

NOTE ON THE STRATIGRAPHIC POSITION OF THE ZONDERSCHOT SANDS MEMBER OF THE BERCHEM FORMATION (MIOCENE, BELGIUM)¹

by

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(1 table and 1 plate)

RESUME.- Trois échantillons de la localité type des Sables de Zonderschot, Formation de Berchem, contiennent 15 espèces de foraminifères planctoniques. L'association des foraminifères planctoniques indique une Biozone provinciale à *Globigerinoides trilobus trilobus* / *Globigerinoides altiaperturus*.

ABSTRACT.- Planktonic foraminifera are recorded from three samples of the Zonderschot Sands Member of the Berchem Formation in the type locality at Zonderschot. Altogether 15 taxa are described. The association of planktonic foraminifera indicates a provincial *Globigerinoides trilobus trilobus* / *Globigerinoides altiaperturus* Biozone.

I.- INTRODUCTION

In a temporary excavation for a new pipe line at Zonderschot (Heist-op-den-Berg; X = 176,50, Y = 194,60) a 60 cm thick layer of glauconiferous and very fossiliferous sand was visible in 1972 between the underlying eroded Boom Clay and 3,5 m Quaternary sand. The dark green clayey and micaceous sand has been defined as the Zonderschot Sands Member of the Berchem Formation (DE MEUTER & LAGA, 1976).

This contribution deals with the planktonic foraminifera recorded from three samples of these Zonderschot Sands in the type locality (B 327, B 328, B 329), taken every 20 cm from the base to the top of the 20 cm thick deposit.

II.- STRATIGRAPHY

The distribution of the planktonic foraminifera in the Zonderschot Sands samples is represented in table 1.

The populations are dominated by *Globigerina angustiumbilicata* and by taxa of the *Globigerina praebulloidis* group. Some less frequently occurring taxa however are more important in a biostratigraphical point of view. Especially the presence of *Globorotalia zealandica incognita*, *Globigerinoides trilobus trilobus* and *Globigerinoides altiaperturus* are interesting.

The association of planktonic foraminifera within the Zonderschot Sands can be considered as a *Globigeri-*

noides trilobus trilobus / *Globigerinoides altiaperturus* Concurrent Range Zone. Some other important taxa as f.i. *Globigerinatella insueta* and *Globigerinita dissimilis* have not yet been observed in the Zonderschot Sands.

The association of planktonic foraminifera within the Zonderschot Sands resembles this of the higher part of the Houthalen Sands (HOOYBERGHS & DE MEUTER, 1972). *Globigerinoides trilobus trilobus* and *Globigerinoides altiaperturus* also occur together in this part. *Globorotalia zealandica incognita* however is recorded first from the Zonderschot Sands. The stratigraphic gap between the Zonderschot Sands and the older Houthalen Sands (Burdigalian) appears to be very restricted.

The correlation of the planktonic foraminiferal association in the Zonderschot Sands with those of the Antwerpen Sands still has to be worked out in detail. *Globorotalia zealandica incognita* also occurs in the Antwerpen Sands. It has been described as *Globorotalia* sp. by HOOYBERGHS & DE MEUTER (1972).

1 Communication reçue et présentée le 8 juillet 1980.

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Table 1.- Distribution of planktonic foraminifera in the Zonderschot Sands samples.
(X = less than 1 % of the population)

B 237	B 238	B 239	
X	1	X	<i>Globorotalia obesa</i> BOLLI, 1957
X	X	X	<i>Globorotalia praescitula</i> BLOW, 1959
X	1	X	<i>Globorotalia zealandica incognita</i> WALTHERS, 1965
60	69	68	<i>Globigerina angustiumbilitata</i> BOLLI, 1957
1	2	4	<i>Globigerina bulloides</i> D'ORBIGNY, 1826
6	5	2	<i>Globigerina ouachitaensis</i> HOWE & WALLACE, 1932
9	4	6	<i>Globigerina praebulloides leroyi</i> BLOW & BANNER, 1962
18	12	17	<i>Globigerina praebulloides occlusa</i> BLOW & BANNER, 1962
2	3	2	<i>Globigerina praebulloides praebulloides</i> BLOW, 1959
4	3	1	<i>Globigerina woodi</i> JENKINS, 1962
X	X	X	<i>Globigerinoides altiapertura</i> BOLLI, 1957
X	X		<i>Globigerinoides quadrilobatus</i> (D'ORBIGNY, 1846)
X	X	X	<i>Globigerinoides trilobus trilobus</i> (REUSS, 1850)
	X	X	<i>Globigerinoides trilobus immaturus</i> LEROY, 1939
X	X	X	<i>Globigerinita unicava unicava</i> (BOLLI, LOEBLICH & TAPPAN, 1957)

III.- SYSTEMATICS

Family *Globorotaliidae* CUSHMAN, 1927

Subfamily *Globorotaliinae* CUSHMAN, 1927

Genus *Globorotalia* CUSHMAN, 1927

Globorotalia obesa BOLLI, 1957

+ 1957 *Globorotalia obesa* Bolli, new species - BOLLI, p. 119, pl. 29 : 2a - 3.

v 1972 *Globorotalia obesa* BOLLI - HOOYBERGHS & DE MEUTER, p. 13, pl. 1 : 5a - c.

Remarks :

A few specimens have an aperture extending over the dorsal peripheral margin of the preceeding whorl. They show a transition to *Hastigerina siphonifera praesiphonifera* BLOW, 1969, with at least three consecutive planispiral chambers.

Globorotalia praescitula BLOW, 1959

+ 1959 *Globorotalia scitula praescitula* Blow, subsp. nov. - BLOW, p. 221, pl. 19 : 128a - c.

Remarks :

Besides typical specimens, individuals with a more rounded axial periphery occur.

Globorotalia zealandica incognita WALTERS, 1965

Pl. 1 : 3

+ 1958 *Globorotalia zealandica* Hornibrook subsp. *incognita* Walters - WALTHERS, p. 120, tf. 6a - j (Fide ELLIS & MESSINA).

Remarks :

Globorotalia zealandica incognita is characterized by the small compact and thick-walled test. Some of our specimens have a finely perforated last chamberlet.

Family *Globigerinidae* CARPENTER, PARKER & JONES, 1862

Subfamily *Globigerininae* CARPENTER, PARKER & JONES, 1862

Genus *Globigerina* D'ORBIGNY, 1826

Globigerina angustiumbilitata BOLLI, 1957

Pl. 1 : 5

+ 1957 *Globigerina ciperoensis angustiumbilitata* Bolli, new subspecies - BOLLI, p. 109, pl. 22 : 12a-13c.

v 1972 *Globigerina angustiumbilitata* Bolli - HOOYBERGHS & DE MEUTER, p. 17, pl. 3 : 4a - c.

Remarks :

Some specimens have an asymmetrical aperture extending from the umbilicus to the peripheral margin.

Globigerina bulloides D'ORBIGNY, 1826
Pl. I : 4

+ 1826 *Globigerina bulloides* d'Orbigny - d'ORBIGNY, p. 277.

v 1972 *Globigerina bulloides* D'Orbigny - HOOYBERGHS & DE MEUTER, p. 18, pl. 4 : 2a-c.

Remarks :

A few individuals, having a larger aperture, resemble *Globigerina apertura* CUSHMAN, 1918.

Globigerina ouachitaensis HOWE & WALLACE, 1932
Pl. I : 6

+ 1932 *Globigerina ouachitaensis* Howe & Wallace - HOWE & WALLACE - HOOYBERGHS & DE MEUTER, p. 23, pl. 6 : 3a - c.

Remarks :

Rarely occurring smaller individuals resemble *Globigerina officinalis* SUBBOTINA, 1953.

Globigerina praebulloides leroyi
BLOW & BANNER, 1972
Pl. I : 9

+ 1962 *Globigerina praebulloides leroyi* Blow & Banner subsp. nov. - p. 93, pl. IX R - T : 9(v).

v 1972 *Globigerina praebulloides leroyi* Blow & Banner - HOOYBERGHS & DE MEUTER, p. 24, pl. 7 : 2a - c.

Remarks :

The typical specimens have a symmetrical semi-circular aperture bordered by a small lip.

Globigerina praebulloides occlusa
BLOW & BANNER, 1962

+ 1962 *Globigerina praebulloides occlusa* Blow & Banner subsp. nov. - BLOW & BANNER, p. 93, pl. IX v - w : 14i - ii.

v 1972 *Globigerina praebulloides occlusa* Blow & Banner - HOOYBERGHS & DE MEUTER, p. 25, pl. 7 : 3a - c.

Remarks :

The asymmetrical aperture lacks a lip.

Globigerina praebulloides praebulloides
BLOW, 1959
Pl. 1 : 8

+ 1959 *Globigerina praebulloides* Blow, sp. nov. - BLOW, p. 180, pl. 8 : 47a-c, pl. 9 : 48.

v 1972 *Globigerina praebulloides praebulloides* Blow - HOOYBERGHS & DE MEUTER, p. 25, Pl. 7 : 4 a-c.

Remarks :

Typical individuals with a relative large asymmetrical aperture occur rarely in our samples.

Globigerina woodi JENKINS, 1960
Pl. 1 : 7

+ 1960 *Globigerina woodi* Jenkins, new species - JENKINS, p. 352, pl. 2 : 2a - c.

v 1972 *Globigerina woodi* Jenkins - HOOYBERGHS & DE MEUTER, p. 27, Pl. 8 : 4a - c.

Remarks :

The size of the aperture varies considerably.

Genus *Globigerinoides* CUSHMAN, 1927
Globigerinoides altiapertura BOLLI, 1957
Pl. 1 : 10, 11

+ 1957 *Globigerinoides triloba altiapertura* Bolli, new subspecies - pl. 25 : 7a - 8, text-fig. 21, nr 3.

v 1972 *Globigerinoides quadrilobatus altiapertura* Bolli - HOOYBERGHS & DE MEUTER, p. 28, pl. 9 : 2a - c.

Remarks :

The rarely occurring specimens have typically highly arched primary and secondary apertures.

Globigerinoides quadrilobatus

BANNER & BLOW, 1960

Pl. 1 : 12.

- + 1960 *Globigerinoides quadrilobatus* (d'Orbigny) -
BANNER & BLOW, p. 17, pl. 4 : 3a - b.
- v 1972 *Globigerinoides quadrilobatus quadrilobatus*
Banner & Blow - HOOYBERGHS & DE
MEUTER, p. 29, pl. 9 : 4a - c.

Remarks :

The typical specimens have 3 1/2 chambers in the last whorl.

Globigerinoides trilobus immaturus

(LE ROY, 1939)

Pl. 1 : 14

- + 1939 *Globigerinoides sacculiferus* (Brady), var. *immatura* Le Roy - LE ROY, p. 263, pl. 3 : 19 - 21 (Fide ELLIS & MESSINA).

Remarks :

Some specimens have a very coarsely cancellated wall.

Globigerinoides trilobus trilobus (REUSS, 1850)

Pl. 1 : 13

- + 1850 *Globigerina triloba* Reuss - REUSS, p. 374, pl. 47 : 11a - b.
- v 1972 *Globigerinoides trilobus* (Reuss) - HOOYBERGHS & DE MEUTER, p. 30, pl. 10 : 2a - c.

Remarks :

Typical specimens have 3 chambers in the last whorl, but the embracing character of the chambers varies slightly.

Globigerinita unicava unicava

(BOLLI, LOEBLICH & TAPPAN, 1957)

Pl. 1 : 15

- + 1957 *Catapsydrax unicavus* Bolli, Loeblich & Tappan, new species - BOLLI, LOEBLICH & TAPPAN, p. 37, pl. 7 : 9a - c.
- v 1972 *Globigerinita unicava unicava* Bolli, Loeblich & Tappan - HOOYBERGHS & DE MEUTER, p. 33, pl. 11 : 4a - c.

Remarks :

The size of the umbilical bulla varies but is mostly rather small.

IV.- ACKNOWLEDGEMENTS

Sincere thanks are due to Professor BULTYNCK, Professor BOUCKAERT, Professor GULLENTOPS and to Dr. DE MEUTER for their critical and instructive advise and for their permitting to study the samples of the Zonderschot Sands.

Thanks are also due to Professor KING for the reading of the manuscript.

The author thanks Dr. WOUTERS (Koninklijk Belgisch Instituut voor Natuurwetenschappen) for making the photographs of the specimens.

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PLATE I

1. *Globorotalia obesa* BOLLI, 1957
Sample B 237. Br. 1/2. X 70
2. *Globorotalia obesa* BOLLI, 1957.
Sample B 238. Br. 1/17. X 75
3. *Globorotalia zealandica incognita* WALTHERS, 1965.
Sample B 238. Br. 1/25 X 90
4. *Globigerina bulloides* D'ORBIGNY, 1826.
Sample B 238. Br. 1/16 X 70
5. *Globigerina angustiumbilitata* BOLLI, 1957.
Sample B 237. Br. 1/8 X 130
6. *Globigerina ouachitaensis* HOWE & WALLACE, 1932.
Sample B 239. Br. 1/6 X 110
7. *Globigerina woodi* JENKINS, 1960.
Sample B 239. Br. 1/22 X 80
8. *Globigerina praebulloides praebulloides* BLOW, 1959.
Sample B 238. Br. 1/26 X 135.
9. *Globigerina praebulloides leroyi* BLOW & BANNER, 1962.
Sample B 238. Br. 1/5 X 120.
10. *Globigerinoides altiapertura* BOLLI, 1957.
Sample B 238. Br. 1/15 X 80. Ventral side.
11. *Globigerinoides altiapertura* BOLLI, 1957.
Sample B 239. Br. 1/10 X 95. Dorsal side.
12. *Globigerinoides quadrilobatus* BANNER & BLOW, 1962.
Sample B 237. Br. 1/1 X 65.
13. *Globigerinoides trilobus trilobus* (REUSS, 1850).
Sample B 238. Br. 1/4 X 80.
14. *Globigerinoides trilobus immaturus* LEROY, 1939.
Sample B 238. Br. 1/7 X 135
15. *Globigerinita unicava unicava* (BOLLI, LOEBLICH & TAPPAN, 1957).
Sample B 239. Br. 1/19 X 90.



