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ENTREPRISE DE RECHERCHES ET D'ACTIVITÉS PÉTROLIÈRES

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WELL 3/7-1

MICROPALEONTOLOGICAL REPORT  
(TERTIARY AND UPPER CRETACEOUS)

WELL 3/7-1

DIRECTION EXPLORATION  
LABORATOIRES

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Micropaleontological report  
(Tertiary and upper Cretaceous) -

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LABORATOIRES  
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WELL 3/7-1

MICROPALEONTOLOGICAL REPORT  
(TERTIARY AND UPPER CRETACEOUS)

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2035 n° 3/875 R  
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P. DURIF  
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## I - INTRODUCTION

This report summarizes the results of the micropaleontological and stratigraphical analyses which have been carried out on material studied from the interval 580-3220 m. The stratigraphic interval ranges through a Tertiary sequence and into the Upper Cretaceous. The well reached T.D. (3227 m) in Basement strata, top at 3214 m.

### SAMPLING

No samples have been recovered down to 580 m.

The examination of free microfaunas has been made on cutting samples, from 580 m to 3220 m. In addition, thin sections made on the coarse fraction of cutting washed residues have been examined below 3030 m, from the Campanian (part) and the Lower Senonian.

The samples have been collected at about 30 m intervals in the Tertiary down to 2650 m, at 10 to 20 m intervals in the Paleocene and the Upper Cretaceous.

### SUMMARY OF RESULTS

Diagnostic Foraminifera consisting of planktonic and benthonic species have enabled the following biostratigraphic subdivisions to be made :

- 580- 680 m : ? Plio-Pleistocene  
Uncharacterized interval (Mollusc debris)
- 710-1720 m : ? Pliocene-Upper Miocene to Lower Miocene.  
Progressive appearance of characteristic species including planktonic forms, such as *Globigerina* gr. *humerosa* at the top, *Globorotalia praescitula* and *Globigerinoides* gr. *trilobus* towards the base.
- 1760-1925 m : ? Oligocene.
- 1965-2285 m : Middle Oligocene to ? Upper Eocene.  
*Rotaliatina bulimoides*, *Globorotalia* cf. *increbescens*.  
Below 2150 m = arenaceous microfauna predominant.
- 2300-2750 m : Lower Eocene-Paleocene  
*Spiroplectammina spectabilis*.
- 2760-2845 m : Lower Paleocene (Danian)  
Characteristic microfauna with diagnostic planktonic species.
- 2860-2990 m ? : Maestrichtian.  
*Pseudotextularia elegans*, *Racemigümbelina fructicosa*,  
*Rugoglobigerina* gr. *rugosa*...
- 3000-3170 m : Campanian, to ? Lower Senonian.  
Abundant small *Globigerinidae* and *Heterohelicidae*,  
together with rare *Globotruncana*.
- 3175-3215 m : Lower Senonian- ? Upper Turonian.  
*Globotruncana* assemblage.
- Below 3215 m : Basement.

... / ...

II - ZONATION AND STRATIGRAPHICAL REMARKS

1 - TERTIARY

1.1 - INTERVAL 580-680 m : Uncharacterized (? Plio-Pleistocene)

This unit contains very poor faunas consisting mainly of rare Gastropod and Pelecypod debris, locally with Plant remains.

1.2 - INTERVAL 710-1720 m : Miocene (to ? Pliocene)

The upper part of this interval contains a varied foraminiferal assemblage consisting mainly of benthonic species, such as :

Cassidulina gr. laevigata  
Glandulina laevigata  
Ammonia beccarii var. tepida  
Nonion commune  
Nonion boueanum  
Nonion affine  
Bulimina aculeata  
Bulimina elongata var. subulata  
Pullenia bulloides  
Elphidium incertum var. clavatum  
Cibicides gr. dutemplei  
Sphaeroidina bulloides

together with a few planktonic forms in relatively great numbers of specimens, represented by :

Globigerina bulloides  
Globigerina gr. humerosa

These planktonic species are indicative of the Upper Miocene and the Pliocene.

The transition to the Middle Miocene is marked by the progressive appearance of the following species :

Uvigerina hosiusi, at 860 m  
Uvigerina rugulosa, at 860 m  
Trifarina bradyi, at 860 m  
Globorotalia acostaensis, at 1140 m .

A Middle Miocene determination is further substantiated by the incoming of rare :

Globorotalia continuosa, at 1420 m  
Uvigerina tenuipustulata, at 1420 m  
Virgulinea pertusa, at 1540 m  
Astigerina staeschei, at 1595 m .

... / ...

The microfaunas become impoverished below 1000 m. Arenaceous foraminifera including: *Cyclammina* spp., *Haplophragmoides* spp., *Hormosinidae*..., are noticeable locally in the samples between 1300 and 1460 m.

On account of the occurrence of rare *Globorotalia praescitula*, abundant *Globigerinoides* gr. *trilobus* and *Globigerinoides* spp., a Lower (to ? Middle) Miocene age has been assigned to the interval 1610-1720 m. Relatively abundant *Globigerina* cf. *angustum-bilicata* are present at 1710 m. This long ranging form has been observed in that sample together with rare *Globigerinoides* spp.

1.3 - INTERVAL 1760-1925 m : ? Oligocene

The microfaunal assemblage encountered throughout this interval consists mainly of not characteristic arenaceous foraminifera including: *Ammodiscus incertus*, *Cyclammina* spp., *Haplophragmoides* spp., together with *Sigmoilina* cf. *schlumbergeri*. For that reason a questionable Oligocene (? Upper Oligocene) age has been assigned to this interval.

1.4 - INTERVAL 1965-2285 m : Oligocene- ? Upper Eocene

At 1965 m, the incoming of *Rotaliatina bulimoides* and rare *Globorotalia* cf. *increbescens* indicates that the Middle Oligocene has been penetrated.

Numerous specimens of *Coscinodiscus* sp. may be seen locally, at 2080 and 2130 m.

Below 2150 m, the microfauna is represented essentially by arenaceous foraminifera including: *Bathysiphon* and *Hyperammina* spp., *Ammodiscus incertus*, *Glomospira charoides*, *Cyclammina* ? sp.1, *Trochammina globigeriniformis* and *T. globigeriniformis* var. *altiformis*... This association would signify that the lower part of the interval possibly is of Eocene (? Upper Eocene) age.

1.5 - INTERVAL 2300-2750 m : Lower Eocene-Paleocene

This determination is based on the first occurrence of *Spiroplectammina spectabilis* at 2300 m. Flattened *Radiolaria* occur in relatively great numbers at several horizons below 2400 m. The foraminiferal assemblage is predominantly arenaceous throughout the interval and consists mostly of the same species aforementioned from the overlying unit.

Towards the base of the interval, the presence of *Ammosphaeroidina* sp. and numerous specimens of *Coscinodiscus* sp.2 (Diatoms) may be noted.

... / ...

1.6 - INTERVAL 2760-2845 m : Lower Paleocene (Danian)

The diagnostic species ? *Lamarckina paleocenica* first occurs at 2760 m, closely followed below 2770 m by a typical Danian association including several characteristic planktonic species, such as :

*Globorotalia pseudobulloides*  
*Globorotalia compressa*  
*Globigerina triloculinoides*  
*Globigerina daubjergensis*

Below 2800 m, the microfaunas become impoverished and possibly include a few reworked Cretaceous forms.

2 - CRETACEOUS

2.1 - INTERVAL 2860-2990 m ? : Maestrichtian

This interval contains a foraminiferal assemblage including several characteristic Maestrichtian species in more or less great number of specimens :

*Pseudotextularia elegans*  
*Racemigümbelina fructicosa*  
*Rugoglobigerina gr. rugosa*  
*Stensiöina pommerana*  
*Gavelinopsis bembix*  
*Bolivinoidea draco draco*  
*Bolivina incrassata var.*

The incoming of *Reussella pseudospinulosa* in the lower part of the unit would suggest a Lower Maestrichtian (to ? Uppermost Campanian) age for these strata.

*Inoceramus* debris are present throughout the interval.

2.2 - INTERVAL 3000-3170 m : Campanian (to ? Lower Senonian)

The microfauna recovered from this interval is dominated by small planktonic Foraminifera consisting mainly of :

small *Heterohelicidae*  
*Globigerinidae* indet.  
*Globigerinelloides* spp.  
 ? *Rugoglobigerina* spp.  
*Rugoglobigerina gr. rugosa*, sporadic  
*Globotruncana gr. marginata*, rare

together with abundant *Calcisphaera* and/or *Stomiosphaera*, and rare *Inoceramus* fragments.

Towards the base of the interval, the incoming of rare *Globotruncana globigerinoides* at 3120 m and ? *Pseudogaudryinella* spp. at 3160 m, together with the appearance of pink-stained Foraminifera below 3150 m would suggest a possible Lower Senonian age for this section.

2.3 - INTERVAL 3175-3215 m : Lower Senonian- ? Upper Turonian

The microfauna is composed mainly of red-stained planktonic Foraminifera including :

- Globotruncana lapparenti bulloides
- Globotruncana lapparenti lapparenti
- Globigerinidae indet.
- small Heterohellicidae

together with rare benthonic species :

- ? Pseudogaudryinella spp.
- Eponides aff. lunata
- Bulimina reussi
- Stensiöina gr. praeexculpta

Small amounts of Basement rock fragments occur in the cutting samples examined here at 3215 m.

2.4 - INTERVAL 3215-3227 m (T.D.) : Basement.

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## TRAVAUX POUR ELF NORGE

## WELL FILE

○ SONDAGE 3/7-1Etude micropaléontologique

L'étude micropaléontologique du sondage 3/7-1 a été faite sur déblais de 580 à 3220 m avec un espacement de 30 m environ dans le Miocène, l'Oligocène et l'Eocène, de 10 à 20 m dans le Paléocène inférieur et le Crétacé. L'examen des microfunes dégagées a été complété par celui de lames minces effectuées sur résidus grossiers de lavages au-dessous de 3000 m environ.

La zonation suivante peut être proposée :

- Intervalle 580-680 m : Age indéterminé (PLIO-PLÉISTOCÈNE ?)  
 Rares débris de Mollusques et débris végétaux.
- Intervalle 710-1720 m : MIOCÈNE (à PLIOCÈNE ?),  
 . Au sommet, présence d'assez nombreuses :  
   *Globigerina balloides*  
   *Globigerina gr. humerosa*  
     (Miocène supérieur - Pliocène)  
 et d'espèces benthiques comprenant notamment :  
   *Nonion commune*  
   *Nonion boueanum*  
   *Nonion affine*  
   *Cassidulina gr. laevigata*  
   *Elphidium incertum var. clavatum*  
   *Cibicides gr. dutemplei*  
   *Ammonia beccarii var. tepida*  
   *Bulimina aculeata*  
   *Bulimina elongata var. subulata*  
   *Pullenia bulloides*  
   *Uvigerina cf. hosiusi*, à 860 m  
   *Trifarina bradyi*, à 860 m
- . Au-dessous de 1000 m, à noter l'apparition progressive des espèces :  
   *Globorotalia acostaensis*, à 1140 m (Sommet Miocène moyen à  
     Miocène supérieur)  
   *Globorotalia continuosa*, à 1420 m (Burdigalien à base Miocène  
     supérieur)  
   *Uvigerina tenuipustulata*, à 1420 m  
   *Virgulinea pertusa*, à 1540 m  
   *Astigerina staeschei*, à 1595 m (Miocène moyen)
- . A 1620 m, apparition des espèces :  
   *Globorotalia praescitula*  
   *Globigerinoides gr. trilobus*, abondant (Miocène inférieur à moyen?)
- . A 1710 m, présence de  
   *Globigerina cf. angustum-bilicata*  
   *Globigerinoides spp.*, rares (Miocène inférieur?)

- Intervalle 1760-1925 m : OLIGOCENE ?  
Microfaune non caractéristique.
- Intervalle 1965-2285 m : OLIGOCENE à EOCENE SUPERIEUR ?  
Apparition des espèces :  
  - Rotaliatina bulimoides (Oligocène moyen)
  - Globorotalia cf. increbescens (Oligocène à Eocène supérieur)

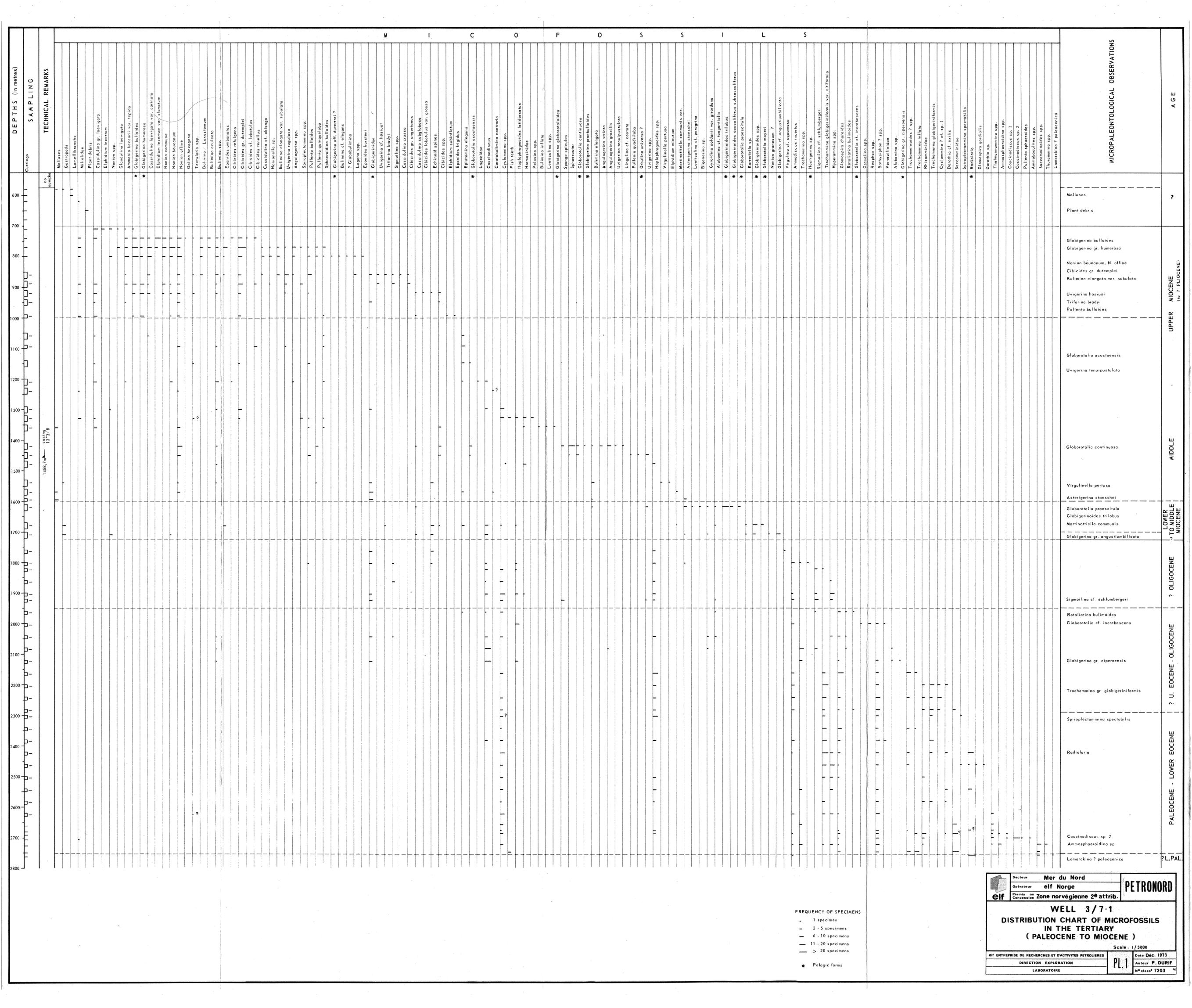
A partir de 2150 m environ, faune essentiellement arénacée renfermant notamment Trochammina globigeriniformis et sa variété altiformis.
- Intervalle 2300-2750 m : EOCENE INFERIEUR - PALEOCENE  
Apparition de l'espèce :  
  - Spiroplectammina spectabilis, à 2305 m

Vers le bas, présence de : Ammosphaeroidina sp.  
Coscinodiscus sp.2, abondant
- Intervalle 2760-2845 m : PALEOCENE INFERIEUR (DANIEN)  
  - ? Lamarckina paleocenica
  - Globorotalia pseudobulloides
  - Globorotalia compressa
  - Globigerina triloculinoides
  - Globigerina daugjergensis

Au-dessous de 2800 m = appauvrissement de la microfaune.
- Intervalle 2860-2990 m ? : MAESTRICHTIEN  
  - Pseudotextularia elegans
  - Racemigümbelina fructicosa
  - Rugoglobigerina gr. rugosa
  - Stensiöina pommerana
- Intervalle 3000-3170 m : CAMPANIEN (à SENONIEN INFERIEUR ?)  
Microfaune peu caractéristique comprenant surtout :  
  - Rugoglobigerina gr. rugosa
  - Globigerinelloides spp.
  - petits Heterchelicidae
  - Globotruncana gr. marginata, rare
  - Globigerinidae indét.

Vers le bas, apparition des espèces :  
  - Globotruncana globigerinoides, à 3120 m
  - Pseudogaudryinella spp. à 3160 m.

en même temps qu'une teinte rosâtre du test des individus
- Intervalle 3175-3215 m : SENONIEN INFERIEUR (à TURONIEN ?)  
Microfaune à test rougeâtre renfermant :  
  - Globotruncana lapparenti bulloides
  - Globotruncana lapparenti lapparenti
  - Eponides aff. lunata
  - Bulimina reussi
  - Stensiöina gr. praexculpta
- A partir de 3215 m : Socle



DEPTHS (in metres)

SAMPLING

600  
700  
800  
900  
1000  
1100  
1200  
1300  
1400  
1500  
1600  
1700  
1800  
1900  
2000  
2100  
2200  
2300  
2400  
2500  
2600  
2700  
2800

no. sample	TECHNICAL REMARKS	M	I	C	O	F	O	S	S	I	L	S
1488	Molluscs											
	Gastropods											
	Lamellibranchs											
	Mollusca											
	Plant debris											
	Cassidulina gr. laevigata											
	Elphidium incertum											
	Nonion spp.											
	Glauertina laevigata											
	Ammonia beccarii var. repida											
	Globigerina bulloides											
	Globigerina humerosa											
	Cassidulina laevigata var. carinata											
	Elphidium incertum var. clavatum											
	Nonion commune											
	Nonion boreanum											
	Nonion affine											
	Oolina hexagona											
	Tenulineria spp.											
	Bolivina											
	Bolivina oculata											
	Bulimina spp.											
	Eponides umbonatus											
	Cibicides refulgens											
	Cibicides gr. dutemplei											
	Cibicides cf. laboulboul											
	Cibicides tenuis											
	Cassidulina cf. oblonga											
	Nonionella sp.											
	Bulimina elongata var. subulata											
	Uvigerina rugulosa											
	Angulogerina spp.											
	Spiroplectamina spp.											
	Pullenia bulloides											
	Pullenia spinqueloba											
	Sphaeroidina bulloides											
	Globigerina aff. duvernoyi ?											
	Bulimina cf. elegans											
	? Globulimina											
	Lagena spp.											
	Eponides karsteni											
	Globigerinoides											
	Trifarina bradyi											
	Signalina spp.											
	Cassidulina crassa											
	Cibicides gr. ungerianus											
	Cassidulina subglobosa											
	Cibicides laboulboul var. grossa											
	Echinoid spines											
	Cibicides spp.											
	Elphidium subinflatum											
	Eponides fragilis											
	Epistominella elegans											
	Globorotalia acostaensis											
	Legumida											
	Coscinodiscus											
	Cerapullinia contorta											
	Cyclammina spp.											
	Fish teeth											
	Haplaphragmoides lateroschus											
	Homocididae											
	Pelosina spp.											
	Bulimina inflata											
	Lenticulina spp.											
	Globigerina globorotaloidea											
	Spongia spicules											
	Sphaeraster											
	Globorotalia continosa											
	Globigerina praebulloides											
	Bulimina elongata											
	Angulogerina striata											
	Angulogerina gracilis											
	Uvigerina tenuispustulata											
	Lingulina cf. costata											
	Pullenia quadriloba											
	Obolus universa ?											
	Uvigerina spp.											
	Haplaphragmoides spp.											
	Virgulina pertusa											
	Elphidium minutum											
	Martinottiella communis var.											
	Asterigerina staeschei											
	Lenticulina cf. peregrina											
	Bigenina sp.											
	Gyrodina soldanii var. girardana											
	Alabamina cf. tongantalis											
	Globigerinoides trilobus											
	Globigerinoides asculiferus subaequaliferus											
	Globorotalia praestictula											
	Kareriella sp.											
	Globigerinoides spp.											
	Globorotalia majori											
	Nonion grossum ?											
	Globigerina cf. angustumbilicata											
	Virgulina cf. squamea											
	Ammodiscus incertus											
	Trachamma spp.											
	Trachamma aff. schlumbergeri											
	Trachamma globigeriniformis var. ciliiformis											
	Hyperamma spp.											
	Glaucina charoides											
	Radiolaria bulimoides											
	Globorotalia cf. increbescens											
	Globorotalia cf. increbescens											
	Reophax spp.											
	Barthysiphon ? spp.											
	Verruculinidae											
	Alabamina spp.											
	Globigerina gr. ciperoensis											
	Globigerina gr. ciperoensis											
	Trachammaoides ? spp.											
	Trachamma inflata											
	Rhinocaminidae											
	Trachamma globigeriniformis											
	Cyclammina ? cf. sp. 1											
	Dorothia cf. exilis											
	Saccamminidae											
	Spiroplectamina spectabilis											
	Radiolaria											
	Glaucina gardialis											
	Dorothia sp.											
	Thalassammina spp.											
	Ammodiscus sp. 1											
	Coscinodiscus sp. 2											
	Pullenia sphaeroides											
	Ammodiscus spp.											
	Saccamminoides spp.											
	Thurammina spp.											
	Lamarckina ? paleocenica											

MICROPALEONTOLOGICAL OBSERVATIONS

AGE

UPPER MIOCENE (to ? PLIOCENE)

MIDDLE

LOWER TO MIDDLE MIOCENE

? OLIGOCENE

? U. EOCENE - OLIGOCENE

PALEOCENE - LOWER EOCENE

? L.PAL.

FREQUENCY OF SPECIMENS  
 . 1 specimen  
 - 2 - 5 specimens  
 — 6 - 10 specimens  
 — 11 - 20 specimens  
 — > 20 specimens  
 \* Pelagic forms

Secteur	Mer du Nord	PETRONORD
Opérateur	elf Norge	
Perm. ou Concession	Zone norvégienne 2 <sup>e</sup> attrib.	
WELL 3/7-1 DISTRIBUTION CHART OF MICROFOSSILS IN THE TERTIARY (PALEOCENE TO MIOCENE)		
Scale: 1/5000		Date: Déc. 1973
OP ENTREPRISE DE RECHERCHES ET D'ACTIVITES PETROLIERES		Auteur: P. DURIF
DIRECTION EXPLORATION		N° classé: 7203
LABORATOIRE		

