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REPORT ON THE CONSULTANT GROUP
ON CALCAREOUS NANNOPLANKTON,
KIEL, September 5-7, 1974

by

Denise NOËL and Katharina PERCH-NIELSEN

The consultant group on calcareous nannoplankton was open to all workers in this field wishing to attend. Topics discussed included a review of the recommendations made by the "Round table on calcareous nannoplankton" in Rome (1970), methods of study, species concepts, evolutionary trends, diagenetical effects and nannofacies, stratigraphical correlations from the Jurassic to the Cenozoic including also probabilistic stratigraphy, biogeographic and ecological aspects of recent and fossil coccolith communities, the need for a "Coccolith Committee" and the formulation of recommendations for future work.

The purpose of the meeting was twofold. While it should present an opportunity to discuss different problems and to formulate approaches it should, by presenting "the state of the art", also serve as a seminar for colleagues who have recently joined this field.

The discussion of the above mentioned topics was requested by a number of colleagues who had answered a questionnaire about what should be discussed at the meeting. From the same questionnaire a list of addresses and a table of "Who does what and where" (geographical area and stratigraphical interval) were compiled for the almost 100 out of 130 workers approached.

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1. *Recommendations made by the "Round Table on Calcareous nannoplankton" in Rome*

See Recommendations (9).

2. *Methods of study :*

Besides the already widely known preparation methods currently in use, a new and easy technique to observe the same specimen under light (LM) and scanning electronmicroscope (SEM) was presented by S. MOSHKOVITZ ¹

The method was demonstrated at the meeting.

3. *Species concepts :*

The topic about species concepts was approached from a biologist and a palaeontologist's point of view. For the palaeontologist the morphological species concept still seems to be the only applicable one despite the recent contributions and progress made by biologists.

Our knowledge about the biology of coccolithophorids and related forms, specially their life cycles and their ability of forming coccoliths, is still very limited. Although this influences the species concept of the living forms, it is of no immediate consequence for coccolith stratigraphy, since only the coccoliths are preserved and dimorphous or polymorphous coccospheres leave parallel ranges.

Calcareous nannofossils include coccolithophorids *s. str.* (coccoliths on, or likely to have been covering a cell) and many other minute calcareous bodies (nannoliths or fasciculiths, sphenoliths and discoasters) of unknown origin. In relation to this it was drawn to the attention of the palaeontologists by R. NORRIS, that some dinoflagellates and/or other phytoplankton groups form comparable calcareous bodies.

¹ Paper published in the *Israel J. earth Science*.

4. *Evolutionary lineages :*

Obviously the best way of biostratigraphical subdivision is the application of an evolutionary lineage. Only few evolutionary studies have been published so far (*Chiasmolithus*, *Helicopontosphaera*, *Sphenolithus*). The following new lineages of morphological groups from the Cretaceous were proposed by G. LAUER (*Arkhangelskiellaceae*)¹ and W. SISSINGH² (*Micula*) and discussed by the group. These two examples illustrate the utility of such studies for high resolution stratigraphy.

5a. *Dissolution and diagenesis of coccolith assemblages :*

Clearly this topic is in fashion for the moment. There were several talks at this symposium already which have dealt with it and where the micropalaeontologist became a sedimentologist or the other way round. Certainly and hopefully we will be more careful in describing new species and in evaluating assemblages in the future. We have long known that the coccoliths found in the sediments represent only a fraction of what was present in the photic zone but rarely were aware just how bad it was.

5b. *Nannofacies :*

Besides the study of nannofossils in smear slides, their examination *in situ* was stressed. This so called nannofacies study can provide interesting data: 1) from a petrographical point of view to find out environment of deposition by the observation of all constituents of a sediment in their mutual arrangement and their relative importance in the rock composition. For example in samples of DSDP (leg 1) smear slides show only a few *Nannoconus* whereas rock surfaces show that they are in fact abundant. 2) From a stratigraphical point of view study of nannofacies can be useful for hard limestones.

6. *Stratigraphic correlations :*

There seemed very little interest to discuss correlations between the quite well established nannoplankton zonations in the Tertiary. This is only partly true for the Cretaceous where zonation is still less reliable and for the Jurassic where zonation is only attempted yet. Here it was stressed that more precise information should be given about the age of a studied sample (means of dating).

In view of the "probabilistic stratigraphy" now practised and the fact that the DSDP volumes informations on nannofossils are used as base, it was discussed that it would be better to have a more uniform input in the computer than the one currently produced by shipboard nannofossil persons. For this purpose, a list of

¹ Paper published here, in addendum.

² Paper published in the *Proceed. of the Royal Academy of Amsterdam*.

Cretaceous taxa, one for Paleogene and one for Neogene forms were discussed. A list of jurassic species was started. The presence or absence of these species should always be noted. The forms chosen—the number being limited by the possible input in the computer—should provide the possibility of a detailed zonation and furnish paleobiogeographical informations. It was stressed that also “background noise”, long-ranging species be noted, since they are the only ones present in high latitudes.

7a. Ecological aspects of coccolith communities :

In the discussion of ecological aspects of modern coccolithophores it was established that the distribution of coccolithophores seems most clearly limited by temperature. Composition and diversity of assemblages also are influenced primarily by temperature, although other criteria cannot be ruled out principally because of a lack of adequate data.

7b. Paleobiogeography :

Studies in paleobiogeography were found to be fraught with several problems. Foremost among these are the difficulty of ascertaining polymorphism among fossil forms, and bias introduced into the sedimentary record by prolific versus sparse coccolith producers. Other important considerations enumerated are difficulties resulting from a non-uniform taxonomy (including variable quality of published data), imprecise stratigraphy for the level under consideration, and the effects of post depositional processes.

8. Coccolith committee :

Clearly the CC appointed at the Round table on calcareous nannoplankton in Rome 1970 has not functioned the way it was intended. However the CC was active in organizing the consulting group meeting for the III Planktonic Conference; in preparing a new address list of coccolith workers and a new inventory of who does what and where (which both will be distributed to workers who replied to the questionnaire).

The continuation of a CC could not be justified because most persons attending did not feel free to undertake additional time consuming tasks. Therefore a secretary was elected (Dr. S. GARTNER, RSMAS, 4600 Rickenbacker Causeway, Miami, Florida 33149, U.S.A.). He can be contacted if needed, particularly to arrange a new coccolith meeting.

9. Recommendations of the Consultant group on Calcareous Nannoplankton :

1. The recommendations regarding the description of new taxa made at the II Planktonic Conference in Rome are strongly reemphasized. Whenever

feasible, however, holotypes described by SEM should be preserved, now that methods to do so are available.

2. We recommend that researchers carefully consider and further investigate the effects of dissolution and diagenesis in their work. In doing so they are also urged to clearly state their criteria.

3. The few existing studies on paleobiogeography and evolutionary trends are very useful. We strongly recommend that more attention be given to these fields.

4. We recommend that in future the shipboard nannofossil paleontologists for DSDP/IPOD etc., prepare a checklist (range charts) of at least all species on the included lists for every drill site. Information about frequency of the species and preservation of the assemblage being noted also.

5. We recommend that DSDP material studied prior to the inception of the above scheme and in which checklists are lacking, be restudied. Such restudy should be encouraged in order to extract from existing samples all possible paleobiologic and paleoceanographic information that could be obtained within the framework of the present state of the art.

6. We strongly recommend that more complete information about the age assignment (fossil group, etc.) of a sample studied for coccoliths from land-sections, be given.

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This list and the inventory of "who does what and where" below have been compiled by D. NOËL from the replies to the questionnaire sent to all the known nanoplankton workers. They were displayed during the conference in Kiel to be rectified and improved.

COUNTRY	RECENT	QUATERNARY	TERTIARY		CRETACEOUS		JURASSIC		ANTE-JURASSIC
			UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	
AFRICA	Cepek	Cepek	Cepek Deres Everett	Deres	Acheriteguy Benghezal Cepek Deres	Acheriteguy Benghezal Cepek Deres	Deres	Deres	
		Everett	Haq Kerdany Martini Prins Siesser	Haq Kerdany Martini Perch-Nielsen Prins Shafik Siesser	Grün Kerdany Martini Perch-Nielsen Prins Shafik Sissingh				
AMERICA (north)		Boudreaux	Boudreaux	Boudreaux	Acheriteguy Barbieri Cepek Cooper Deres Everett Gartner Haq Hay Hoganson Le Blanc	Acheriteguy Cepek Cooper Deres Everett	Deres Everett		
		Everett Gartner Hoganson Kling Le Blanc	Deres Everett Gartner Haq Hoganson Ki Hong- Chang Kling Le Blanc	Deres Everett Gartner Haq Hay Hoganson Ki Hong- Chang Kling Le Blanc					

			Levin Lipps Martini Poore Sherman Smith, Ch. Smith, L. Steinmetz Warren Wray	Levin Martini Poore Sherman Sherwood Smith, Ch. Smith, L. Steinmetz Warren Wray	Martini Michael Rissatti Sissingh Smith, Ch. Smith, L. Warren Wray	Michael Smith, Ch. Worsley
Wilbur						
AMERICA (south)				Deres Malumian Warren	Deres Haq Malumian Smith, L. Thierstein	
ASIA				Carlos Haq Jafar Moshkovitz	Ehrlich Jain Kerdany Lauer Moshkovitz	Ehrlich Kerdany Moshkovitz

COUNTRY	RECENT	QUATERNARY	TERTIARY		CRETACEOUS		JURASSIC		ANTE-JURASSIC
			UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	
ASIA (cont.)	Nishida	Nishida Okada	Narasimhan	Narasimhan	Narasimhan	Narasimhan			
			Nishida	Perch-Nielsen	Perch-Nielsen		Prins	Prins	
			Prins	Prins	Prins				
			Singh	Singh	Singh	Singh	Singh	Singh	Sayar
			Smith, L.						
EUROPE	Boalch	Borsetti Cati Cepek	Baldi-Beke Barbieri	Baldi-Beke Barbieri	Acheriteguy Baldi-Beke Barbieri	Acheriteguy Baldi-Beke Barbieri	Baldi-Beke Barnard	Baldi-Beke Barnard	
				Benič	Benghezal Benič	Benghezal Benič			
			Borsetti	Borsetti	Burns	Burns			
			Cati	Cati	Cepek	Cepek			
			Cepek	Cepek	Cooper	Cooper			
			Deres	Deres	Deres	Deres	Cooper Deres	Cooper Deres	
					Dmitrienko	Dmitrienko			
					Downs	Downs			
			Fonseca	Farinacci Fonseca	Farinacci	Farinacci	Farinacci	Farinacci	
			Gartner	Gartner	Forchheimer Fortuin	Forchheimer Fortuin			
	Gayral								

	Haq	Haq	Grigorovitsch Grün	Grün	Grün	Grün	Sayar
		Iaccarino Jafar	Iaccarino Jafar		Hay	Hay	
		Jerkovič					
		Ki Hong- Chang		Jafar			
		Lebenzon					
	Le Blanc	Le Blanc	Le Blanc	Le Blanc	Le Blanc	Le Blanc	
		Lleleva	Lleleva				
		Locker	Locker				
		Manivit	Manivit	Manivit			
	Martini	Martini	Martini	Martini			
Martini			Medd	Medd			
		Mikkelsen					
		Moorkens	Moorkens				
		Morel	Morel				
		Müller					
		Musyloo					
		Pavšič	Noël Pavšič	Noël Pavšič	Noël	Noël	
		Perch-Nielsen	Perch-Nielsen	Perch-Nielsen	Perch-Nielsen	Perch-Nielsen	
		Poore	Prins	Prins	Prins	Prins	
		Prins	Prins	Prins	Prins	Prins	
		Proto-Decima	Rio	Rio			
	Rio	Rio	Rio	Rio			
		San Miguel					
		St. Leu					
		Schmidt	Sissingh Smith, Ch.	Sissingh	Sissingh	Sissingh	

COUNTRY	RECENT	QUATERNARY	UPPER	TERTIARY UPPER	TERTIARY LOWER	CRETACEOUS UPPER	CRETACEOUS LOWER	JURASSIC UPPER	JURASSIC LOWER	ANTE- JURASSIC
EUROPE (<i>cont.</i>)		Smith, L.	Smith, L. Steinmetz Stradner	Smith, L. Steinmetz Stradner Stuijvenberg	Smith, L. Stradner Thierstein Verbeek Verdenius Wilcoxon Worsley	Smith, L. Stradner Stuijvenberg Thierstein Verdenius Wilcoxon Worsley	Smith, L. Stradner Thierstein Verdenius Wilcoxon Worsley	Smith, L. Stradner Thierstein Verdenius Wilcoxon Worsley	Smith, L.	
OCEANIA		Edwards Smith, L.	Deres Edwards Lipps Smith, L. Wilcoxon	Deres Edwards		Edwards				
AUSTRALIA	Hekel	Hekel	Hekel Poore Shafik	Hekel Poore Shafik Smith, L.	Deres Noël Perch-Nielsen Shafik Smith, L. Thierstein					
ANTARCTIC OCEAN	Boalch Burns	Burns Edwards	Burns Edwards	Burns Edwards Haq	Burns	Burns	Burns	Burns	Burns	Burns

	McIntyre Wise	McIntyre Müller Wise	Wise Worsley	Hay Wise	Wise	Wise
ATLANTIC OCEAN	Boalch Cepek	Cepek Clocchiatti	Barbieri Cepek Elliott Fonseca Gartner Haq Hay	Cepek Gartner Haq Hay	Cepek	
	Gaarder	Gartner	Fonseca			
	Gayral	Haq Hay	Gartner Haq Hay			
	Heimdal Honjo Leadbeater Lefort Martini	Martini Melguen Müller	Martini Melguen			
	Okada	Okada Perch-Nielsen	Perch-Nielsen Poore Roth Samtleben	Noël Perch-Nielsen Roth Sissingh Smith, Ch. Thierstein	Noël Perch-Nielsen Sissingh Thierstein	Noël Sissingh Thierstein
	Samtleben	Roth Samtleben	Poore Roth Smith, Ch. Steinmetz			
	Thierstein	Thierstein	Smith, Ch. Steinmetz			

COUNTRY	RECENT	QUATERNARY	TERTIARY		CRETACEOUS		JURASSIC		ANTE-JURASSIC
			UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	
ATLANTIC OCEAN (cont.)	Ushakova Wilbur	Ushakova	Ushakova	Worsley					
ARCTIC OCEAN	Boalch Martini	Martini	Deres Hay Martini	Deres Martini					
INDIAN OCEAN	Cepek Guptha McIntyre Okada Ushakova	Cepek Clocchiatti Gartner Guptha Haq McIntyre Müller Proto-Decima Thierstein Ushakova Wilcoxon	Clocchiatti Dmitrienko Gartner Müller Narasimhan Proto-Decima Roth Steinmetz Thierstein Ushakova Wilcoxon	Clocchiatti Gartner Müller Narasimhan Proto-Decima Roth Shumenko Steinmetz Thierstein Worsley	Gartner Narasimhan Roth Thierstein	Narasimhan Proto-Decima Thierstein			
MEDITERRANEAN SEA	Boalch Borsetti								

[illegible]

COUNTRY	RECENT	QUATERNARY	TERTIARY		CRETACEOUS		JURASSIC		ANTE-JURASSIC
			UPPER	LOWER	UPPER	LOWER	UPPER	LOWER	
PACIFIC OCEAN (<i>cont.</i>)	Nishida Okada	Müller Nishida Okada	Narasimhan Nishida	Narasimhan	Narasimhan	Narasimhan			
		Roth Shafik	Poore Roth Shafik	Poore Roth Shafik	Roth Shafik	Roth Shafik			
	Ushakova	Ushakova Wilcoxon Worsley	Steinmetz Ushakova Warren Wilcoxon	Shumenko Steinmetz Ushakova Warren	Warren	Warren			
				Worsley					
OTHER OCEANS	Boudreaux	Gartner Hoganson	Gartner Hoganson	Gartner Hoganson	Gartner Hoganson				
	Honjo Jerkovič Kling		Jerkovič						
	Martini Mikkelsen	Martini Müller Okada Smith, Ch. Wilcoxon	Lleleva	Lleleva	Lleleva				
	Okada		Smith, Ch. Warren Wilcoxon	Warren	Warren				