third species, *Valvulineria lenticularis*, appears in basal *labiatus* Zone and is then very long ranging. So, based on distributions in southern England, the concurrent range puts the assemblage in foraminiferal Zone BGS9 (of the Holywell Nodular Chalk), in the low to middle *labiatus* Zone so that in terms of northern Chalk stratigraphy, the Welton Chalk Formation can be inferred.

2.6 DEEP DALE: BASE OF TRACK-SIDE SECTION

MPA56522 WMD12708 SE 82059 55267

Foraminifera are poorly preserved. *Gavelinella cenomanica* & *G. intermedia* are long ranging, but go into extinction in the lower part of the Plenus Marls. Little can be concluded other than the assemblage is Cenomanian in age and therefore the Ferriby Chalk Formation can be inferred.

2.7 PIT NEAR UNCLEBY BARN

MPA56523 WMD12709 SE 82218 59339

Very poor preservation with considerable recrystallisation obscures the foraminifera so that all identifications and conclusions are tentative. *Osangularia cordieriana*, if correctly identified, indicates a position no lower than the Shoreham Marl equivalent (Uppermost Lewes Chalk equivalent of the S England stratigraphy). Its inception is in uppermost foraminiferal Zone BGS 13 in the uppermost part of the cortestudinarium zone. Key foraminiferal taxa such as species of *Stensioeina* were not seen suggesting a position no higher than cortestudinarium and the “middle” Burnham Chalk Formation. It should be noted, however, that other key foraminifera for that interval were not found.

2.8 BISHOP WILTON PIT (?TOTTENHOE STONE)

MPA56524 WMD12710 SE 80551 56053

Fish teeth and debris were seen. The occurrence of *Plectina mariae* and *Arenobulimina anglica* indicates foraminiferal zones BGS4i or BGS4ii, but the absence of *Globorotalia* is more indicative of BGS4i in southern England (but this may not hold true for northern England). The assemblage can be given an *inermis-costatus* age and placed in the Middle Ferriby Chalk. The question whether the sample is Tottenhoe Stone or Nettleton Stone equivalent seems to be

resolved, in that inner Zone/costatus Subzonal age is consistent with the Tottenhoe Stone (Nettleton Stone is placed in the *jukesbrownei* Zone).

2.9 BISHOP WILTON PIT (?VIRGATUS BEDS)

MPA56525 WMD12711 SE 80551 56053

Very rare, long-ranging foraminifera were present. No biostratigraphical conclusions are possible other than the assemblage is Cenomanian in age as *Gyroidinoides parva* appears to go into extinction at the Plenus Marl.

2.10 PAINSTHORPE WOLD FARM

MPA56526 WMD12712 SE 82194 58446

Pseudotextulariella cretosa, *Plectina cenomana* and *Rotalipora cushmani* were present suggesting foraminiferal Zone BGS4iii. Consistent occurrences of *P cretosa* is confined to BGS2 to BGS4; it disappears at the top of BGS4, although very rare (?reworked) specimens have been recorded in BGS5. *Plectina cenomana* first appears at the base of BGS 4 to become extinct in the lower Plenus Marl (highest BGS6), whereas the occurrence of *Rotalipora*, such as *R. cushmani*, mark the base of BGS4iii. *Lingulogavelinella globosa* which occurs in BGS6 was not found. As BGS4iii equates with the *acutus* Subzone (upper *rhotomagense* zone) and the chalk has a pink coloration, it seems reasonable to equate it with the "Lower Pink Band" of Lincolnshire.

2.11 PIT AT NORTH BRECKENHOLME

MPA56527 WMD12713 SE 83459 59466

The sample contained only a low diversity fauna of generally long-ranging species. The appearance of *Verneuilina muensteri* marks the base of foraminiferal Zone BGS13 in southern England, but stratigraphically higher taxa, such as species of *Stensioeina*, which are characteristic of BGS14 and 15, were not seen. The best fit is, therefore, BGS13 (approximately equivalent to the *cortestudinarium* macrofaunal zone) and the lower to middle Burnham Chalk is suggested, although this conclusion is based on a sparse assemblage.

2.12 PIT IN BRECKENHOLME DALE

MPA56528 WMD12714 SE 83967 59898

Foraminifera are rare, fragmentary and recrystallised so that conclusions are extremely tentative. *Globorotalites michelinianus* appears in *lata* Zone but is then long ranging. A single questionable *Osangularia*, if correctly identified, suggests the Upper Burnham Chalk.

2.13 LANDSLIP BELOW SOUTH WOLD BROW 1:

MPA56529 WMD12715 SE 81998 57680

Pseudotextulariella cretosa, *Plectina cenomana* and *Arenobulimina anglica* form a characteristic association. The range of *P cretosa* is foraminiferal Zone BGS 2 to BGS4; *A anglica* goes into extinction in BGS4ii; and *P cenomana* appears in BGS4i. Biostratigraphically useful keeled planktonics, such as *Rotalipora*, were not observed. The best fit is lower/lowest BGS4 (inner Zone to T *costatus* Subzone of the A *rhotomagense* Zone). This conclusion infers the mid Ferriby Chalk at about the West Melbury/Zigzag chalk boundary of southern England.

2.14 LANDSLIP BELOW SOUTH WOLD BROW 2

MPA56530 WMD12716 SE 81992 57677

Common *Inoceramus* prisms were present. *Gavelinella tourainensis* and *Lingulogavelinella globosus* appear in foraminiferal Zone BGS6 (*guerangeri* macrofaunal Zone) in the Zigzag Chalk Formation of southern England, whereas *Gavelinella intermedia* and *G. cenomana* become extinct within BGS7 (Plenus Marl). This sample is a pink chalk and is clearly not Plenus Marl. On biostratigraphical grounds, it is placed in the Upper Ferriby Chalk Formation and the lithology suggests that this horizon is the "Upper Pink Band".

2.15 LANDSLIP BELOW SOUTH WOLD BROW 3

MPA56531 WMD12717 SE81973 57386

Foraminifera are rare, recrystallised and generally indeterminate. *Hedbergella brittonensis* was the only species identified with certainty, but this is a long ranging species that ranges through the chalk up to BGS17ii (top *coranguinum* zone). No useful biostratigraphical conclusions are possible.

References

WILKINSON, I.P. 2000. A preliminary foraminiferal biozonation of the Chalk Group (In preparation for the Holostrat Project: Upper Cretaceous). *British Geological Survey Internal Report*, IR/00/13, 21pp.