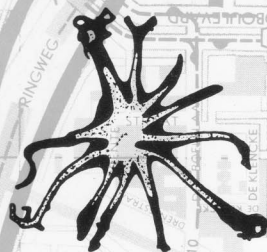


FIRST WORKSHOP ARENAEUS FORAMINIFERA



Program – Information – Abstracts

V.U.

FIRST WORKSHOP ARENACEOUS FORAMINIFERA

7. - 9. SEPTEMBER 1981

**FREE UNIVERSITY,
AMSTERDAM**

**Institute of Earth Sciences,
Free University, Amsterdam, Netherlands**

**Continental Shelf Institute
Trondheim,
Norway**



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GENERAL INFORMATION

The workshop will be held at the Institute of Earth Sciences of the Free University, Amsterdam.

Adress: De Boelelaan 1085
Postal adress: Postbox 7161, 1007 MC AMSTERDAM, Netherlands
Telephone: 020-5489111 (operator's desk).

A pre-workshop welcome cocktail party will be organized on Sunday 6. September from 1800 to 2000 in the Nightwatch Bar of the Americain Hotel, Leidsplein (Leidse Kade 97).

The organizing committee has arranged a workshop program with colloquium sessions and study sessions. At the colloquium sessions, papers will be read and discussed. A formal program and timetable has been prepared for these sessions based on the information and abstracts available at the closing of the program manuscript. (19. June).

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For the study sessions the committee will arrange laboratory room and microscopes and interested colleagues are expected to take with them their foraminifera slides. No program has been prepared in advance of the study sessions.

These program and abstracts are meant for restricted circulation among colleagues attending the workshop. It is not considered a publication and all information and timetables included are open to change when necessary.

Organizing committee, First Workshop on Arenaceous Foraminifera:

Jacob G. Verdenius
Anne R. Fortuin
Jan E. van Hinte

Monday 7. September 1981

- | | |
|-------------|---|
| 09.30-10.30 | Registration. Coffee. |
| 10.30-10.45 | Opening of the workshop. |
| 10.45-11.00 | Information and messages. |
| 11.00-12.30 | Colloquium. Recent and Sub-Recent arenaceous foraminifera.
Chairman: F. Røgl. |
| 11.00-11.20 | Ted E. Delaca: Physiological ecology of a large agglutinated foraminifer (<i>Notodendroides antarctikos</i>). |
| 11.20-11.40 | C.T. Schafer: Bathyal Zone arenaceous foraminifera genera and species assemblages off Northeast Newfoundland. |
| 11.40-12.00 | D. Haman: The agglutinated foraminifera of the Balize Delta, Luisiana. |
| 12.00-12.30 | Discussion. |
| 12.30-13.30 | Lunch. |
| 13.30-15.30 | Colloquium. Tertiary and Late Cretaceous arenaceous foraminifera. Chairman: H.J. Hansen. |
| 13.30-13.50 | W. Willems: Agglutinating foraminiferids of the Ieper Formation (Early Eocene) in Belgium. |
| 13.50-14.10 | K. Pozaryska: Paleocene arenaceous foraminifera from Poland. Carpathians and Lowland. |
| 14.10-14.30 | D.H. McNeil: Paleogene Agglutinated foraminifers from the Mackenzie Delta and Beaufort Sea areas of arctic Canada. |

- 14.30-14.50 B.B. Toxwenius: Paleogene arenaceous foraminiferal assemblages from the West Greenland basin.
- 14.50-15.10 A. Govindan: Upper Cretaceous arenaceous foraminifera from the Godivari-Krishna Basin, Andhra Pradesh, India.
- 15.10-15.40 Discussion.
- 15.40-16.00 Tea/Coffee break.
- 16.00 Colloquium. Arenaceous foraminifera and flysch sediments. Chairman: K. Pozaryska.
- 16.00-17.00 F. Gradstein:
K.G. Miller:
W.A. Berggren:
Depth independence of Flysch-type agglutinated foraminifera.
- 17.00-17.30 Discussion.

Tuesday 8. September 1981

- 09.00-10.40 Colloquium: Application possibilities of arenaceous foraminifera. Chairman: H.R. Eckert.
- 09.00-09.20 J.P. Beckmann: Deep-water agglutinated foraminifera from the Cretaceous (Albian to Maastrichtian) and Paleocene of Trinidad (West Indies).
- 09.20-09.40 S.C. Davies: Practical industrial applications of agglutinating foraminifera - well site palaeontology of the Kingak formation (Jurassic) of Arctic Alaska.

- 14.30-14.50** **B.B. Toxwenius:** Paleogene arenaceous foraminiferal assemblages from the West Greenland basin.
- 14.50-15.10** **A. Govindan:** Upper Cretaceous arenaceous foraminifera from the Godivari-Krishna Basin, Andhra Pradesh, India.
- 15.10-15.40** **Discussion.**
- 15.40-16.00** **Tea/Coffee break.**
- 16.00** **Colloquium.** Arenaceous foraminifera and flysch sediments.
Chairman: K. Pozaryska.
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- 09.20-09.40** **S.C. Davies:** Practical industrial applications of agglutinating foraminifera - well site palaeontology of the Kingak formation (Jurassic) of Arctic Alaska.

09.40-10.00	J.H. Wall: Jurassic and Cretaceous arenaceous foraminifera in the eastern portion of the Sverdrup Basin, Canadian Arctic Archipelago.
10.00-10.20	J.G. Verdenius: Tertiary arenaceous foraminifera from Norwegian Sea boreholes, DSDP leg. 38.
10.20-10.40	Discussion.
10.40-11.00	Coffee break.
11.00-12.20	Colloquium: Mesozoic arenaceous foraminifera and various subjects. Chairman: C.T. Schafer.
11.00-11.20	J. Nagy: Arenaceous foraminifera from delta influenced environments in the North Sea basin.
11.20-11.40	M. Løfaldli: Arenaceous foraminifera from Jurassic strata, Spitzbergen.
11.40-12.00	T. Toksvad: Calcite cement in agglutinated foraminifera: fact or fancy?
12.00-12.20	M.B. Hart: Arenaceous foraminifera from Late Cretaceous anoxic events in Northwest Europe.
12.20-12.40	Discussion.
12.40-13.30	Lunch.
13.30-17.00	Study sessions. Optional tea and coffee breaks.
Evening:	Workshop dinner. Place and time will be announced during the opening session of the workshop.

Wednesday 9. September 1981

09.30-12.30	Study sessions. Optional coffee breaks.
12.30-13.30	Lunch.
13.30-15.30	Study sessions.
15.30-15.45	Tea/coffee break.
15.45-17.45	General session. President: J.E. van Hinte.

Reports

Tertiary biostratigraphy with arenaceous foraminifera.
F.M. Gradstein.

Mesozoic biostratigraphy with arenaceous foraminifera.
J.H. Wall.

Ecological data from arenaceous foraminifera.
J. Aubert.

Arenaceous foraminifera as an exploration tool.
H.R. Eckert.

Statistical treatment of arenaceous foraminiferal faunas.
J.G. Verdenius

ABSTRACTS

BECKMANN, J.P.

Trinidad	Cretaceous-Paleocene	Arenaceous Foraminifera
Deep-water	taxonomy	biostratigraphy

Deep-water agglutinated foraminifera from the Cretaceous (Albian to Maastrichtian) and Paleocene of Trinidad (West Indies)

The Cretaceous and early Tertiary rocks of Trinidad are known mostly from well sections but there are also a few scattered surface outcrops. The arenaceous foraminiferal faunas are usually associated with planktic and calcareous benthic species. Their ages have been determined by foraminiferal plankton using Bolli's zonation (***Rotalipora ticinensis*** Zone to ***Globorotalia velascoensis*** Zone). The fauna (about 160 species) includes representatives of the important families of the Ammodiscacea and Lituolacea, with the exception of the Pavonitinae and Dicyclinidae, its composition suggests a deep-water (probably bathyal) environment of deposition. Biostratigraphically useful species are found mostly among the Rzehakinidae, Textulariidae and Ataxophragmiidae.

CRITTENDEN, S.

Isle of Wight, U.K.
Aptian

Arenaceous Forams

Taxonomy
Shallow Marine

A Foraminiferal analysis of the Atherfield Clay (Lower Aptian) of the Isle of Wight, U.K., with special emphasis on the arenaceous forms

This paper represents the first published foraminiferal analysis of The Atherfield Clay, Isle of Wight. A section of the Lower Aptian (**Deshayesites forbesi** Biozone) Atherfield Clay at Atherfield Point was sampled at approximately one metre intervals. Each sample was processed for Foraminiferida in the usual manner. The investigation resulted in

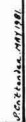
- (i) a Standard Foraminiferida Range chart correlated with a lithology column.
- (ii) A foraminiferal analysis by means of a superfamily abundance chart.

Of the 43 species of Foraminiferida recorded 25 are agglutinating benthonic forms, 13 are calcareous benthonic forms and 5 are planktonics. The taxonomy of the arenaceous fauna is discussed and shall be prepared for publication but only a brief discussion of a few of the forms shall be entertained in the verbal presentation. The main discussion will centre on the importance of the arenaceous fauna as part of the total fauna within the faunal analysis.

The fauna appears to be representative of the **Ammobaculites** Association of Haig (1979) whereby a low diversity association is characterised by abundant agglutinating Foraminiferida of siliceous rather than calcareous wall composition with the accompanying rotaline forms being mainly very small and unornamented. This association according to Haig's (1979) research is extensively developed in shallow land locked epicontinental seas in the northern and southern cool temperate belts of the late early cretaceous.

The total Foraminiferida fauna, the first to be recorded from the Aptian of the Isle of Wight, compares well with the fauna recorded from the Aptian of the Paris Basin (Magniez Jannin 1973) and of the southern Celtic Sea offshore Ireland (Colin et al in press 1981).

5m to base of Lower Lobster Bed



DAVIES, S.C.

Arctic Alaska
Jurassic

Agglutinating Foraminifera

Industrial Application

Practical industrial applications of agglutinating foraminifera - well site palaeontology of the Kingak Formation (Jurassic) of arctic Alaska

An industrial application of agglutinating foraminifera is presented using forms which have no formal biostratigraphic significance.

The Kingak Formation of the Prudhoe Bay area of arctic Alaska represents an essentially complete Hettangian to Early Oxfordian section which yields sporadic, poorly preserved, agglutinating foraminifera.

The vast majority of samples available for examination are ditch cuttings which increases the inherent difficulties in relating the microfossils to previously described assemblages to derive an inferred age.

The separation of the agglutinating foraminifera into artificial morphologic types allows the recognition of six qualitative intervals throughout the Kingak Formation which can be related to wireline logs and hence regional seismic lines.

These six intervals can be easily recognised on well site during penetration of the Kingak section by conventional rotary drilling in the exploration for hydrocarbons, allowing prediction of the base of the Kingak section to an accuracy of better than ten metres.

The major industrial application of this analysis is that the unstable shales of the Kingak Formation can be protected by casing before the penetration of the underlying, higher pressure, reservoir sequence.

Notes:

Davies, S.C.:

Godavari-Krishna Basin, India
Upper Cretaceous

Stratigraphy
Arenaceous Forams

Middle-outer shelf
Taxonomy

Upper Cretaceous arenaceous foraminifera from the Godavari - Krishna Basin, Andhra Pradesh, India

The Godavari-Krishna Basin situated in Andhra Pradesh, India, is covered mostly by the alluvium of Godavari-Krishna Rivers draining into the Bay of Bengal. Sedimentary rocks of Upper Jurassic to Mio-Pliocene age are exposed along the western margin of the basin fringing the peninsular Shield. These sediments are chiefly continental except for the thin strips of Lower Cretaceous and (?) Paleocene sediments, which are marginal marine. Although Upper Cretaceous rocks are not exposed, these are seen in some shallow wells and in a deep exploratory well drilled at Narsapur close to the coast, in the basin. Some marine Permian reworked polospores are present in the Lower Cretaceous subsurface sediments.

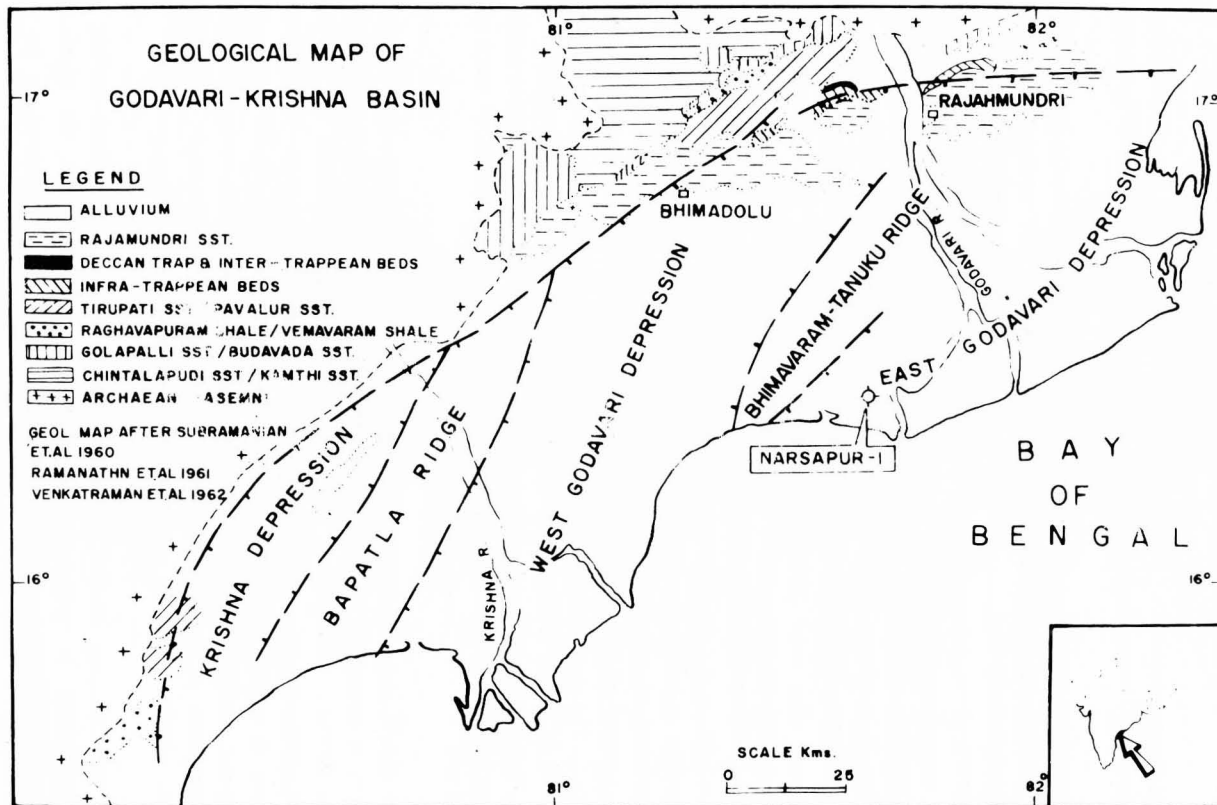
The Upper Cretaceous subsurface sediments are light grey claystones with minor sandstones. At 3.3 km depth, towards the top of the sequences, these sediments are interstratified with, three, thin flows of basalts. Both the inter-Trappean clays and the infra-Trappean claystones contain a diversified, moderately rich benthonic and planktonic foraminiferal fauna.

In the assemblage, the arenaceous foraminifers are conspicuous by their large size (0.3 - 0.7 mm) and coarse grained wall. The genera distinguished are:

Nodellum, Bathysiphon, Dendrophrya, Hyperammina, Saccammina, Reophax, Ammodiscus, Haplophragmoides, Ammobaculites, Cribrostomoides, Haplophragmium, Textularia, Spiroplectammina, Clavulinoides, Trochammina, Gaudryina, and Dorothis. Of the twenty two recognised species, two are considered new. All the species are illustrated and described.

The sediments containing the arenaceous assemblages are dated as Maastrichtian on the basis of rich planktonic fauna associated with it. The fauna suggests middle to outer shelf depths for these sediments.

Arenaceous species such as **Ammodiscus cretaceus, Dorothis oxycona, Haplophragmium lueckeii** and **Saccammina complanata** were reported from the Upper Cretaceous sediments in the Indian Ocean deep sea sites implying a wide geographic distribution.



GRADSTEIN, F.M., MILLER, K., AND BERGGREN, W.A.

Late Cretaceous	Circum North Atlantic	Basin sediments
Paleogene	Agglutinated foraminifera	Hydrographic conditions

Depth independence of flysch-type agglutinated foraminifera

Late Cretaceous and Paleogene agglutinated assemblages typical of those found in Alpine flysch basins, occur in passive continental margin basins such as the Labrador Shelf, intracratonic basins such as the North Sea, and locally in deep-sea sediments. Over 32 genera and 60 species are commonly recognized, belonging in the Astrorhizidae, Saccamminidae, Ammodiscidae, Hormosinidae, Rzehakiniidae, Lituolidae, Trochamminidae, Textulariidae, and Ataxophragmiidae. Calcareous benthic taxa are generally rare to absent.

The prevailing test cement of these agglutinated assemblages apparently is organic rather than calcareous. The occurrence of such assemblages is thought to be related to (1) conditions advantageous to agglutinated benthic foraminifera, including reduced competition from calcareous taxa; (2) post depositional dissolution of calcareous and calcareous cemented agglutinated forms, and (3) the absence of calcareous foraminifera due to constraints on the availability of CaCo_3 . The conditions which favour the agglutinated foraminifera assemblages prevail in basins with bathyal to abyssal water depth but depth alone is not a significant factor in their occurrence. Independent paleobathymetric estimates using age versus depth curves in oceanic basins indicate a paleodepth range of 0.7 to 4 km.

The distribution of flysch-type assemblages in the Labrador and North Sea basins is described in a model which involves relatively rapid deposition of organic rich, fine grained clastics under somewhat restricted bottom water circulation conditions, leading to lower pH and low positive or negative eH values at or just below the seafloor. Carbonate-poor provenance and reduced biogenic carbonate productivity enhanced these pH/eH conditions. Minimum water depth to create and maintain these conditions is thought to be on the order of 200 m but may have been much more in the cases considered.

On the Canadian margin, decreases in clay and organic carbon content and disappearance of subbasins conditions are associated with the elimination of the agglutinated assemblages in Mid-Tertiary time. In contrast, in the deep

Labrador Sea (Site 112) percent carbonate and percent organic carbon are relatively constant across this faunal change. This suggest that, at least in the deep-sea, these properties may not be critical to the development of predominantly agglutinated assemblages and supports models which suggest agglutinated foraminifera are favored by certain hydrographic properties (low oxygen, low pH, high CO₂). Similar hydrographic conditions may develop in reducing substrates associated with high organic matter and poor circulation as suggested for the North Sea and Labrador Shelf. The elimination of agglutinated assemblages in the deep Labrador Sea in Eocene-Oligocene time may have been due to a change in hydrographic properties associated with the development of vigorous abyssal circulation. Seismic and isotopic evidence indicate initiation of northern sources of strongly circulating bottom water in late Eocene to early Oligocene time. Thus, the disappearance of agglutinated foraminifera from Site 112 resulted from a change in hydrographic properties, while local tectonic and sedimentological changes may have been important in the elimination of agglutinated assemblages in the Canadian Margin and North Sea.

HAMAN, D.

Recent
Louisiana, U.S.A.

Agglutinated foraminifera
Delta environment

The Agglutinated Foraminifera of the Balize Delta, Louisiana

Microfaunal trends exhibited by both living and dead agglutinated foraminifera are discussed in relation to four subenvironments of the Balize Delta, Louisiana. The subenvironments are the channels, levees, interdistributary bays, and distributary mouth bars. Environmental preference is exhibited by the living forms for interdistributary bay locations, with a secondary preference for levee locations. This distribution is reflected by the total fauna. The Textulariina are represented by 9 genera with 30 species of which **Hippocrepina alba** (Heron-Allen and Earland, 1932), **Polysaccammina ipohalina** Scott, 1976, and "**Pseudothurammina**" **limnetes** Scott and Medioli, 1980, are recorded for the first time from the northern Gulf of Mexico.

Notes:

Haman, D.:

HART, M.B. and BIGG, P.J.

England Anoxic events N.W. European Shelf
Cretaceous (Late) Silled Basins

Arenaceous foraminifera from Late Cretaceous 'Anoxic events' in Northwest Europe

In an investigation of Late Cretaceous 'anoxic events' of N.W. Europe (England, Denmark, N.Germany) unusual faunas of arenaceous Foraminifera have been recovered. The most important level is that of the Cenomanian/ Turonian boundary (approximately) in N.E. England where the Black Band forms a very distinctive clay rich horizon in the otherwise white chalk succession. This horizon has been investigated in great detail and its regional setting will be discussed. The fauna from the very black clays in the centre of the Black Band have yielded a fauna composed entirely of ***Ammodiscus cretaceus*** (REUSS), ***Glomospira corona*** CUSHMAN & JARVIS, and ***Psammimopelta bowsheri***

TAPPAN. This fauna shows many similarities with Cretaceous faunas from North America (Tappan 1957 and Chamney 1977), and DSDP sites in the Indian Ocean (Bartenstein, 1974). In all these cases the faunas are thought to have been very deep water, but such depths could not be contemplated for the Black Band. In this instance the reduced O₂ level of the water column appears to be the controlling influence. The chalks above and below the Black Band contain very high percentages of planktonic Foraminifera, and the event has been correlated with similar stratigraphic features in N. Germany. A model for the formation of these anoxic sediments within basins on the N.W. European shelf has been proposed. The ranges of the key species are shown on the attached figure.

The Fish Clay at the Cretaceous/Tertiary boundary has been investigated to see how similar/different it is when compared to the Black Band. It would appear to have formed in very different circumstances, being a product of very shallow water lagoons, and containing a very restricted fauna (that is mostly derived from the underlying Cretaceous).

LØFALDLI, M., NAGY, J.

Spitsbergen
Dark shale facies

Arenaceous foraminifera

Jurassic

Arenaceous foraminifera from Jurassic strata, Spitsbergen

Two sections covering the Agardhfjellet Member of the Janusfjellet Formation in Spitsbergen (Sørkapp Land) are analysed for foraminifera. The sequence consists of dark shales deposited during the Callovian and Upper Jurassic. The total organic carbon content of the shales varies from 0,5 to 8%.

The foraminiferal assemblages are strongly dominated by **Haplophragmoides**, with **Trochammina** and **Recurvoides** common at some horizons. Among less common genera are **Gaudryina**, **Dorothia** and **Ammodiscus**. The sequence is supposed to have been deposited in a shelf environment with varying degree of stagnant bottom conditions.

Notes:

Løfaldli, M., Nagy, J.:

Arctic Canada
Paleogene

Agglutinated forams

Paleoenvironments
Shelf sedimentation

Paleogene Agglutinated Foraminifers from the Mackenzie Delta and Beaufort Sea Areas of Arctic Canada

Agglutinated foraminifers are the dominant microfaunal group in Paleogene sediments of the Mackenzie Delta and Beaufort Sea area of Arctic Canada. They mark the marine beds of a several-kilometre thick terrigenous clastic section deposited during three major Paleogene progradational episodes. The section includes facies of many environments, terrestrial to deep marine. Planktonic foraminifers are absent throughout the section, their absence due possibly to low stability or high turbidity.

The first progradational cycle began in the Late Cretaceous. Its early Paleogene component beneath the Mackenzie Delta and in neighbouring outcrops consists of only the late-cycle nearshore to terrestrial facies containing foraminifers characteristic of brackish-water nearshore environments. A second cycle commenced with marine transgression during the mid-Paleocene. The resultant marine shale section yields a low-diversity, possibly decalcified, shelf assemblage, noteworthy for the occurrence of **Cyclammina** in what appears to be an inner shelf setting. The deeper-water biofacies of this assemblage are unexplored, lying at great depth in the subsurface of the Beaufort Sea.

The third progradational cycle began with an extensive transgression in the late Early or Middle Eocene and deposition of a thick section of marine rocks in near-shore to deep-marine environments of sedimentation. The terminal regressive stage of this cycle occurred during the Early to Middle Oligocene and is represented now by a thick arenaceous section, mainly barren of foraminifers. The early-cycle, nearshore biofacies is monospecific under the outer Mackenzie Delta, consisting of one species of **Haplophragmoides**. Northward (seaward), the assemblage increases in diversity, changing progressively in composition, until a deep-sea biofacies characterized by **Bathysiphon**, **Haplophragmoides**, **Cyclammina**, **Recurvoides**, **Trochammina**, and **Gravellina**, among other genera, is attained offshore beneath the Beaufort Sea. Calcareous benthic foraminifers occur in neither the nearshore nor the deeper-water biofacies of this cycle but **Brizalina** was recovered rarely in intermediate biofacies.

Dominantly or exclusively agglutinated foraminiferal assemblages derive from environments characterized by various and often inter-related factors such as low salinity, low temperature, organic-rich substrate, low oxygen levels, high carbon dioxide levels, low or negative pH, low or negative Eh, or undersaturation of calcium carbonate. Of these, low salinity and a high organic content no doubt characterized the water and substrate respectively of the Paleogene Beaufort Sea. Decomposition of terrestrial-rich organic matter in the deltaic and pro-deltaic environments may have led to many of the noted conditions and thus to the preferential development (or preservation) of agglutinated versus calcareous foraminifers that we see today in the assemblages of the Paleogene Mackenzie Delta and Beaufort Sea section.

NAGY, J., LØFALDLI, M.

North Sea Basin

Lower and Middle Jurassic

Arenaceous species

Prodelta shale

Interdistributary bay deposits

Arenaceous foraminifera from delta influenced environments in the North Sea Basin

The following stratigraphical units have been examined for foraminifera: The upper part of the Dunlin Shale (Toarcian) from well 33/9-3 from the northern North Sea, the overlying Brent Sandstone (Middle Jurassic) from the same well, the Yons Nab Beds (Bajocian) from the Yourshire Coast. The depositional environments of these units have previously been interpreted on the basis of sedimentological and palynological studies.

The upper part of the Dunlin Shale, which was deposited under prodelta conditions, contains rich arenaceous assemblages with comparatively high diversity. The dominant genera are **Trochammina**, **Verneuilinoides**, **Lagenammina** and **Reophax**. Nodosarids, regarded as an open shelf component, occur very sporadically. The Brent Sandstone, deposited under delta from and interdistributary bay conditions, contains very few and poorly preserved specimens.

The assemblages found in the Yons Nab Beds, formed under interdistributary bay conditions, are strongly variable in size and are generally dominated by **Ammodiscus** with subordinate amounts of Spirillinids and Nodosarids.

SCHAFER, C., COLE, F. and CARTER, L.

Newfoundland
Recent

Arenaceous Foraminifera

Assemblages
Bathyal Zone

Bathyal Zone Arenaceous Foraminifera Genera and Species Assemblages Off Northeast Newfoundland

Bathyal zone arenaceous foraminifera on the continental slope and rise off northeast Newfoundland are represented by about 43 genera most of which have an average absolute abundance of greater than one specimen per cubic cm of wet sediment (FN). **Trochammina** is the most abundant and most ubiquitous arenaceous taxon. First occurrences of deep water arenaceous genera are especially evident in middle to lower slope and continental rise environments. **Ammobaculites**, **Karreriella** and **Reophax** are among the arenaceous genera that are associated with a base-of-slope to rise (2000-3000 m) contour current factor. **Astrammina**, **Hormosina** and **Saccorhiza** appear to be most related to middle slope low energy, fine substrate conditions.

Cluster analysis of total species percentages indicates at least two distinctive upper slope associations (A - **Thurammina faerleensis** and **Recurvoides turbinatus**, B - **Reophax catenata** and **Reophax scotti**) and two base-of-slope to rise associations (A - **Cribrostomoides subglobosum** and **Tritaxis fusca**, B - **Ammomarginulina foliacea**, **Siphonotextularia rolshauseni** and **Ammolagena clavata**)

TOKSVAD, T., HANSEN, H.J.

Ultrastructure
Matrix

Agglutinated foraminifera

Calcitic cements in agglutinated foraminifera: fact or fantasy?

Repeated reports in the foraminiferal literature regarding presence of a calcitic cement in agglutinated foraminifera provoked a study of the shell structures of representatives of a large number of agglutinated groups. Ultrastructural investigations seem to indicate that previous reports of presence of a calcitic matrix most likely is caused by the limited spatial resolution power of the light microscope used by earlier workers. So far only one species has been found to possess a calcite cement. Some fossil forms show structures that may be interpreted as representing traces of primary cement but are difficult to interpret due to later diagenetic changes. The character seems useless in the taxonomy of agglutinated foraminifera. In consequence of the above it seems impossible to use presence or absence of calcitic cement as environmental indicator.

TOXWENIUS, B.W.

West Greenland basin
Environment analysis

Stratigraphy

Paleogene
Paleo-geography

Paleogene arenaceous foraminiferal assemblages from the West Greenland Basin and their paleoecological implication

The present paper describes the first foraminiferal faunas, from five offshore wildcat wells drilled in 1976 and 1977 in the West Greenland Basin, offshore West Greenland between lat 65° N and lat 68° N.

Low diversity assemblages of arenaceous foraminifera dominate the majority of the Paleogene microfossil assemblages. They are mainly dominated by the genera **Haplophragmoides** and **Bathysiphon**, with subsidiary and occasional occurrences of the genera **Cyclammina**, **Glomospira**, **Karrerella**, **Saccammina** and **Psammosphaera**. **Spiroplectammina spectabilis** and **Textularia midwayana** occur at certain stratigraphic intervals.

Among the subsidiary calcareous foraminifera, members of the **Nodosariacea** are common, as well as **Praeglobobulimina ovata**, **Chilostomelloides** sp. and **Allomorphina** sp.

Planktonic foraminifera occur at certain stratigraphic intervals. The five wells can be dated lithostratigraphically and biostratigraphically by means of calcareous foraminifera, calcareous nannoplankton and dinoflagellates, making it possible to interpret the broad basinal evolution.

In Late Paleocene - Late Oligocene times, the sedimentary environment constituted at rather narrow N-S elongate basin, which received immature clastic sediments as prodelta turbidites. Sedimentation rate was high and kept pace with the considerable subsidence. The final stage of Paleogene deposition was marked by deltaic progradation.

VERDENIUS, J.G., van HINTE, J.E.

Tertiary	Arenaceous foraminifera	Taxonomy
Norwegian-Greenland Sea	Turbidites	Statistics

Tertiary Arenaceous foraminifera from the Norwegian-Greenland sea

DSDP leg 38 cored intervals with exclusively arenaceous foraminifera at seven sites in the Norwegian-Greenland Sea, that, combined, cover the Eocene to Late Miocene. This paper describes the arenaceous fauna and proposes a key to identify fragments as well as complete tests of about 50 species.

Spiroplectammina spectabilis, **S. navarroana**, **Karreriella conversa**, **Dorothia principiensis**, **Cyclammina amplexans**, **Budashevaella** sp. **Karreriella siphonella** and **Martinottiella communis** can be used as stratigraphic markers in the area, and probably beyond.

Factor analysis of the total arenaceous association shows several partial associations which develop independently from each other. Turbidite sedimentation seems to be the major influence in the distribution of the partial associations.

Siliceous oozes yield few **Spiroplectammina** spp. (Paleogene) or **Martinottiella communis** (Neogene). They represent a stable deep-sea bottom environment with a low trophic level carrying a small, monospecific arenaceous foraminiferal biomass. Turbidite clay muds, silts and graded sands yielded abundant arenaceous foraminifera of many species. These sediments represent low stability, high nutrient conditions that support a large arenaceous foraminiferal biomass. A low diversity subset of the rich association is interpreted as representing a pioneer fauna. A high diversity subset may indicate a stable environment or could alternatively be interpreted as a mixed thanatocoenose.

Notes:

Verdenius, J.G., van Hinte, J.E.:

WALL, J.H.

Arctic Canada
Arenaceous forams

Jurassic

Cretaceous
Biostratigraphy

Jurassic and Cretaceous arenaceous foraminifera in the eastern portion of the Sverdrup Basin, Canadian Arctic Archipelago

The Jurassic and Cretaceous rocks on eastern Axel Heiberg Island and Fosheim Peninsula of west-central Ellesmere Island comprise a 2000 metre-thick series of transgressive-regressive cycles of shallow-water shelf and fluvial-deltaic sediments. Arenaceous foraminifera generally are dominant in the sequence with a succession of 14 assemblages or key species being recognized as shown in accompanying table.

The assemblages from the upper Lower Jurassic (Toarcian) and basal part of the Middle Jurassic (Aalenian/Lower Bajocian) shown affinity with those from northern Alaska and Svalbard. This trend is continued in the Upper Jurassic, but with close biogeographic affinities established also in Siberia and the Canadian Arctic mainland.

The pre-Albian Lower Cretaceous assemblages, composed of both long-ranging species which also occur in the Jurassic and a few stratigraphically restricted species, are entirely boreal in aspect, whereas the Albian agglutinates are widely distributed in the Western Interior region of North America as well as in the Arctic. The record for the lower part of the Upper Cretaceous is fragmentary, but the Santonian-Campanian suites correspond closely with those to the south in Alberta and Saskatchewan.

For the Jurassic and most of the Lower Cretaceous, dating of the microfauna and hence of the host rocks is dependant on integration with the megafaunal zones. For the Albian and Upper Cretaceous, however, the time-stratigraphic framework of the foraminifera is adequately known from southern areas to facilitate direct dating. Once the arenaceous foraminiferal succession has been determined from adequate control sections, the agglutinates can be applied with reasonable confidence to the solution of stratigraphic problems in this frontier region.

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WILLEMS, W.

Belgium
Early Eocene

Agglutinating foraminiferids
Inner shelf

Agglutinating Foraminiferids of the Ieper Formation (Early Eocene) in Belgium

Agglutinating foraminiferal faunas, of Early Eocene age, have been studied in some wells in Northern Belgium and in some outcrops around Mons (Southern Belgium). Two distinct associations have been remarked. The oldest association, occurring at the base of the Flanders Clay (Ypresian age, Early Eocene) is constituted mainly of specimens belonging to the **Rhabdammina**, **Rhizammina**, **Ammodiscus**, **Haplophragmoides**, **Trochammina** and **Verneuilina** genera. The second association, occurring in the larger part of the Flanders Clay, contains representatives of the genera **Spiroplectammina**, **Textularia** and **Karreriella**. The first association represents the only foraminiferids recorded in that part of the Flanders Clay, except for some reworked specimens, while the second association never constitutes more than 10% of the benthic foraminiferal fauna. The generic and specific composition of the first association differs largely from that of the so called "**Rhabdammina**-faunas" which are considered as bathyal. The rather small dimensions of the specimens recorded, in comparison with well developed individuals of the same species from deep sea facies, refer to abnormal living conditions. Compressed and disformed specimens, occurring frequently in this association within species with a calcareous matrix, suggest a neutral to slightly reducing environment. Differentiation in species composition, wall structure and dimensions between the faunas studied indicates deposition in a shallow innershelf sea with lagoonal and fluvial influences. The second association, occurring together with abundant anomalinidids, nodosaridids and planktonic foraminiferids, reflects central shelf conditions. About fifty-five different forms of agglutinating foraminiferids have been observed, of which twenty are typical for the first association and ten for the second.

THE EARLY EOCENE IN NORTHERN BELGIUM			MOST IMPORTANT AGGLUTINATING FORAMINIFERA		RELATION ROTALEINA TEXTULARIINA		IMPORTANT EVENTS WITHIN OTHER GROUPS	
Formation	members	Lithology			100% calcareous	100% agglutinating		
Ieper	Flanders							

HOTELS, TRANSPORT:

For Participants who ordered hotel accommodation through Wagon Lits Reizen, rooms have been reserved primarily in the following hotels:

Hotel Jan Luyken

Luykenstraat 54-58

Hotel Centraal

Stadhouderskade 7

Hotel Delphi

Apollolaan 101-105.

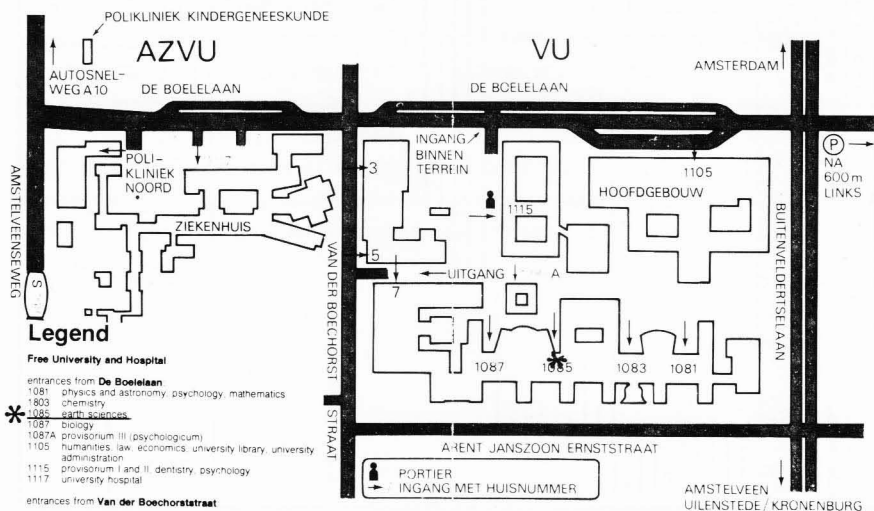
The approximate places of these hotels have been marked by circles on the town plan (outside cover).

The Free University can be reached by several bus lines. We suggest that you ask in the lobby of your hotel for the easiest way.

Tourist information folders and maps are best obtained in the hotel lobby likewise.

The Netherlands have a wet temperature climate and you may need a raincoat or umbrella. September can be warm or cool, but won't be freezing cold.

PLAN OF THE FREE UNIVERSITY



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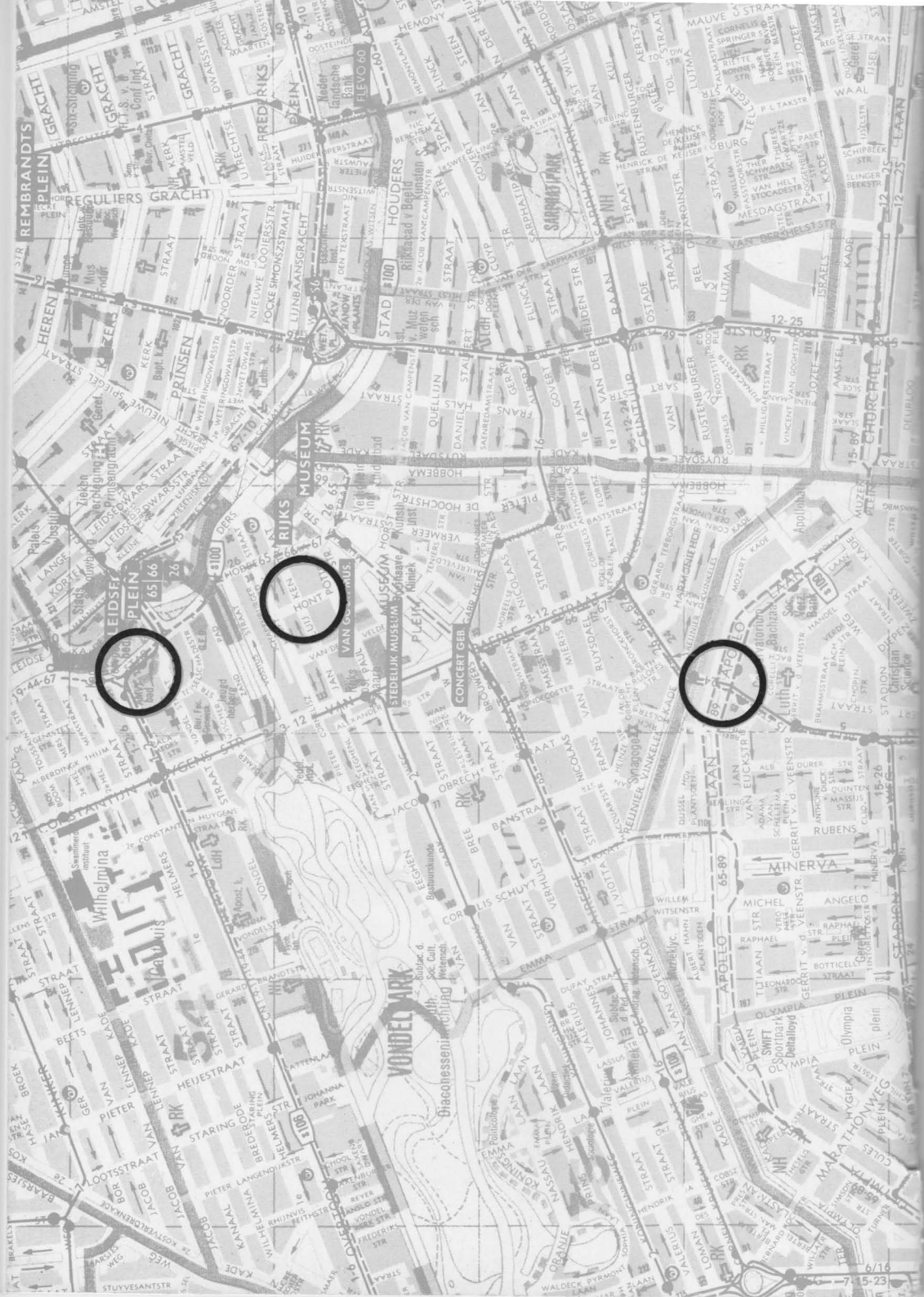
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Contribution:

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Contribution:
Significance of arenaceous foraminifera for the stratigraphy of Cretaceous
and Paleogene deposits.

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Contribution:
Late Cretaceous to Early Tertiary Agglutinated Benthic Foraminifera from
the Labrador Sea.

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Contribution:
Stratigraphy of Polish Flysh Carpathians based on arenaceous foraminifera.

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Mesozoic

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Contribution:
Albian to Paleocene, Trinidad (biostratigraphy mainly)

John Church
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Contribution:
Mesozoic Agglutinants.

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Contribution:
Jurassic - Cretaceous microfaunal succession, Sverdrup basin, Canadian
arctic archipelago.

Jurassic

Dr. S. C. Davies
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Contribution:

Practical industrial applications of agglutinating foraminifera - well site palaeontology of the kingak formation (Jurassic) of arctic Alaska.

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Contribution:

Arenaceous Foraminifera from Jurassic strata, Spitzbergen.

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Contribution:

Jenő Nagy and Magne Løfaldli: Arenaceous foraminifera from delta influenced environments in the North Sea Basin.

THE RECENT AS A KEY TO THE PAST:
DOES IT APPLY TO AGGLUTINATED FORAMINIFERAL ASSEMBLAGES

by

D. Scott¹, A. Miller¹, M. Williamson¹, F. Gradstein², and C. Schafer²

ABSTRACT

Five niches in the modern (N.W. Atlantic) marine environment contain foraminiferal assemblages that are relatively rich in agglutinated taxa and

specimens: 1. marsh,
2. estuary,
3. continental shelf,
4. slope and rise,
5. deep ocean.

In marsh systems approximately 8 agglutinated genera and 9 species occur, while in estuaries approximately the same number of taxa occur but diversities increase. On the shelf, 17 genera and 29 agglutinated species are observed with some overlap from outer estuarine systems.

On the slope and rise, between 400 and 3200 m, up to 48 agglutinated genera occur, comprising 9 families and 127 species. The Newfoundland slope fauna is an integral part of Brady's Recent cosmopolitan slope-abyssal plain assemblage, except for some Textulariid-Ataxophragmiid genera, which occur essentially deeper than 500 m. There are no uniquely abyssal taxa.

At the species level, the marsh-estuarine and bathyal-abyssal assemblages are not comparable. Three of eight marsh genera also occur in deeper water.

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The modern marsh assemblage is similar to Cretaceous assemblages^{in Alberta}, classified as marsh associations. Such faunas are both cosmopolitan and relatively stable through time.

The fossil (flysch type) agglutinated assemblages in the Maestrichtian to Paleogene of the Newfoundland and Labrador continental margin, and in the Paleogene of the North Sea, lack taxonomic affinity to modern marsh-estuarine assemblages. On the contrary, up to 90% of the 35 Paleogene genera comprise 50% of the modern Newfoundland slope assemblage. The low degree of species similarity between the modern slope and fossil assemblages ($\leq 16\%$) may relate to differential preservation and provincialism. Representation at the family level is equal.

The same genera dominate the Maestrichtian to Paleocene, Eocene and modern Canadian slope assemblages. An exception is Cyclammina, which for unexplained reasons is insignificant on the Recent slope.

The modern slope assemblage increases generally in species diversity from 1500-3000 m. This increase parallels a complex environmental gradient. It is not easy to relate the gradient factors to geologically-established trends in the Newfoundland and Labrador basins, but the increase in fossil assemblage diversity, basin-inward, agrees with the modern one.

Absence of carbonate in abyssal and marsh environments leads to 100% agglutinated faunas. It is reasonable to assume that solely agglutinated flysch-type fossil assemblages were either diagenetically affected or formed in the absence of carbonate.