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

by

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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. SISSINGH [2] *(Micula)* and discussed by the group. These two examples illustrate the utility of such studies for high resolution stratigraphy.

5*a*. *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.

5*b*. *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

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[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 primarly 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 frought 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 paleooceanographic 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 assignement (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 nannoplankton workers. They were displayed during the conference in Kiel to be rectified and improved.

Country	Recent	Quaternary	Tertiary Upper	Tertiary Lower	Cretaceous Upper	Cretaceous Lower	Jurassic Upper	Jurassic Lower	Ante-Jurassic
Africa					Acheriteguy	Acheriteguy			
					Benghezal	Benghezal			
	Cepek	Cepek	Cepek		Cepek	Cepek			
			Deres	Deres	Deres	Deres	Deres	Deres	
		Everett	Everett						
					Grün				
			Haq	Haq					
			Kerdany	Kerdany	Kerdany				
			Martini	Martini	Martini				
				Perch-Nielsen	Perch-Nielsen	Perch-Nielsen			
			Prins	Prins	Prins	Prins			
				Shafik	Shafik				
		Siesser	Siesser	Siesser					
					Sissingh	Sissingh			
America (north)					Acheriteguy	Acheriteguy			
					Barbieri				
		Boudreaux	Boudreaux	Boudreaux					
					Cepek	Cepek			
					Cooper	Cooper			
			Deres	Deres	Deres	Deres	Deres		
		Everett	Everett	Everett	Everett	Everett	Everett	Everett	
		Gartner	Gartner	Gartner	Gartner				
			Haq	Haq	Haq				
				Hay	Hay				
		Hoganson	Hoganson	Hoganson	Hoganson				
			Ki Hong-Chang	Ki Hong-Chang					
		Kling	Kling	Kling		Kling	Kling		
		Le Blanc	Le Blanc	Le Blanc	Le Blanc	Le Blanc	Le Blanc		

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

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

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

Country	Recent	Quaternary	Tertiary		Cretaceous		Jurassic		Ante-Jurassic
			Upper	Lower	Upper	Lower	Upper	Lower	
Europe *(cont.)*		Smith, L.	Smith, L. Steinmetz Stradner	Smith, L. Steinmetz Stradner Stuijvenberg	Smith, L. Stradner Stuivjenberg Thierstein Verbeek Verdenius	Smith, L. Stradner Thierstein Verdenius Wilcoxon Worsley	Smith, L. Stradner Thierstein Verdenius Wilcoxon Worsley	Smith, L. Verdenius Worsley	
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 Perch-Nielsen Shafik Smith, L. Thierstein	Deres Noël Thierstein			
Antarctic Ocean	Boalch Burns	Burns Edwards	Burns Edwards	Burns Edwards Haq	Burns	Burns	Burns	Burns	Burns

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

Country	Recent	Quaternary	Tertiary Upper	Tertiary Lower	Cretaceous Upper	Cretaceous Lower	Jurassic Upper	Jurassic Lower	Ante-Jurassic
Atlantic Ocean *(cont.)*	Ushakova Wilbur	Ushakova	Ushakova						
				Worsley					
Arctic Ocean	Boalch								
			Deres Hay	Deres					
	Martini	Martini	Martini	Martini					
Indian Ocean	Cepek	Cepek							
		Clocchiatti	Clocchiatti Dmitrienko	Clocchiatti					
		Gartner	Gartner	Gartner	Gartner				
	Guptha	Guptha Haq							
	McIntyre	McIntyre							
		Müller	Müller	Müller					
			Narasimhan	Narasimhan	Narasimhan	Narasimhan			
	Okada								
		Proto-Decima	Proto-Decima	Proto-Decima		Proto-Decima			
			Roth	Roth	Roth				
				Shumenko					
			Steinmetz	Steinmetz					
		Thierstein	Thierstein	Thierstein	Thierstein	Thierstein			
	Ushakova	Ushakova	Ushakova						
		Wilcoxon	Wilcoxon						
				Worsley					
Mediterranean Sea	Boalch Borsetti								

		Clocchiatti						
			Deres	Deres	Deres			
			Fonseca	Fonseca				
	Gaarder							
			Gartner	Gartner				
	Gayral							
		Haq	Haq					
	Honjo							
	Jerkovič		Jerkovič					
		Le Blanc	Le Blanc	Le Blanc	Le Blanc	Le Blanc	Le Blanc	Le Blanc
	Lefort							
	Martini	Martini	Martini	Martini				
		Moshkovitz						
		Müller						
			Poore	Poore				
			Steinmetz	Steinmetz				
			Stradner					
		Ushakova	Ushakova					
Pacific Ocean			Barbieri					
	Burns	Burns	Burns	Burns	Burns	Burns		
			Dmitrienko					
		Edwards	Edwards	Edwards	Edwards			
			Elliott					
		Ellis	Ellis					
		Gartner	Gartner	Gartner	Gartner			
		Haq	Haq	Haq				
		Hay	Hay					
		Hekel	Hekel	Hekel	Hekel	Hekel		
	Honjo							
			Lipps					
	McIntyre	McIntyre						
	Martini	Martini	Martini	Martini	Martini	Martini		
		Melgen	Melgen					

Country	Recent	Quaternary	Tertiary		Cretaceous		Jurassic		Ante-Jurassic
			Upper	Lower	Upper	Lower	Upper	Lower	
Pacific Ocean *(cont.)*		Müller							
			Narasimhan	Narasimhan	Narasimhan	Narasimhan			
	Nishida	Nishida	Nishida						
	Okada	Okada							
			Poore	Poore					
		Roth	Roth	Roth	Roth	Roth			
		Shafik	Shafik	Shafik	Shafik	Shafik			
				Shumenko					
			Steinmetz	Steinmetz					
	Ushakova	Ushakova	Ushakova	Ushakova					
			Warren	Warren	Warren				
		Wilcoxon	Wilcoxon						
		Worsley		Worlsey					
Other Oceans	Boudreaux								
		Gartner	Gartner	Gartner	Gartner				
		Hoganson	Hoganson	Hoganson	Hoganson				
	Honjo								
	Jerkovič		Jerkovič						
	Kling								
			Lleleva	Lleleva	Lleleva				
	Martini	Martini							
	Mikkelsen								
		Müller							
	Okada	Okada							
		Smith, Ch.	Smith, Ch.						
			Warren	Warren	Warren				
		Wilcoxon	Wilcoxon						