

# DEEP-SEA NEWSLETTER



No. 21, November 1993

## 7th Deep Sea Biology Symposium

KNOSSOS ROYAL VILLAGE HOTEL, CRETE

Thursday Sep. 29 - Tuesday Oct. 4, 1994

### Theme:

Biology and ecology of the  
Deep Sea

### Symposium Office:

The Organising Secretariat  
7th Deep-Sea Biology Symposium  
Inst. of Marine Biology of Crete  
P.O.Box 2214, Iraklion 71003,  
Crete, GREECE

Tel.: +30 81 242022 / 246647

Fax: +30 81 241882

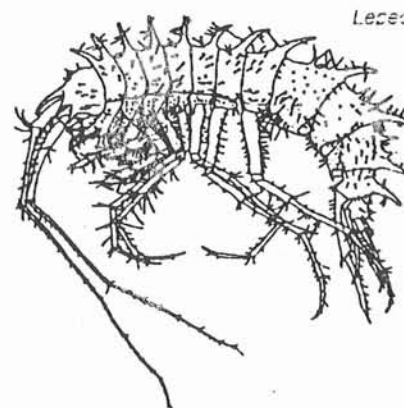
E-mail: imbc@imbc.gr

### Organising Committee:

Prof. Anastasios Eleftheriou  
Dr. Anastasios Tselepides  
Dr. Chris J. Smith  
Ms. K. Nadia Papadopoulou

### Language:

The Symposium will be in English



*Lecechinella manco*  
Mediterranean  
Endemic

7th Deep Sea Biology Symposium  
IMBC, Crete, 1994

### Symposium Fee:

Before June 15, 1994:

• 130 ECU, students 65 ECU

After June 15, 1994:

• 175 ECU, students 90 ECU

• *Symposium*  
*Information* •

• The goal of the Organising Committee is to bring together all the members of the deep-sea international community. The Symposium is open to scientists from all countries. Young scientists and students are encouraged to participate and invited to present their work. Following the first announcement, 60 scientists from 15 countries have already expressed interest in participating in the Symposium. So far the presentations have addressed the following topics: Deep sea biota and community structure, hydrothermal vents, seamounts, microbiology, fluxes, food chains and investigations conducted by remote operated submersibles. The Organising Committee hopes that many more will register since Crete is also a very popular summer resort.

**Belgium**

Ann Vanreusel

**Canada**

Verena Tunnicliffe  
Derek Ellis

**Denmark**

Anette Grøngaard  
Jørgen B. Kirkegaard  
Reinhardt M. Kristensen  
Ole Tendal  
Torben Wolff

**France**

A. Vangriesheim

**Germany**

Hartmut Bluhm  
Antje Boetius  
Christian Borowski  
Angelika Brandt  
Christian Bussau  
Dieter Fiege  
Kalus Hausmann  
Claudia Luth  
Ulf Luth  
Olaf Pfannkuche  
Gerd Schriever  
Thomas Soltwedel  
Hjalmar Thiel  
Michael Türkay

**Greece**

Anastasios Eleftheriou  
K.-Nadia Papadopoulou  
Chris J. Smith  
Anastasios Tselepidis

**Iceland**

G. Gudmundsson  
Jörundur Svavarsson

**Italy**

G. Albertelli  
Roberto Danovaro  
Norberto Della Croce  
M. Fabiano

**Ireland**

J.W. Patching

**Israel**

Nechama Ben-Eliahu  
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**Russia**

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I.I. Burmistrova  
S.V. Galkin  
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N.B. Keller

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E.M. Krilova  
Alexei P. Kuznetsov  
V.Ja. Lus  
Marina N. Sokolova  
Olga N. Zezina

**Ukraine**

Murina Godena-Vanzetti

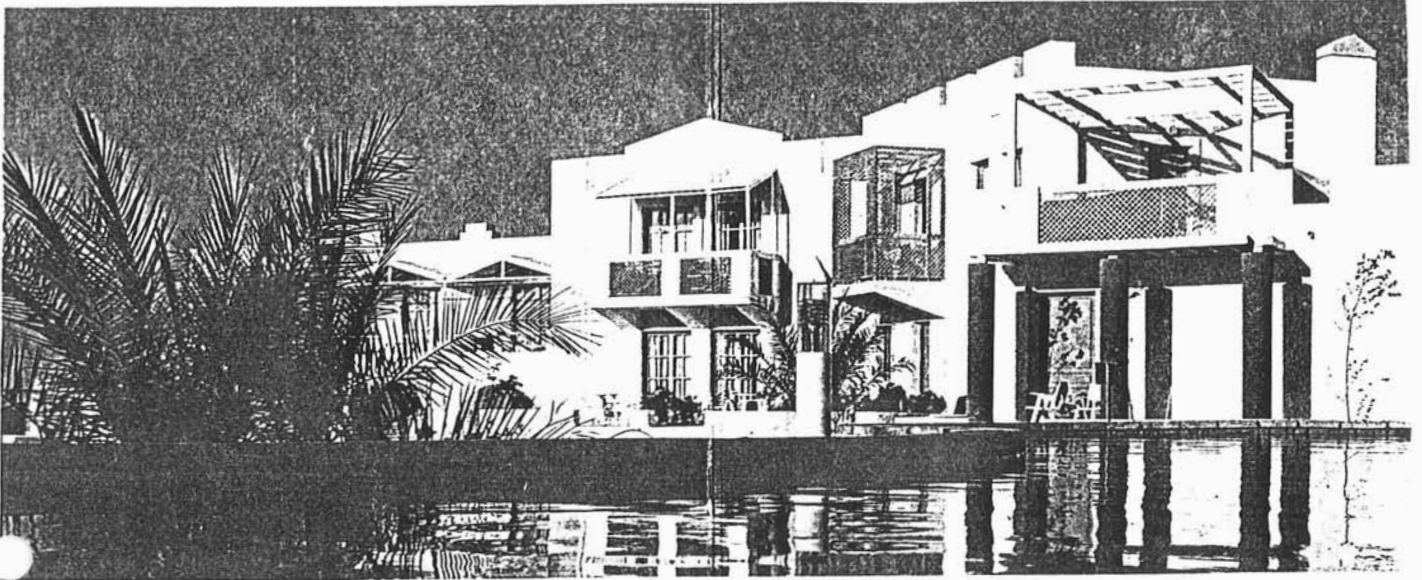
**United Kingdom**

Phil Bagley  
Brian Bett  
David S.M. Billett  
T.J. Ferrero  
Andrew Gooday  
John D.M. Gordon  
P.J.D. Lambshed  
I.G. Priede  
Tony Rice  
Michael Thurston  
George Wolff

**USA**

Gregor M. Cailliet  
Andrew G. Carey  
Scott France  
Horst Felbeck  
Craig Smith  
Karen Wishner  
Marsh J. Youngbluth

• Limin Hersonissos, an ancient Roman port, is a small seaside town near Iraklion with extensive tourist facilities. The Symposium will take place in the Knossos Royal Village Hotel, a five-star seaside hotel right on the beach, with appropriate conference facilities, in an attractive location on the northern coast of Crete, only 25 km from Iraklion International Airport. Among the existing facilities are spacious areas with large verandas overlooking the sea, panoramic restaurants, a snack bar, a cafeteria, a small shopping centre, numerous swimming-pools, tennis & squash courts, diving club and other recreational facilities. Accommodation has also been arranged in two adjacent hotels which can offer a wider range of negotiated prices.



- Please note that the Symposium centre is three kilometres from the centre of Limin Hersonissos. There is **no** public bus service from L. Hersonissos to the Symposium Centre and therefore participants are **strongly** advised to register at the Symposium Hotels and **not** to seek alternative accommodation arrangements.

### • *Presentation Information* •

- Lectures and oral presentations.  
The scientific programme will include oral presentations of papers, posters, informal meetings, as well as video film sessions. Oral presentations of papers should not exceed 20 minutes, including discussion. Short communications should not exceed 10 minutes. There will be no parallel sessions.
- Instructions for authors of papers and posters.  
Papers and posters may concern all aspects of deep-sea biology and ecology. Depending on the number of papers submitted we may have to ask contributors to present their research as a poster. We consider both to be of equal scientific value. If possible, posters will be displayed throughout the symposium. We urge those preparing papers and posters to include hard data abstracts which will allow a better understanding of their presentation. Abstracts should not exceed one full A4 page. In case of computer ready abstracts please send a floppy disc (preferably 3'5) with your abstract to the Organising Committee together with a printed copy of your abstract. Use Word (Macintosh) or Word for Windows, Word Perfect (IBM or compatibles) and label your disc clearly. A volume with the abstracts will be available at the Symposium. The proceedings will not be published.
- Instructions for Presenters of Posters.  
Posters should be prepared beforehand and brought in person by the participants. Do not send your poster by mail. The poster may be up to 1 m wide and 2 m high. Use large lettering that can be read at a distance and keep the amount of lettering at a minimum. Posters should be legible from a distance of 1 - 2 m. Include author(s), address(es) and institute(s). Include also a photo of yourself and indicate at what time you will be present at your poster. Materials for assembling posters will be provided, ie. tape, drawing pins.

- Projection facilities.

Only OHP and slide projector for standard 50 x 50 mm slides will be available for talks and lectures. Requests for other projection facilities (film, video, etc.) should be made to the Secretariat in advance. Slides should be numbered in the upper right hand corner as seen when they are placed in the projector. Try to minimize the number of words and maximize the size of lettering on slides and overhead transparencies. Check that your lettering can be read from the back of a large conference room.

- Video film sessions.

Scientific videos will be presented in the breaks between sessions, in a room set aside for that purpose. The Institute of Marine Biology of Crete will present some of its video material. Others who wish to present video material should specify the format in advance: VHS (PAL, SECAM, NTSC), low or high band U-matic (PAL). They should also be present when the video is running.

- Informal meetings and workshops.

Small meeting rooms are available for informal meetings or workshops. If any of the participants want to have a workshop arranged they should notify the organizing committee well in advance.

- Passports and visas

Crete is subject to European Community laws. Visitors entering Greece must have a valid passport. Depending on nationality, some foreign visitors may require a visa. Please enquire at your local Greek Embassy or Consulate.

• *How To Get To  
Hersonissos* •

- By air

Hersonissos can be reached by air via Iraklion International Airport, which has 5 scheduled flights each day from Athens, as well as direct charter links with many European countries and scheduled Lufthansa flights from Germany and Trans Avia (KLM) from Holland.

- By boat

There are ferry links with the mainland (at least 2 sailings per day from Pireaus Port) and with Italy.

- By taxi

From Iraklion Airport the Taxi cost is approximately 5.800 drx. for 1 person, 3.500 drx for 2 and 3.000 drx for 3 persons. You may be asked to share a taxi with someone who is travelling in the same direction as yourself. This is an environmental measure rather than an economic one and the fare for each person remains the same, i.e., it is not shared.

• *Accommodation* •

- There are three designated Symposium Hotels: the Knossos Royal Village which is the Symposium Centre and 2 adjacent hotels.

- All prices are quoted in **ECU per person**, per day, on **half board** basis (Bed, Breakfast & Dinner) and include taxes and service charge.



ECU = \$1.6

	<u>Single</u>	<u>Double</u>
KNOSSOS ROYAL VILLAGE (5 star)	85	60
CRETAN VILLAGE (4 star)	73	55
CHRISSI AMOUDIA (3 star)	51	40

- The total amount due for accommodation should be paid by **August 15, 1994**. No reservation can be confirmed **until** the Organising Committee has received your payment.
- **Accommodation cancellation:** upon written request received no later than **August 15, 1994**, 90% of the hotel deposit will be refunded after the Symposium.

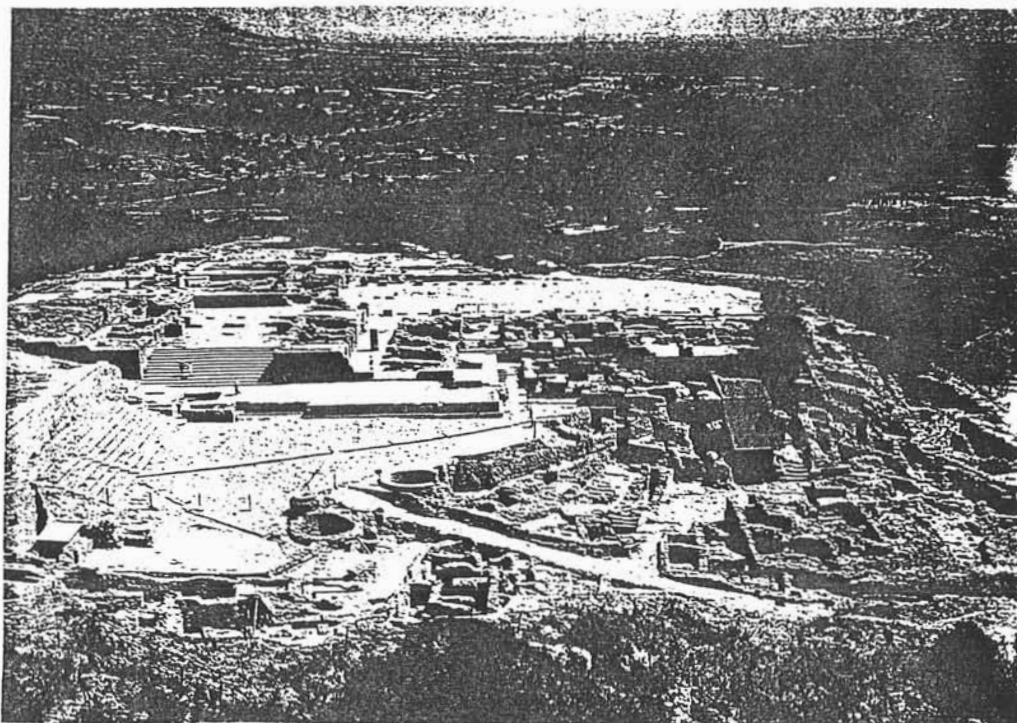
**• Provisional Programme •**

- 28/9/94 : Registration, Symposium Office open in foyer, Knossos Royal Village.
- 29/9/94 to 1/10/94 : Morning & Afternoon scientific sessions.
- 2/10/94 : Mid-Symposium Excursion.
- 3/10/94 : Morning & Afternoon scientific session, Symposium Dinner.
- 4/10/94 : Morning & Afternoon scientific session, Closing Address.

There will be a visit to IMBC at some time during the course of the Symposium.

**• Social Events •**

- Mid-Symposium Excursion (PHAESTOS - GORTYN - MATALA Guided Tour).  
The only pre-historic palace in the southern part of Crete is that of PHAESTOS (63 km SW of Iraklio), overlooking the fertile plain of Messara. It ranks second only to Knossos, though its situation is perhaps the most spectacularly beautiful of all the Minoan sites.



Plan of the  
Palace of Phaistos

GORTYN nearby, had its origins in the Minoan era. The Gortyn Law Code is a major document of early Greek society. There will also be a short stop at the fishing village MATALA, whose caves have given refuge to visitors, from Roman times right to the present.

• Symposium Dinner.

A Cretan style evening where traditional dishes will be served accompanied by local wine. There will be a programme of local music and Cretan folk dancing performed by dancers in traditional costumes.

• *Registration  
& Payment* •

• The Application & Registration Form (see next pages) must be completed and returned **with payment** not later than June 15, 1993.

• **No** registration or room reservation can be confirmed **until** the Organising Committee has received your payment (registration fee and hotel accommodation). Please remember that early registration will greatly facilitate accommodation arrangements.

• All payments must be made by **cheque** or **visa card** to :

The Organising Secretariat,  
7th Deep-Sea Biology Symposium,  
Institute of Marine Biology of Crete,  
P. O. Box 2214, Iraklion 71003,  
Crete, GREECE

• In the case of cheques : along with the application & registration form send us **by fax** a copy of the cheque or **proof of payment** to avoid confusion and/or delays. Please make sure that your name & 7th DSBS is on all payments.

• In the case of visa card : along with the application & registration form send us **by fax** a statement indicating your name, address, Visa card number and expiration date, total amount due, date and signature.

• Any bank charges **will** be borne by the remitter.

• The approximate rate for ECU, which is liable to small fluctuations only, is presently :

1 ECU= 1.1 US \$, 1,9 DM, 6.6 FF, 0.8 £ PS, 7.6 DKK, 1876 Itl, 270 Greek drachma.

• The Symposium fee covers: attendance at all scientific sessions, morning & afternoon coffee breaks and the Symposium material including one copy of the Abstracts of all contributions. Students are required to submit the Student Eligibility Form, signed by the Department Head, in order to be eligible for reduced registration fees.

• *Deadlines* •

• **June 15, 1994**

Abstracts should arrive not later than June 15, 1994.

• **June 15, 1994**

Application & Registration form must be completed and returned **with payment** not later than June 15, 1994. Participants choosing to register after June 15, will have to pay the late registration fee (175 ECU, Stud. 90 ECU).

• **July 15, 1994**

Authors will be notified of any rejections by July 15, 1994.

• **August 15, 1994**

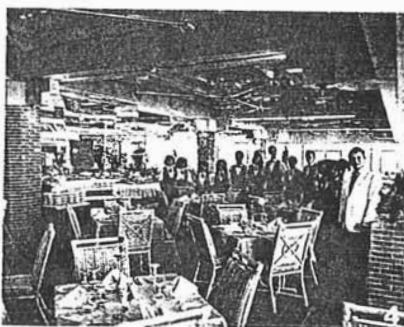
**Registration cancellation:** upon written request received no later than August 15, 50% of the registration fee will be refunded after the Symposium. After August 15, no refund is possible.

• **August 15, 1994**

The **total amount due for accommodation** should be paid by **August 15**. No hotel reservation can be confirmed **until** the Organising Committee has received your payment.

• **August 15, 1994**

**Accommodation cancellation:** upon written request received no later than **August 15**, 90% of the hotel deposit will be refunded after the Symposium.



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**7th Deep Sea Biology Symposium**  
29 September - 4 October 1994, IMBC, Crete, Greece  
**PREDOCTORAL AND STUDENT ELIGIBILITY FORM**

Family Name:..... First Name:.....

Institution: .....

I certify that the above-named fellow / student is presently enrolled at this institution.

Name : ..... (Department Head)

Signed : .....

Application & Registration Form  
**7th Deep Sea Biology Symposium**  
 29 September - 4 October 1994, IMBC, Crete, Greece

**Participant** : M  F

Family Name: ..... First Name: .....

Title: .....

Institution: .....

Address:.....

Postal code: ..... City: ..... Country: .....

Telephone: ..... Telefax : .....

Telex : ..... E-mail : .....

**Accompanying person** : M  F

Family name: ..... First name: .....

**Dates :**

Arrival Date:..... Departure Date: .....

<i>Personal Fees</i>		ECU	ECU
1	Participant before June 15, 1994	130	
or 1	Participant after June 15, 1994	175	
1	Student before June 15, 1994	65	
or 1	Student after June 15, 1994	90	
Accommodation Total (by August 15, 1994)			
Accompanying person (s)		0	0
Accommodation Total (by August 15, 1994)			

***Social Events***

Symposium dinner X No of Persons	45 X 1	
Mid-Symposium Excursion X No of Persons	35 X 1	
<b>Total :</b>		

I wish to present a : paper  short communication  poster   
 with the following title : .....

• I intend to arrange my own accommodation in Hersonissos:

• For Symposium Hotel Reservation please turn over and fill in the form.  
 (The approximate rate for ECU, which is liable to small fluctuations only, is presently : 1 ECU= 1.1 US \$, 1,9 DM, 6.6 FF, 0.8 £ PS, 7.6 DKK, 1876 Itl, 270 Greek drachma)



Hotel Reservation Form  
**7th Deep Sea Biology Symposium**  
 29 September - 4 October 1994, IMBC, Crete, Greece

**Participant** : M  F

Family Name: ..... First Name: .....

**Accompanying person** : M  F

Family Name: ..... First Name: .....

**Dates :**

Arrival Date:..... Departure Date: .....

Hotel	Single	No. of Rooms	No. of Nights	Double per person	No. of Rooms	No. of Nights
KRV *****	85			60		
CV *****	73			55		
CA ***	51			40		

If Double room please indicate if :

- you are sharing with Mr/Ms ..... (accomp. person)
- you want to share with Mr/Ms ..... (a participant)

**Total (No of Nights X No of Persons X Room Price per person X No of Rooms)**

No of Nights .....  
 No of Persons .....  
 Room Price per person .....  
 No of Rooms .....

**Total = \_\_\_\_\_ ECU**

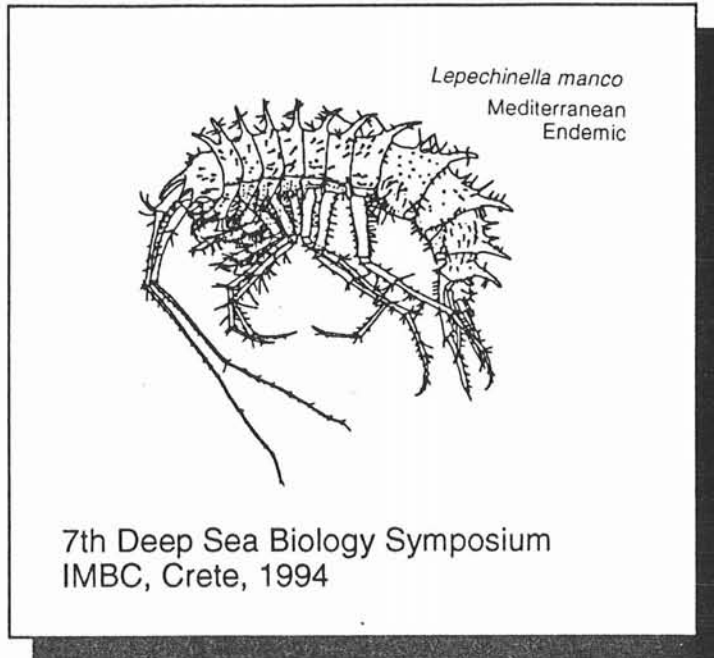
• Please return this Application & Registration Form together with payment to :  
 The Organising Secretariat, 7th Deep-Sea Biology Symposium  
 Institute of Marine Biology of Crete, P.O. Box 2214, Iraklion 71003,  
 Crete, GREECE.  
 Tel. + 30 81 242022 / 246647 / 241992, Fax. + 30 81 241882

Date: ..... Signature : .....

• To avoid delays please send this form also by **fax** with a copy of proof of payment.

# 7th SYMPOSIUM

## *Deep Sea Biology*



**29 Sept. - 4 Oct. 1994, Crete.**

Theme: Biology and Ecology of the Deep Sea

Organisers: Prof. A. Eleftheriou, Dr. A. Tselepides,  
Dr. C. Smith, Ms. K. N. Papadopoulou

*For Details Contact :*

The Organising Secretariat, 7th DSBS,  
Institute of Marine Biology of Crete, Box 2214,  
Iraklion 71003, Crete, GREECE

Tel. +30 81 242022 / 246647, Fax. +30 81 241882

E-mail : [imbc@imbc.gr](mailto:imbc@imbc.gr)

LIMIN HERSONISSOS

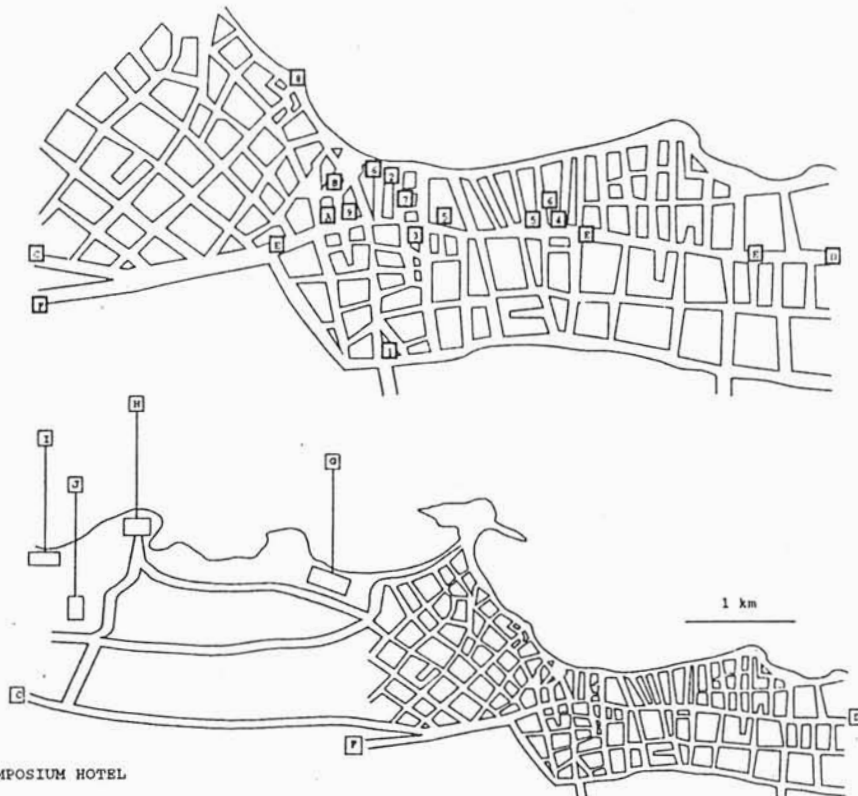
Population 2183  
Height above sea level 0-10 m

MAP KEY

- 1 TOWN HALL
- 2 POLICE STATION
- 3 POST OFFICE
- 4 TELEPHONE

District code 0857  
Emergency services 106  
Fire brigade 199  
Hospital 22042  
Directory enquiries (local) 131  
Directory enquiries (Greece) 132  
Directory enquiries (Inter) 01-169  
Local operator 151  
International operator 161  
Telegrams 155  
Weather forecast (in Greek) 149  
Speaking clock (in Greek) 141

- 5 PHARMACY
- 6 BANK
- 7 CHURCH
- 8 VENETIAN SITE
- 9 TAXI STATION
- A BUS STATION
- Q TOURIST INFORMATION
- } ROAD TO IRAKLION
- Q ROAD TO MALIA/AG.NIKOLAOS
- E ELEFThERIOU VENIZELOU ROAD
- F ROAD TO HERSONISSOS VILLAGE
- G HOTEL CRETA MARIS
- H KNOSSOS ROYAL VILLAGE, SYMPOSIUM CENTRE & SYMPOSIUM HOTEL
- I CRETAN VILLAGE, SYMPOSIUM HOTEL
- J CHRISSI ARMOUDIA, SYMPOSIUM HOTEL



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- U.S.A. (East): Dr. Fred Grassle, Woods Hole Oceanographic Institution, Woods Hole, Mass. 02543.
- (West): Dr. Ken Smith, Scripps Institution of Oceanography, A-002, La Jolla, Calif. 92093.

### Again: Standardization of Methods

Deep-Sea Newsletter No. 20 on pages 6 and 7 printed information on "The Standardization on Methods for Benthos Studies and Biochemical Measurements in Sediments" and "Introduction: Core Measurements for Ecological Studies of Benthos and Sediment Biochemistry". Both articles are based on a workshop on the standardization of methods, held during the Copenhagen Symposium in 1991.

In the last issue, the chairmen of the discussion groups had asked the readers of Deep-Sea Newsletter to indicate their interest in and to offer their help for the completion of the 16 chapters. It had been explained that it would become too expensive to distribute a draft copy to every reader. I regret to state that the reaction has been near zero: We received a total of 3 inquiries for chapters! This leads to the following questions:

- (1) Does nobody read the Deep-Sea Newsletter?
- (2) Is standardization regarded to be unimportant?
- (3) Has the Deep-Sea Newsletter after scanning through and reading entered an office subduction zone (which relates to 2)?

I am not going to reprint those pages. You may reread them and respond by asking to review one or more specific chapters from the following list of contents:

Sampling procedures ( )	Electron transport activity ( )
Total organic carbon ( )	Extracellular enzyme activity ( )
Chloroplastic pigments ( )	Hydrolytic enzyme activity ( )
Desoxyribonucleic acid ( )	Picobenthos (bacterial) ( )
Phospholipids ( )	Nanobenthos ( )
Adenylates ( )	Meiobenthos ( )
Carbon dioxide fixation ( )	Macrobenthos ( )
Oxygen consumption ( )	Megabenthos ( )

The arguments for method standardization were presented in several communications in previous issues of the Deep-Sea Newsletter. In short: standardization of methods provides the basis for full comparison of data and results, and this is specifically important under the topics of

- (1) high efforts necessary for deep-sea research,
- (2) large, international programmes like JGOFS,
- (3) risk evaluation related to large-scale impacts from waste dumping and mining.

The deadline for receiving your comments is February 1, 1994. Therefore, you should soon ask for the chapters of your interest. Your contributions to the standardization of methods will be appreciated!

Hjalmar Thiel  
Institut für Hydrobiologie  
und Fischereiwissenschaft  
der Universität Hamburg  
Zeiseweg 9, D-22765 Hamburg



## EUROPEAN RESEARCH CONFERENCES



### Sea and the Climate Interactions The Deep-Sea Floor as a Changing Environment

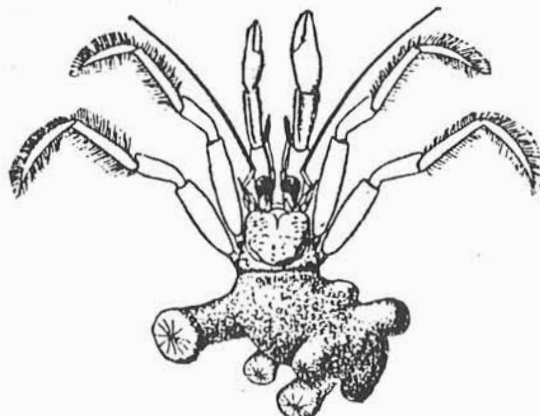
Since 1990 the Directorate XII of the Commission of the European Communities (CEC) and the European Science Foundation (ESF) cooperate in the development of future marine and polar research. Together they established ECOPS, the European Committee on Ocean and Polar Sciences. Key words of their policy are "cooperation in European research", "long-term European strategy", "promotion of major European projects", "climate and global change", "European marine and polar research ... in a worldwide perspective".

ECOPS identified 5 great challenges for European marine and polar research, and one of them is "The Deep-Sea Floor as a Changing Environment". To reach consensus theme-oriented meetings were arranged and European Research Conferences were or will be held during the winter months. For the deep-sea great challenge the conference (title see heading) will be held at San Feliu de Guixols, Spain, from 8 to 13 February, 1994.

During this conference 20 papers will be presented in morning sessions, and in the afternoons workshops will be held for intense discussions on future deep-sea research. The morning lectures are arranged under 4 headings:

- General interest for the deep sea as a changing environment and why it is important.
- The Benthic Eckman Layer.
- The deep sea floor as an active interface.
- The subsea floor as a paleorecord and an active source and sink of materials.

For late 1994 a major "European Conference on Ocean and Polar Research" is under preparation to review and integrate the conclusions concerning the great challenges which have been obtained during the conferences. The CEC and the ESF have published a joint brochure titled "The Ocean and the Poles - European Cooperation in Ocean and Polar Research" which can be obtained from the said organizations. Chapter 6 of the brochure "Exploration and Monitoring of the Deep-Sea Environment" by Jarl-Owe Strömberg summarizes the problems for the deep ocean.





## AN ENIGMATIC ORGANISM DISCLOSED - AND SOME NEW ENIGMA

In the last issue of D-S.N. (no 20: 12-15) OT and DB discussed the distribution and biology of the large clubsponge *Chondrocladia gigantea* (Hansen, 1885). When a poster on the same theme was shown at the 4th International Porifera Congress in Amsterdam in April 1993, KT told us about new observations made from the Russian submersible "Mir-2". The information reveals the nature of a class of enigmatic organisms encountered now and again in deep-sea photographs and makes the function of some conspicuous morphological structures in members of the genus *Chondrocladia* an intriguing challenge.

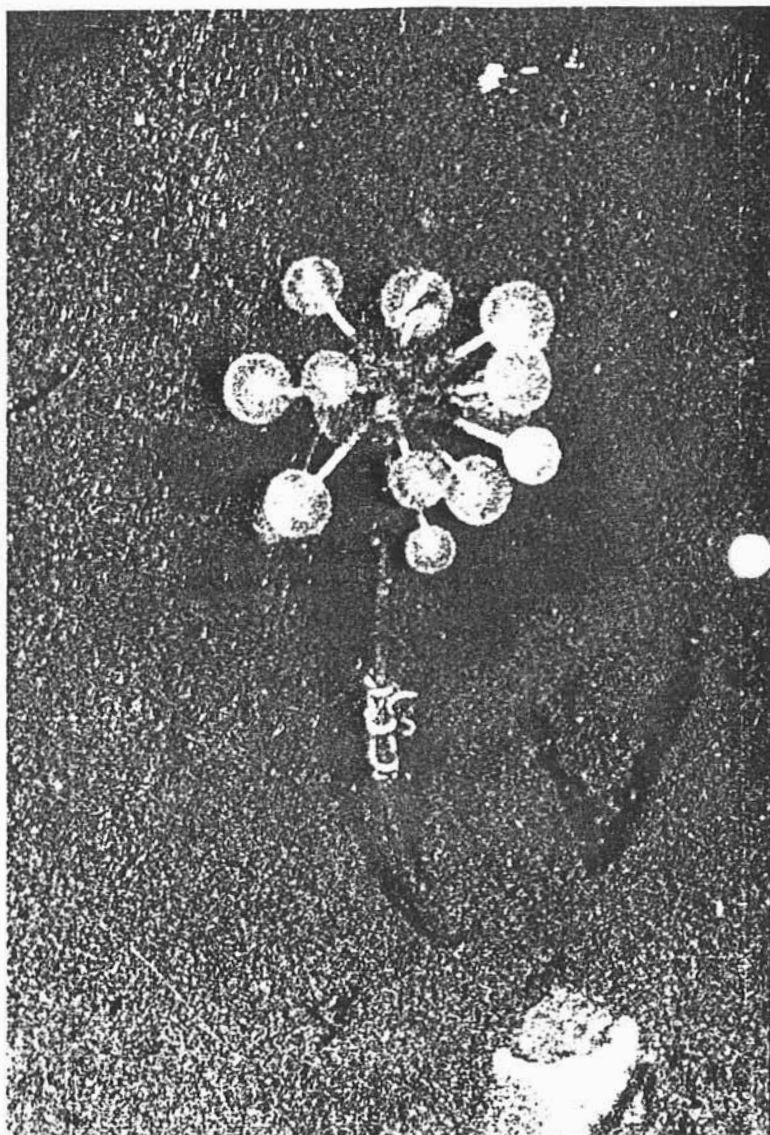
During a dive at abyssal depths in the North Pacific, "Mir-2" met a peculiar, stalked organism about 50 cm high (Fig. 1). The lower end of the 6 mm thick cylindrical stalk came out of the mud. The upper end supported a poorly defined, spherical head about 3 cm in diameter, from which 10-15 thin, cylindrical branches radiated in all directions. At the free end each branch carried a translucent sphere, 1-2 cm in diameter.

The organism was collected with the movable arm of the submersible. On deck, it was obvious that it was a sponge, and the spheres at the tips of the branches were shrunk into the somewhat oblong, clavate, relatively massive structures characteristic of the branches of a number of *Chondrocladia* species called "the concrescens group" (Fig. 2).

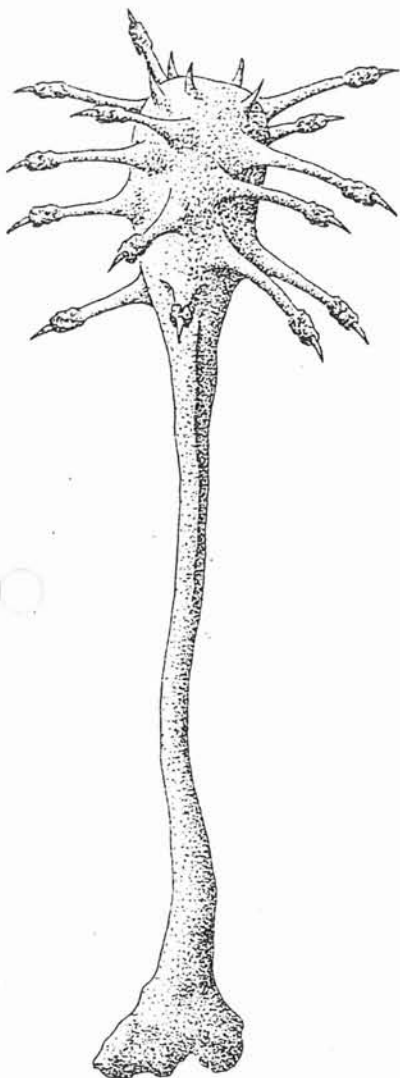
Bottom photographs showing the extended sponge have been taken before, but because of lack of identification they seem, with one exception, not to have been published. The single case is found in a manual for submersible pilots (Segonzac 1987) where a photo shows the same kind of organism from between 2000 and 3000 m in the East Pacific. It is called "Boules" and texted as "Tous les zoologistes interrogées ignorent la nature de cet organisme"!

What is the function of the papillae that obviously under natural conditions, at least part of the time, are so swollen that they become thin and transparent as opposed to the collapsed condition where they are massive, although "spongy" in texture?

Lundbeck (1905) described the gross morphology of the papillae of *C. gigantea*: In the central part is a longitudinal axis consisting of a bundle of skeletal fibers. Around it is a lacunous



The peculiar organism was photographed during a dive to 5320 m depth at 54°59.25'N, 165°42.50'E (J. Volodin phot.)



Ole S. Tendal

A generalized *Chodrocladia* of "the concrescens group"

tissue with only few spicules. Outermost is a denser tissue with many spicules. Parts of the canal system can be seen here and there, running longitudinally. In the narrow part of the papilla the lacunous tissue constitutes only a thin layer, while in the swollen outer part it is thicker and either fills the interior completely or only to some degree, the rest being occupied by a large cavity. The very end is provided with numerous small openings.

The spheres must be parts of the canal system. The inflation means that they contain much water in relation to tissues, and the transparency shows the tissues to be thin. One can imagine that the flagellate cells driving the water and creating the pressure necessary, sit in membrane-like interior structures, the outer layer being the most resistant and keeping the shape. This would require an arrangement unusual for a demosponge. The whole seems very delicate, much like in hexactinellids. The single spherical, cavernous, membraneous unit probably performs its functions rather independently of the rest of the sponge, although there must be some connection to the central head that may serve as a kind of brooding area, like in *C. gigantea*. We are investigating these possibilities.

The incident serves as another example of how different some sponges can behave when being in their natural environment as compared to on the deck. It also emphasizes the value of *in situ* photographs of identified species (samples from the area!) when interpreting aspects of their biology (Barthel *et al.* 1991).

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## THE FIRST XENOPHYOPHORE (PROTISTA) FROM THE ANTARCTIC BATHYAL

The Xenophyophora constitute a protozoan phylum of macro- and megafauna-sized, agglutinating rhizopods, mainly found in the deep sea (Tendal 1972, 1989). Although erected around the turn of the century, it is only over the last two decennia that the wide geographical occurrence and the ecological significance of the group have become acknowledged beyond a narrow circle of deep-sea workers. The generalities are now accessible in larger textbooks (Marshall 1979; Page 1982; Tendal 1989; Gage & Tyler 1991). The ecology of the group has called upon a special interest in recent years (Levin *et al.* 1986; Levin & Thomas 1988; Levin 1991; Levin & Gooday 1992).

While there are many records of xenophyophores at bathyal and abyssal depths of the lower latitudes of the Atlantic, Pacific and Indian Ocean, only two species have been reported from the Antarctic deep sea. One is a poorly known species, *Syringamina minuta* Percy, 1914, that has been recorded once, from 4795 m in the northern part of the Weddell Sea (Tendal 1972). The other is an identification from a photograph taken in the Pacific sector of the Antarctic Ocean at 3400 m, where an organism seems reasonably recognizable as *Reticulammina* sp. (Tendal & Gooday 1981).

### The new record

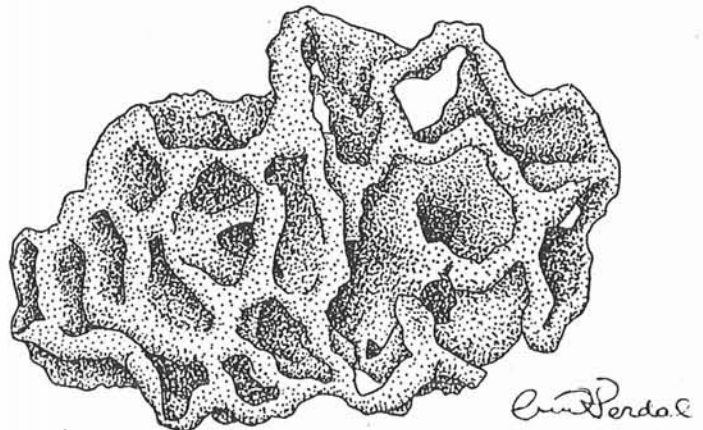
The first xenophyophore from the bathyal of the Antarctic Sea was taken with a Reineck box corer and observed and secured by F. Riemann during "Polarstern" Cruise ANT-3, 1991, St. 214, 69°47.0'S, 01°28.8 E (NE Weddell Sea); the depth was 1449 m; the bottom was classified as clay; the temperature was -1.6°C.

The single specimen was found on top of the sediment. Although a thin upper layer of sand may have been washed aside, there can be no doubt about its epibenthic life style. The specimen seems not to have been provided with buried root-like parts.

The test construction places the specimen in the genus *Reticulammina* Tendal, 1972. In a forthcoming paper it will be described as a new species (F. Riemann, O.S. Tendal & F.X. Gingele, accepted for Polar Biology). The genus is well represented at bathyal depths in southern latitudes around New Zealand.

To judge from the few distinguishable details, the above-mentioned organism identified as *Reticulammina* sp. might belong to the new species.

The existence of only three records indicates that xenophyophores are rare in the Antarctic Ocean. This is supported by the fact that despite careful inspection no other xenophyophores were found in 35 box cores. At present the best explanation for their rarity seems to be unfavorable nutritional conditions.



A generalized *Reticulammina*



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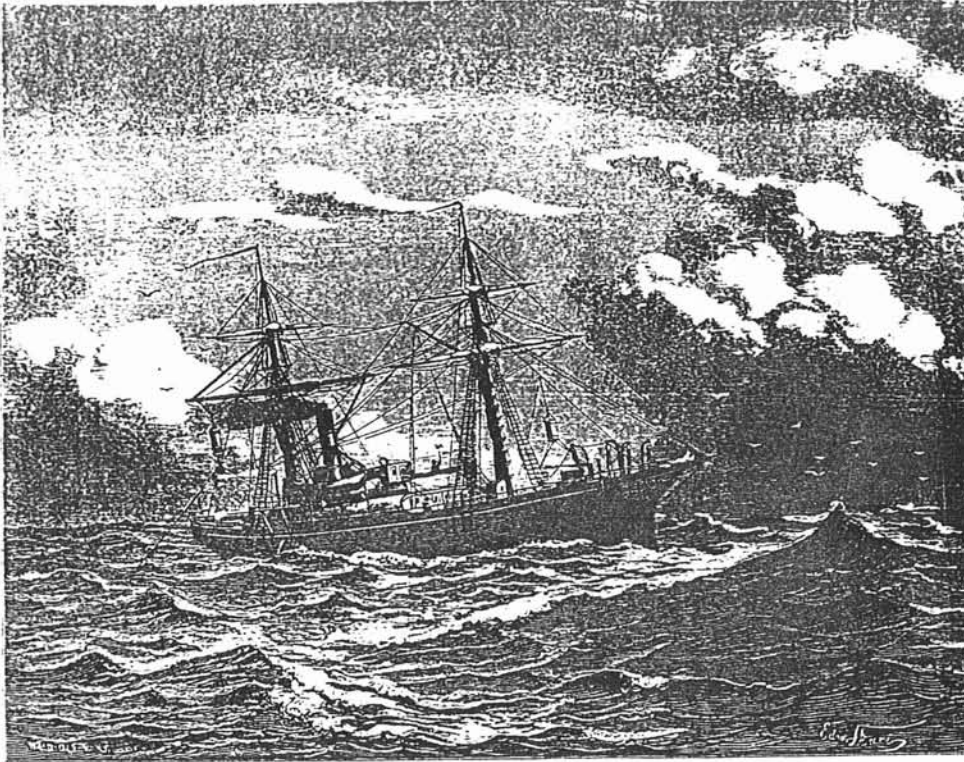
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Dredging  
on the  
Challenger



VÖRINGEN.

work under the scientific leadership of Prof. H. MOHN and Prof. G.O. SARS."

Helland-Hansen and Nansen (1909)

\*The Norwegian North-Atlantic Expedition 1876-78.

Hundred years ago, in 1893, two important events in the history of Norwegian oceanographical research took place. Johan Hjort was appointed Director of fisheries and set up a marine laboratory in Bergen. Fridtjof Nansen started the expedition with "Fram" which drifted with the ice across the Polar Ocean. Seven years later, in 1900, the new R/V "Michael Sars" was built and used for investigations in the Norwegian Sea. These events marked the start of the 'golden age' in Norwegian oceanographic research.

We have now available long time series on oceanographical conditions and fish stocks. From these it has become increasingly evident that there exists a tight coupling between ocean climate variability and fluctuations in the commercially important stocks, and that there is a strong element of periodicity in these changes. Furthermore, it is increasingly recognized that zooplankton and fish may play important roles in regulating the downward vertical flux of carbon, with implications for the global carbon cycle. Finally, we now also recognize that the deep basins of the Nordic Seas play an important role for the ocean circulation and for the regional and global climate.

The importance of the Nordic Seas and of the links between climate and fish resources is the background for the *MARE COGNITUM* program. The initiative to this program was taken by the Institute of Marine Research in Bergen which in 1993 started the first phase as an institute program. It is the intention to launch the second phase of *MARE COGNITUM* as a major national program from 1995 onwards.

The planning has been done in parallel with the international planning of the Global Ocean Ecosystem Dynamics (GLOBEC), dedicated to understanding the effects of physical processes on predator-prey interactions and population dynamics of zooplankton and on their relation to ocean ecosystems within the context of the global climate system. It will be supported by a selected number of regional/national ecosystem research programs. *MARE COGNITUM* will also provide scientific contributions to WOCE (World Ocean Circulation Experiment) and JGOFS (Joint Global Ocean Flux Study).

## MARE COGNITUM

### SCIENCE PLAN

for research on

Marine Ecology of the Nordic Seas  
(Greenland, Norwegian, Iceland Seas)

1993 - 2000

A regional GLOBEC program

with contributions also to WOCE and JGOFS

"But the Norwegian Sea itself, with its deep basins, its temperatures, salinities, and currents, was still practically a *mare incognitum*, when the Norwegian *Vöringen* Expedition\* began its



Efforts shall be made to expand the national program to a regional one for the Nordic Seas with participation particularly from the nations which have responsibility for the management of the biological resources, namely Denmark, Faroe Islands and Iceland, as well as from other countries such as Germany and the United Kingdom, which are actively conducting research in the Nordic Seas.

On the Editor's request, Dr. Jan Helge Fosså has prepared for the D.S.-N. the following abbreviated version of selected chapters in the Science Plan.

### **Benthic communities and pelagic-benthic coupling**

Knowledge of benthic species composition in most of the Nordic Seas is very incomplete despite a number of expeditions to the area. The most important are the Norwegian North-Atlantic Expedition 1876-78, the Danish "Ingolf" Expedition 1895-96, the Russian investigations in 1957-59 (Zatsepin & Rittikh 1976), and the French-Swedish NORBI Expedition 1975. Currently a group from the University of Kiel (benthologists in Sonderforschungsbereich 313) is working in parts of the Nordic Seas. The Nordic BIOFAR program (1988-90) and the Icelandic BIOICE program (1992-96) will contribute significantly to the knowledge of benthic fauna in the southwestern part of the Nordic Seas - the Faroe and the Icelandic economic zones. Also, information on benthic biomass of the Nordic Seas is sparse. Zatsepin & Rittikh (1976) give figures for wet weight of trophic groups, but the findings are devoid of detailed information. Findings for small, restricted areas have been reported by participants in NORBI and SFB 313 (see Romero-Wetzel & Gerlach 1991). Distribution and composition of recent benthic Foraminifera assemblages have been reported by Mackensen (1985) and Thies (1991).

The benthos is an integral part of marine ecosystems and represents a major link between pelagic production and sedimentary deposition. This is of current interest to marine and global researchers with respect to sequestration of excess CO<sub>2</sub> released into the atmosphere. Moreover, benthic and deep-sea remineralization are the major means of replenishing nutrient salts (Nixon *et al.* 1976, Wassmann 1986) removed via primary production. The rates of benthic remineralization depend upon a variety of factors including the nature of the remineralized material, i.e. benthic food supply, physical factors such as redox potential and pH of the sediments as well as biological factors such as benthic species composition, density and physiological activity (Pollehne 1986).

The benthos has several other functions of chief interest to scientists and the *MARE COGNITUM* program. These include consumption of organic material, bioturbation-burial and redistribution of material in the sediments through animal activity, a food source for zooplankton and fish, conditioners of disturbed sediments, indicators of pollution, biogeographic boundaries, e.g. frontal systems, ocean basins, salinity gradients, and environmental changes.

On the continental slope off the Norwegian Trench the Atlantic water converges with the cold deep-water of the Norwegian Sea at 500-600 m depth. This transition zone between the two water masses almost encircles the Nordic Seas, but its depth differs. Data on hyperbenthic and epibenthic fauna accumulated by the Dept. of Fisheries and Marine Biology, Univ. of Bergen, indicate that the transition zone is an ecotone with remarkably high diversity and biomass. This zone is presumably a good feeding area for deep-water benthopelagic and demersal fish.

Except for systems in which strong advection of POM-rich water nourishes the benthos, sediments below the euphotic zone are dependent upon the overlying pelagic system for food. As the development of phytoplankton and zooplankton stocks in boreal regions is highly seasonal, the quality and quantity of sedimenting particles also changes significantly and seasonally. Contrary to earlier beliefs, this seasonality is reflected in vertical flux even to the deep oceans. Due to these seasonal patterns in quality and quantity of benthic food supply, seasonality in bioturbation and metabolic activities of the benthos can be expected (Mills 1975, Jumars & Wheatcroft 1989). Moreover, the deep-sea benthos appears to be capable of responding rapidly to even small inputs of food. For example, at the Vøring Plateau at

1400 m an increase in benthic respiration was attributed to a small but distinct increase in the sedimentation of chlorophyll-rich fecal pellets in spring (Graf 1989). Further, Linke (1992) found that foraminifers appear to be relatively dormant under conditions of low food input, as may be typical for most of the year for many deep-sea sediments. Sufficient food supply, typical of postbloom periods in spring, triggers a rapid response in foraminifers, as indicated by electron-transport-system studies by Linke.

## Biogeography

The Nordic Seas with their deep basins form unique biogeographical zones. The main part of the upper pelagic zone under dominant influence of the Atlantic inflow belongs to the boreal zone, whereas the eastern part of the Greenland Sea belongs to the Arctic zone. With the marked vertical layering of water masses, there is also strong vertical zonation in the main biogeographical distribution patterns. Thus the cold intermediate and deep water masses of the Norwegian Sea have deep Arctic faunal assemblages. The ecology of the deep water of the Norwegian and Greenland Seas is different from that of the Arctic Ocean, however, due to differences in surface productivity. Thus the deep Norwegian Sea has larger vertical flux of organic material from the sedimenting spring bloom and a larger impact from the seasonal occurrence of overwintering zooplankton from the epipelagic zone.

In the ocean the biogeographical zones have in general no sharp boundaries due to the continuous nature of the seawater medium. There are, however, clear transition zones between the main biogeographical zones. Thus the inflow area between Scotland and Iceland is a transition zone between the northern North Atlantic and the Nordic Seas. Likewise, the northern part of the Greenland Sea is a transition zone towards the Polar Sea. There is a need for a clear description of the changes in species composition in these biogeographical transition zones. In this respect there is a need for taxonomical work to clarify the number of species.

Knowledge on biogeography, species distribution patterns and indicator species can be important with regard to possible effects from global climate change. Among such effects would be shifts in distribution patterns and biogeography. Better knowledge will provide a basis for cost-effective monitoring to identify and describe such changes.

## Biodiversity

Maintaining production and biodiversity are two overriding and often conflicting demands in relation to sustainable use of natural systems. The marine systems of the Nordic Seas are unique environments with biota specially adapted to life in this region. While *MARE COGNITUM* cannot provide a complete inventory of the biodiversity of the Nordic Seas, we aim at providing an insight into the problem of biodiversity from an ecological perspective.

At the species level there are important questions related to the structure of populations and subpopulations. For zooplankton we suspect that locally adapted subpopulations may exist. For the major fish species we know that there are several different stocks with separate spawning grounds and differences in their geographical distribution. There is a great need to characterize the genetic diversity of these species and investigate the relationships between genetical variation and adaptation to specific habitats and ecological conditions. With the strong relationship we expect there is between adaptation to achieve geographical life cycle closure and stock size, questions about genetic variation in subpopulations are important from a theoretical ecological point of view as well as from a practical management point of view.

The Nordic Seas pose unique environmental conditions and are likely to contain unique habitats and biota. Such unique habitats could possibly occur in the transition zones between the warmed upper layer and deeper cold water layer. These transition zones should therefore be explored and characterized. Besides the question of biodiversity such zones and their biota are of interest as indicators of regional and temporal changes.

Global climatic change could have a particularly large impact on the water circulation and environmental conditions of the Nordic Seas. With the strong connections we believe there ex-

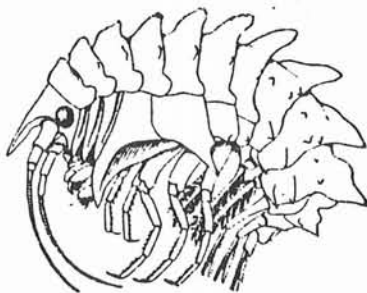
ist between these environmental conditions and populations of plankton and fish, the effects of climate change could also affect the biodiversity of the Nordic Seas. *MARE COGNITUM* aims at providing a basis for evaluating possible effects on biodiversity by different climate change scenarios.

Some of the main tasks to be undertaken with respect to benthic studies are:

- To map the depth distribution of the ecotone zone of the continental slope along the margins of the Nordic Seas. This will lead to identification of potentially good feeding grounds for deep-water benthic-pelagic and demersal fish.
- To exploit the biogeographic use of components of benthos in order to identify the geographic extent of pelagic regions of different sedimentation character.
- To obtain information, e.g. biomass and metabolic activity, necessary for a better understanding of benthic processes. This aids researchers in the analysis of the marine cycle of energy and matter. Without benthos some of the models be "open".

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FRITZ JENSENIUS MADSEN (1916-1993)



The highly regarded member of the group of deep-sea biologists at the Copenhagen Zoological Museum, F. Jensenius Madsen, died in April this year.

Jensenius' doctoral study on octocorals resulted in the awarding of a Ph.D. degree in 1940. By 1937 he had already acquired a poorly paid position as assistant at the Zoological Museum, where he was fully employed in 1945, occupying Th. Mortensen's chair of echinoderms. To make ends meet he was also engaged, from 1941-50, at the Danish Institute of Game Biology; his work on the food habits of various water birds based on stomach contents (cormorants, diving ducks, auks, etc.) resulted in three papers. Another diversion was the book on marine bivalves for "The Zoology of Iceland", since no malacologist was available (or willing) to do the job. His sole paper on tunicates, a peculiar deep-sea species from the *Ingolf* Expedition, was definitely done with greater enthusiasm.

Otherwise Jensenius' work is devoted to octocorals (mainly from the *Ingolf*) and particularly to echinoderms. His finest contribution was the monograph on the Porcellanasteridae (*Galathea* Rep. 4, 1961). This is a well defined family of sea-stars with a bathymetrical range from about 1000 m to beyond 7000 m and is one of the few exclusively deep-sea families. The *Galathea* Expedition collected (in 27 dredgings) 469 specimens which were compared to the 600-650 specimens from all previous expeditions (165 dredgings). While 57 species in 12 genera had hitherto been recognized, Jensenius reduced the number to 9 genera with 25 valid species. As part of the policy for obtaining a D.Sc. degree the monograph was followed by a very appropriate survey, "On the Zoogeography and origin of the abyssal fauna, in view of the knowledge of the Porcellanasteridae". At the time a rather vigorous discussion on the antiquity of the deep sea was going between the Russians and the Americans/Scandinavians. Supported by the evidence of the phylogeny and bathymetry of the Porcellanasteridae, Jensenius followed the latter in assuming that in the main the recent abyssal fauna is younger than the bathyal and littoral faunas and probably on the whole did not invade the abyssal habitat until Early Tertiary.

Other *Galathea* papers by Jensenius deal with two ophiuroid families, two remarkable bathypelagic holothurians (with Bent Hansen) and the hadal echinoderms, except holothurians. Together with colleagues at the Zoological Museum he identified and discussed animals shown on photos from hadal depths in the SW Pacific. Various echinoderms, provided by foreign deep-sea expeditions (Skagerrak, Swedish Deep-Sea Exp., *Norvegia* and B.A.N.Z.A.R.E.) were also treated, as well as the West African ophiuroids (*Atlantide* Exp.).

About 15 years ago Jensenius turned to the North Atlantic as an associate of the series "Marine Invertebrates of Scandinavia" (MIOS). Part of the preparation of his contribution on the sea-stars was a thorough revision of the difficult genus *Henricia*, based on about 1000 samples. However, Bent Hansen's premature death in 1989 (D.S.-N. No. 15) prevented completion of his MIOS contribution on the holothurians. Finalisation of this large manuscript kept Jensenius busy thereafter, and was sent to the editor a few months before he died. Hopefully, Jensenius' prepared sea-star volume may soon be finished by others.

Jensenius did not travel much, other than participating for one year in the last half of the *Galathea* Expedition. He and I shared a cabin, and I could not have wished for a more easy-going room mate.

Jensenius had a profound knowledge of first and foremost all kinds of echinoderms but also of other marine organisms and their ecology. We appreciated his advice, his concern and his quiet manner. Without Jensenius the Zoological Museum is not quite the same.

ERIK BERTELSEN (1912-1993)

On March 18, 1993 Dr. Erik Bertelsen (Bertel for short) died 80 years old. He was active until a few months before his death, spending his 7-8 daily hours in the fish section at the Zoological Museum, Copenhagen.

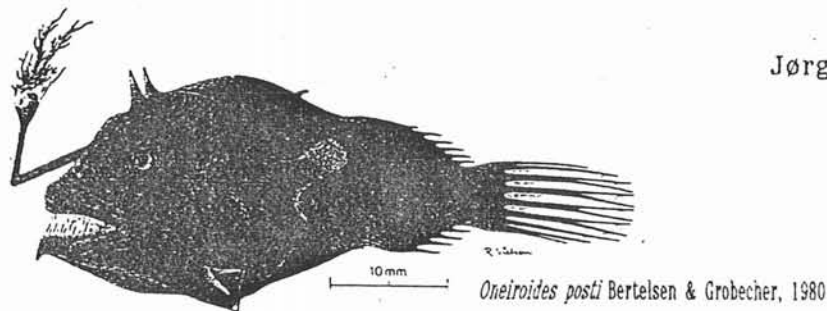
While studying biology at the University of Copenhagen he was already engaged in studies of fishery biology in the North Atlantic, participating in i. a. the 7th Thule Expedition and the daring trip to Iceland and East Greenland in 1933 on the 18-tonner *Thor*. Soon after he had finished his studies he acquired a position at The Danish Institute for Fisheries and Marine Research (DIFMR) at Charlottenlund Castle where he worked until 1971, the last 13 years as its director. Bertel did not get much time for ichthyological studies here as he spent most of his time on meetings, cruises and administration. Besides the monograph on deep-sea angler fishes: "The ceratioid fishes. Ontogeny, taxonomy, distribution and biology", only based on material from the *Dana* expedition (dissertation, 1951), he published relatively few papers. It was therefore of great importance both for himself and for ichthyology when in 1971 he made the major decision to leave the DIFMR and take over a vacant position at the Zoological Museum, University of Copenhagen.

Bertel now had the chance to realize many of his desk-drawer projects from his time at the DIFMR. The result was an impressive number of high quality papers. Most of them were revisions of various ceratioid genera, but also other deep-sea groups were revised, such as the Giganturidae, Monognathidae, Notosudidae and Saccopharyngidae, often in collaboration with other ichthyologists. Bertel wrote about 60 papers, one third before 1971 and the rest later. As editor of the *Dana*-Reports and curator of the *Dana* collections he had much influence on the understanding and development of the pelagic marine biology.

Besides being a great ichthyologist Bertel had other talents. Those who have been on cruises with him know that he was broadly interested in marine life and that he dared to show his enthusiasm when the cod-end was emptied on the deck. He was also interested in people and could talk with everybody. He enjoyed parties and somehow he most often ended as the natural center; this was due to his ability to mix philosophy, ichthyology, singing and drinking in a very catching way. A visit to his room at the Museum revealed that he was also a fine ceramist as shelves and window sills were crowded with various evolutionary stages of the self-created ceratioid family, the Floraphrynidae. To hear Bertel explain the biology and phylogeny of these fishes was an unforgettable event.

We miss him much.

Jørgen Nielsen



THE DEADLINE FOR THE NEXT ISSUE OF D.-S.n. IS 1st JUNE 1994

Editor: Torben Wolff, Zoological Museum of the University  
Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark

ISSN 0903-2533



