DEEP-SEA NEWSLETTER

No. 7, March 1983

International gathering of deep-sea biologists

0-Announcement

Hamburg was thought to be an appropriate meeting location by at least some participants of the international gathering of deep-sea biologists at Scripps in November 1981. It is my suggestion that we should again come together in summer 1985. Meeting one year earlier would probably not allow sufficient time for fund raising in many countries.

In Hamburg we cannot offer the atmosphere and the environment of California and Scripps. We shall, however, place the meeting room close to the center of the town, in walking distance to places of interest. We have in mind to rent a small, comfortable congress center, which offers a good lecture hall and relatively cheap accomodation for most of the participants. This will strongly stimulate communication.

I would prefer to keep this meeting as informal as the preceding one. However, fund raising for travelling by some of the participants and for renting the communication rooms by myself may force us to some formalism, e.g. the First Announcement on the following page, and a small congress fee.

The meeting is more than two years ahead from now on and many of you may not be able to decide on subject and type of lecture, but it would be useful for me to learn about your intentions. The next Deep-Sea Newsletter and your subsequent answer would be too late for my time schedule of fund raising.

At the meeting at Scripps it was a good idea to have papers in the morning and short communications in the afternoon. I shall keep to the same splitting of presentations. However, all of them should be announced with a title to set up a formal programme. Please indicate the type of presentation you prefer and if possible give your (working) title. The subjects of presentations are open and no special topics will be formulated. All results from biological deep-sea research may be presented. I would like to stimulate the discussion on environmental problems of deep-sea industrialization and I hope that some papers in this field will be presented.

I suggest to have four days with presentations and discussions. Since this is rather a long period for indoor communication I shall arrange for a break in the middle of the period for some sort of outdoor activities. My proposal for this would be a visit to the medieval town of Lübeck and to the northern German countryside.

Possibly you know some deep-sea biologists who do not regularly receive the Deep-Sea Newsletter, but may probably be interested in participating in this meeting. It would be greatly appreciated if you would forward this information and the First Announcement to them!

Hjalmar Thiel

Please return the First Announcement (p. 2) by 1 October 1983.

Institut für Hydrobiologie
und Fischereiwissenschaft
der Universität Hamburg
Zeiseweg 9
D-2000 Hamburg

keep for your files

Symposium on Deep-Sea Biology

First Announcement

1. The Symposium will be held in Hamburg, June 24 - 28, 1985.
2. I am planning to attend the Symposium yes ☐ no ☐ with ☐ persons.
3. I wish to present a paper on ... ...
   ... ... subject not decided ☐
4. I wish to present a short communication on ... ...
   ... ... subject not decided ☐
5. I intend to take part in a mid-symposium excursion yes ☐ no ☐
6. Name and title:
   Institution:
   Address:

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before October 1, 1983

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7. Suggestions:

John Murray Expedition - 50th Anniversary

On September 3rd 1933 His Egyptian Majesty's Ship Mabahiss left Alexandria to begin the John Murray Expedition, a joint Anglo-Egyptian venture which was to take her through the Red Sea, Gulf of Aden, northwestern Indian Ocean and Gulf of Oman. By the time she returned to Alexandria almost nine months later she had worked 209 scientific stations and had brought back data and collections which were to form the basis of a long series of reports published by the British Museum (Natural History) over a period of more than 30 years.

As the 50th anniversary of the Expedition approached, several senior Egyptian oceanographers felt that the event should be celebrated in some way and therefore contacted Unesco, the Royal Society and a number of individual colleagues in the U.K. for help and co-operation. As a result, a symposium will be held in Alexandria in 1983, and Unesco will publish a commemorative volume in 1984.

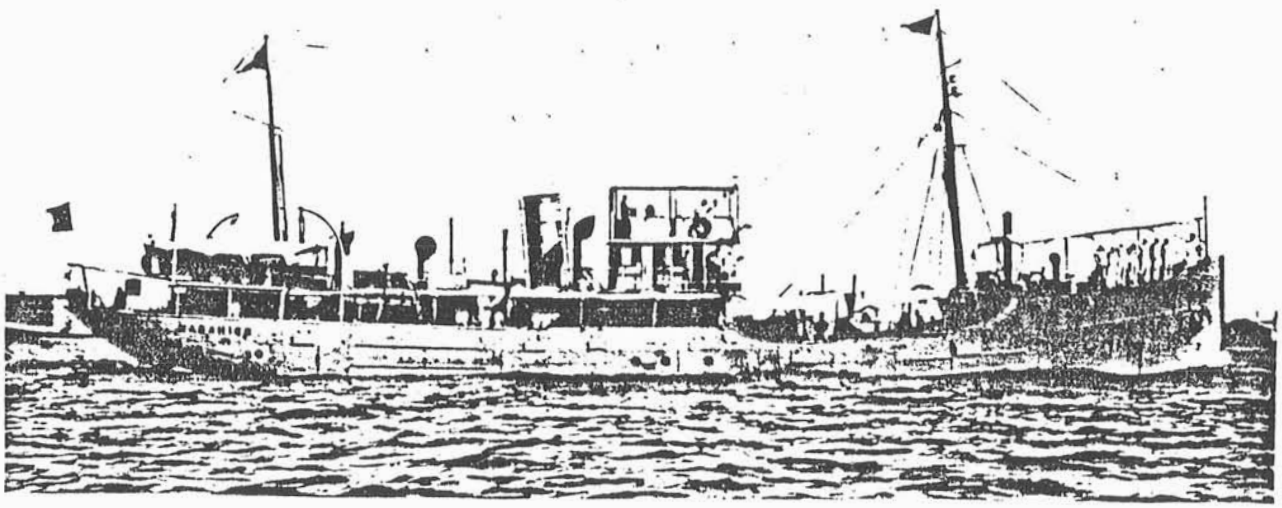
Symposium

The symposium will be held on 3-7 September and will consist of nine major sessions each beginning with a review paper followed by three research presentations. The sessions will be on Physical Oceanography, Chemical Oceanography, Pollution, Deep-water Biology, Shallow-water Biology, Living Resources, Non-living Resources, Geophysics and the work of the Red Sea Commission. Most of these papers will be by invitation, but there will be poster sessions for offered papers. The final day will be devoted to a round-table discussion of future research plans in the region. It is planned to publish the proceedings of the symposium. Anyone interested in participating should contact either Professor S.K. El-Wakeel, Oceanography Department, University of Alexandria, Moharrem Bay, Alexandria, Egypt, or Dr. Martin Angel, Institute of Oceanographic Sciences, Wormley, Godalming, Surrey, GU8 5UB, U.K.

Commemorative volume

In the Introduction to the Scientific Reports (published in 1935) the Leader of the Expedition, Lt. Col. R.B. Seymour Sewell, provided a brief narrative of the voyage but referred to a much fuller account which was to be published elsewhere, but which never appeared. Seymour Sewell's manuscript, which is held by the British Museum (Natural History) will form the bulk of the volume, together with background information on the Expedition, the participants, and the significance of the results. The volume is being edited by Tony Rice (I.O.S. Wormley, U.K.) and he would be pleased to hear from anyone with strong views on the importance of the Expedition (good or bad!) and its significance in the subsequent development of oceanography in general and of the north-western Indian Ocean region in particular.

Martin Angel - Tony Rice



H.E.M.S. "Mabahiss".

A Symposium Sponsored by the Biological Society of Washington:

"The Hydrothermal Vents of the East Pacific"

At the Meeting of the American Society of Zoologists
Philadelphia, December 1983

Session 1: Geology/Geochemistry
Robert D. Ballard, Woods Hole Institution of Oceanography
John M. Edmond, Massachusetts Institute of Technology
Peter F. Lonsdale, Scripps Institution of Oceanography
Alexander Malahoff, National Oceanic and Atmospheric Administration
Bernd R.T. Simoneit, Oregon State University

Session 2: Ecology
J. Frederick Grassle, Woods Hole Institution of Oceanography
Judith P. Grassle, Marine Biological Laboratory, Woods Hole
Robert R. Hessler, Scripps Institution of Oceanography
Howard L. Sanders, Woods Hole Institution of Oceanography
Ruth D. Turner, Museum of Comparative Zoology, Harvard University

Session 3: Microbiology
John A. Baross, Oregon State University
Colleen M. Cavanaugh, Harvard University
Holgar W. Jannasch & Carl O. Wirsen, Woods Hole Oceanogr. Inst.
David M. Karl, University of Hawaii
Jon Tuttle, University of Maryland, Solomons

Session 4: Macrobiology
Carl J. Berg, Marine Biological Laboratory, Woods Hole
Daniel Desbruyeres, Centre Oceanologique de Bretagne
Meredith L. Jones, Smithsonian Institution
Richard A. Lutz, Rutgers University
William A. Newman, Scripps Institution of Oceanography
James H. McLean, Los Angeles County Museum of Natural History
Austin B. Williams, National Oceanic and Atmospheric Administration

Session 5: Physiology/Biochemistry
James J. Childress & Alissa J. Arp, Univ. of California, Santa Barbara
Greg H. Rau, National Aeronautics and Space Administration, Moffett Field
Gurie Roesijadi, Battelle Memorial Institute
George N. Somero & Horst Felbeck, Scripps Institution of Oceanography
Robert C. Terwilliger, University of Oregon
Jonathan B. Wittenberg, Albert Einstein College of Medicine

For information about this meeting you should write to: Ms. Mary Wiley, Business Manager, American Society of Zoologists, Box 2739 California Lutheran College, Thousand Oaks, CA 91360, USA.

Abstracts are due in August.

Joint cruise to the northern Rockall Trough and Wyville Thomson Ridge on RRS Challenger, 29 July - 12 August 1982

The Scottish Marine Biological Association Programme

On this cruise we were a full (and happy) ship, with participation from the SMBA, Swansea, the British Museum (Natural History), Duke University, Luton College of Higher Education, Nottingham University, the Marine Biology Station at Portaferry and the NERC Research Vessel Base at Barry. The aims were to continue the sample time series on our two repeat stations in the Rockall Trough and then to undertake some exploratory sampling in the northern Rockall Trough and Wyville Thomson Ridge. The latter goal continued the programme of an earlier cruise in 1976. However, unlike that cruise we did not lose our precious box corer, but rather got quite blasé about the regularity with which this, described once by Bob Hessler as a "challenging" piece of gear, yielded superb samples of undisturbed sediment. We were amazed at the degree of biogenic structure in some of them with evidence of burrows as deep as the 30 cm penetration of the corer.

After a full week of sampling in superb weather we were glad of our mid-cruise call at Thorshavn in the Faroe Islands where we were able to sample the rather dubious delights of whale blubber and dried cod. Our second leg, however, was less lucky with the weather, and we were finally blown back to Scottish waters in 60 knot winds.

We are lucky enough to be planning a similar cruise this summer when we hope to continue rehabilitating our relationship with the 0.25 m^2 box corer.

Growth studies

Paul Tyler's findings on reproductive seasonality in deep-sea echinoderms have been found to be reflected in highly seasonal recruitment patterns in brittle stars such as Ophiura ljungmani and Ophiocten gracilis. But it was more surprising to see a similar pattern in species such as Ophiomusium lymani that show no seasonal pattern oogenesis and would appear to breed year round. However, the epibenthic sled samples clearly show an increase in numbers of postlarvae of this and several other echinoderm species. It is easy to imagine a vastly improved survivorship of young associated with the fall-out of fast sinking organic aggregates from the spring bloom at the surface. Assuming continuous reproduction, is it possible that those populations can tolerate a wastage in reproductive effort at times of the year when survivorship of freshly settled larvae is low?

Despite mature eggs being available all year, animals possibly only spawn when feeding conditions permit an active metabolism. We would be glad if anyone who has any ideas on this perplexing problem would write to us.

Utilisation of sophisticated computer search methods has permitted estimates to be made of the age structure of the brittle star populations by analysis of size/frequency distributions as a mixture of overlapping normal distributions. This is possible because of the year-class structure resulting from annually pulsed recruitment. Although lacking the desirable corroboration of an independent estimate of individuals' age, such methods provide a method of generating biologically reasonable hypotheses on the age structure of deep-sea populations.

Growth rates estimated from such fitted models may overestimate growth of adults amongst which the clear recruitment peaks of juveniles are but seldom recognizable. Growth of reproducing adults may be much lower than that of young, so estimates of maximum age may underestimate their real longevity. However, such quibling may be academic, since it appears that in most populations examined only a tiny fraction of young survive into old age anyway.

Interestingly, the Ophiomusium lymani population in Rockall seems to provide a contrast to this story in that the population is made up of a high proportion of large, mature adults. However, examination of the fine-meshed sled samples shows that postlarvae of this species are very numerous in summer samples, but that only a small percentage of these survive, growing quickly to reach adulthood within two years. Computer simulations show that the large unimodal peak of adult size/frequencies probably represents a "stack" of adult year classes subjected to only low mortality. The oldest of these may exceed 40 years!

A review of the size frequency distributions available in the literature of this well-known cosmopolitan species shows that differences in adult survivorship - perhaps related to the equilibrium density of the population - can explain the regional pattern evident. For example, in contrast to Rockall, a much lower proportion of the population in the San Diego Trough are adult, and few of these may survive beyond five or six years old.

Bivalves

Paul Tyler and I have recently taken the opportunity to take a closer look at the rich bivalve material in the Rockall Time Series. We can confirm reproductive seasonality occurring in several abundant species including the deposit feeding protobranchs Ledella messanensis and Yoldiella jeffreysi, although the maximum size of fully developed eggs strongly suggests a lecithotrophic mode of development. Other protobranch species such as Malletia cuneata and Nucula cancellata, whose egg size similarity indicates lecithotrophic development, show no such seasonal reproductive cycle. The problem is to explain this, bearing in mind the increasing weight of evidence supporting a strongly seasonal pulsing in flux of particulate organics to the bottom.

Echinoderm Zoogeography

Another study that we are undertaking has involved the efforts of many collaborators, notably Ailsa Clark and Gordon Paterson at BM (NH). The aim is to describe the echinoderm occurrences and distributions in the Rockall Trough area lying to the west of the British Isles as revealed in our SMBA samples. Part 1, covering the sea lilies, sea stars and brittle stars, is in press and adds 29 species (including 17 brittle stars) to those listed in Mortensen's "Echinoderms of the British Isles" (published in 1927). Part 2 will cover the sea urchins and holothurians. With the echinoids now complete (thanks particularly to the help received from Ailsa and Margit Jensen, visiting from Copenhagen, during an intensive three-day visit in January 1983), an interesting story has emerged concerning the extraordinarily extreme forms, Echinosigra phiale and E. paradoxa. The former turn out to be the juvenile form of the latter that is usually only caught as the "head" and "neck" end of the elongated amphora-like body. Final work remains on the holothurians on which Dave Billett of ICS Wormley has kindly agreed to put his expertise to bear.

John D. Gage

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Scotland

Reproduction in Marine Benthic Invertebrates from the N.E. Atlantic Deep Sea.

In Deep-Sea Newsletter No. 2, we reported observations of reproduction in four species of deep-sea ophiuroid collected from either 2900m or 2200m in the Rockall Trough. These studies in collaboration with John Gage and supported by N.E.R.C. have continued and the 2200m station has proved to be exceptionally productive in terms of the number and biomass of echinoderms present. Here we report progress of our studies of reproduction in a variety of asteroids, echinoids and holothurians and some preliminary observations of reproduction in other deep-sea taxa.

ASTEROIDS. Phanerozonia. We have tended to examine this order at the various family levels. In the Astropectinidae, Bathybiaster vexillifer and Psilaster andromeda produce large yolky eggs (c. 1000 µm diameter) throughout the whole year suggesting that these eggs develop directly into juveniles omitting any larval stage. The closely related Plutonaster bifrons and Dytaster insignis produce vast numbers of small (c. 100 µm diameter) eggs. There are enough specimens of Plutonaster from the time series to suggest that, by examination of their oocyte size/

frequency that they undergo seasonal reproduction. Initiation of oogenesis starts in the spring and vitellogenesis gets underway in summer and autumn and there appears to be a period of spawning from December to about April.

In the Benthopectinidae all the species examined, Benthopecten simplex, Pectinaster filholi and Pontaster tenuispinus, have large eggs (c. 900 µm diameter) indicative of direct development. The gametogenesis pattern in these benthopectinids differs from the directly developing astropectinids by the presence of large numbers of accessory cells surrounding the oocytes.

In the Goniasterids, Pseudarchaster parelii and Paragonaster subtilis, the eggs are again large and the accessory cells form a meshwork round the oocytes as it undergoes vitellogenesis. The role of these variable accessory cell types is one of the lines of enquiry being pursued at present.

Spinulosa. The only spinulosan studied in detail has been Hymenaster membranaceus. This again produces a very large egg c. 1250 µm diameter, but we have found no evidence of brooding in the nidamental chamber, as has been suggested to occur in all Pterastids. No evidence of brooding was found in the closely related Hymenaster gennaeus.

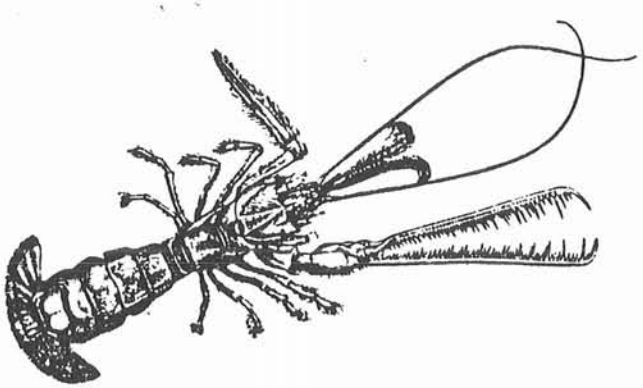
Forcipulata. We have examined the species within this order, but none have been collected regularly enough to permit a time-series analysis. Zoroaster fulgens produce an egg up to 900 µm diameter, whereas Brisinga and Brisingella produce eggs up to 1500 µm diameter. The fecundity of Brisinga is also impressive in an animal producing such a large egg!

ECHINOIDS. An excellent time-series of samples of Echinus affinis from the 2200m station is available. This has been examined in detail and evidence from the oocyte size/frequency data suggests that there is a very marked seasonality of reproduction. Initiation of egg development takes place in the spring, vitellogenesis commences in the summer and there is a fairly synchronous spawnout in January/February of each year.

From the evidence to date, it would appear that those species demonstrating a seasonal reproductive periodicity show strong inter-species synchrony of reproduction with spawning in the early part of the year. We believe that the development of the larva (indicated by the small egg size in all these seasonal breeders) is related to the rapidly sinking primary production of the overlying surface waters. This organic material also reaches the seabed in late spring/early summer, where it provides a labile food source for the benthic invertebrates present.

Work has also started, in conjunction with I.O.S. and the D.O.E., on reproduction in the deep-sea megafauna of the N.E. Atlantic. To date we have examined three deep-sea holothurians in detail. Of these, Oneirophanta and Deima were collected at 4000m. In Oneirophanta, some 50% of the specimens examined were female, in various stages of development. However, it was difficult to sex the other 50% of the specimens! If it is assumed that they are males, we have never met a population where the males were always completely spent. It is always possible that they spawned during collection, but even in these cases some relict sperm should remain. The eggs of Oneirophanta and Deima are large, suggesting direct development, but we have, as yet, found no evidence of brooding. The eggs of Laetmogone violacea collected at c. 1000m are c. 200 µm maximum diameter. In the holothurians this would suggest planktotrophic development.

These studies in the N.E. Atlantic have now progressed to other taxa. Examina-



tion of the hermit crab Parapagurus pilosimanus and its commensal Epizoanthus paguriphilus from 1000m suggests that reproduction in the hermit crab is seasonal whilst that of the Epizoanthus is occurring throughout the year.

Finally, we have now examined a long time series of Ledella messanensis from the 2900m station in the Rockall Trough. Examination of the oocyte size frequency suggests that this species also shows distinct evidence of a reproductive seasonality.

These studies are continuing, and it is hoped that a clearer picture of the reproductive processes present in the deep sea will become apparent, especially in the cases of seasonality of reproduction. It is hoped that a firm data base will enable determination of some of the selective pressures that have lead to this apparently wide variety of reproductive processes within the deep sea.

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References to the two contributions above

GAGE, J.D., 1982. An aerated sedimentation column for subsampling large benthic samples from deep-sea sediments. - Deep-Sea Res. 29A: 627-630.

- 1982. R.R.S. Challenger Cruise 11/1982, 29 July - 12 August. - SMBA Internal Reports, Cruise Report Series.

- 1982. Age structure in populations of the deep-sea brittle star Ophiomusium lymani: a regional comparison. - Deep-Sea Res. 29A: 1565-1586.

- Echinodermata: life history of deep-sea brittlestars and starfish. - In: 1984 Yearbook of Science and Technology. New York: McGraw-Hill Book Company. (In Press).

- & P.A. Tyler, 1981. Non-viable seasonal settlement larvae of the upper bathyal brittle star Ophiocten gracilis in the Rockall Trough abyssal. - Mar. Biol. 64: 153-161.

- - 1981. Re-appraisal of age composition, growth and survivorship of the deep-sea brittle star Ophiura ljungmani from size structure in a sample time series from the Rockall Trough. - Mar. Biol. 64: 163-172.

- - 1982. Growth and reproduction of the deep-sea brittlestar Ophiomusium lymani Wyville Thomson. - Oceanol. Acta 5: 73-83.

- - 1982. Depth-related gradients in size structure and the bathymetric zonation of deep-sea brittle stars. - Mar. Biol. 71: 299-308.

- - 1982. Growth strategies in deep-sea ophiuroids. In: Lawrence, J.M. (ed.): Echinoderms: Proceedings of the International Conference, Tampa Bay, pp. 305-311. Rotterdam: A.A. Balkema.

- M. Pearson, A.M. Clark, G.L.J. Paterson, & P.A. Tyler. Echinoderms of the Rockall Trough area. I. Crinoidea, Ophiuroidea and Asteroidea. - Bull. Br. Mus. nat. Hist. Zool. (In Press).

Pain, S.L., P.A. Tyler, & J.D. Gage, 1982. The reproductive biology of Hymenaster membranaceus Wyville Thomson from the Rockall Trough, N.E. Atlantic, with notes on H. gennaeus H.L. Clark. - Mar. Biol. 70: 41-50.

- - - 1982. The reproductive biology of the deep-sea asteroids Benthopecten simplex, Pectinaster filholi and Pontaster tenuispinus (Phanerozonia: Benthopectinidae) from the Rockall Trough. - J. exp. mar. Biol. Ecol. 65: 195-211.

Tyler, P.A. & J.D. Gage, 1980. Reproduction and growth in the deep-sea brittlestar Ophiura ljungmani (Lyman). - Oceanol. Acta 3: 177-185.

- - 1982. The reproductive biology of Ophiacantha bidentata (Echinodermata: Ophiuroidea) from the Rockall Trough. - J. mar. Biol. Ass. U.K. 62: 45-55.

Tyler, P.A. & J.D. Gage, 1982. Ophiopluteus ramosus, the larval form of Ophiocten gracilis (Echinodermata: Ophiuroidea). - J. Mar. Biol. Ass. U.K. 62: 485-486.

- - The reproductive biology of Ypsilothuria talismani E. Perrier (Holothuroidea: Dendrochirata) from the N.E. Atlantic. - J. Mar. Biol. Ass. UK. (In Press).

- & S.L. Pain, 1982. The reproductive biology of Plutonaster bifrons, Dytaster insignis and Psilaster andromeda (Asteroidea: Astropectinidae) from the Rockall Trough. - J. Mar. Biol. Ass. UK. (In Press).

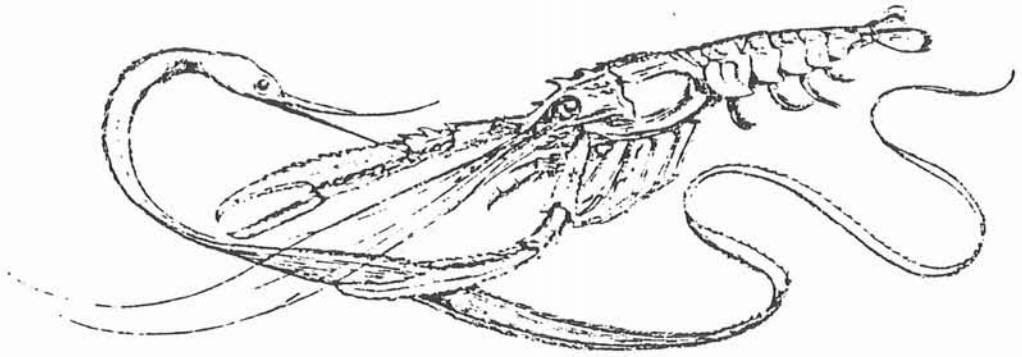
- - 1982. Observations of gametogenesis in the deep-sea asteroids Paragonaster subtilis and Pseudarchaster parelii (Phanerozonia: Goniasteridae). - Int. J. Invert. Rep. (In Press).

- - & J.D. Gage, 1982. The reproductive biology of the deep-sea asteroid Bathybiaster vexillifer. - J. Mar. Biol. Ass. UK. 62: 57-69.

- - - 1982. Gametogenic cycles in deep-sea phanerozoan asteroids from the N.E. Atlantic. - In: Lawrence, J.M. (ed.): Echinoderms: Proceedings of the International Conference, Tampa Bay, pp. 431-434. Rotterdam: A.A. Balkema.

- J.D. Gage & S.L. Pain. Reproductive variability in deep-sea echinoderms and molluscs from the Rockall Trough. - Oceanol. Acta. (In Press).

- A. Grant, S.L. Pain & J.D. Gage, 1982. Is annual reproduction in deep-sea echinoderms a response to variability in their environment? - Nature 300: 747-750.



Seasonal sedimentation of phytoplankton to the deep-sea benthos.

Since 1979 routine phytotransects obtained with the Institute of Oceanographic Sciences' epibenthic sledge (Deep-Sea Newsletter No. 3) have revealed a patchy, detrital layer on the seafloor in the Porcupine Seabight in the northeast Atlantic (51°N, 13°W), at depths between 1370 and 4000m, during the four months from April to July. In addition, Bathysnap (Deep-Sea Newsletter No. 4) has provided invaluable time-lapse data on the arrival and "behaviour" of the detritus, while the prodigious ability of the Scottish Marine Biological Associations's Multiple Corer in sampling virtually undisturbed cores has yielded excellent samples of this flocculent material (P.R.O. Barnett, P. Hardy & J. Watson, Deep-Sea Newsletter No. 6).

A sample taken in May 1981 at 2000m was found to contain many diatoms in some cases bound with amorphous organic material into small aggregations. The phyto-

plankton were identified by Mr. A.W.G. John (Institute for Marine Environmental Research (IMER), Plymouth) who found the species assemblage to be typical of spring, oceanic phytoplankton. Material collected in July 1982 was rather different, consisting of a general grey matrix in which brown gelatinous aggregations, up to 10mm in diameter, could be found. These contained many coccolithophorids as well as dinoflagellates, crustacean eggs, small faecal pellets and amorphous organic material. The whole species assemblage was typical of summer phytoplankton. The close similarity between the phytoplankton species assemblages of the detritus and the surface water just prior to the date of sampling in both May 1981 and July 1982 indicates rapid transport of detrital material.

On 1 April, 1982, Bathysnap was deployed at 2000m to take hourly photographs over a 33 day period. Detrital particles began to accumulate on the sediment surface from 24 April, but there was no appreciable sedimentation until 30 April, when the detrital layer increased rapidly over a 38 hour period. No substantial increase was detected for the remaining two days of observation. Currents typical of the Porcupine Seabight (max. speed 13 cm sec^{-1}, varying tidally) occurred during the arrival of the detritus. Since strong nearbed currents have not been detected, vertical rather than horizontal transport processes are indicated. Assuming that the spring bloom in the Porcupine Seabight occurred in early April 1982 (Continuous Plankton Recorder data, IMER) our results suggest that diatoms can sink to 2000m in as little as 2 to 3 weeks (ca. 100 to 150 m day^{-1}). In comparison, the gelatinous aggregations sampled on the seabed in July 1982 were found to sink at about 400 m day^{-1} (sinking rate experiments corrected for in situ conditions, Dr. R.S. Lampitt & Dr. P.R. Pugh).

Both the composition of the detritus and the process by which it is transported change temporally. It has been suggested that the temporary accumulation of phytoplankton at a density discontinuity may lead to the formation of faster sinking aggregates leading to the rapid sedimentation of Skeletonema in shallow water. A similar process may be found in oceanic water at the start of the spring bloom when zooplankton biomass is usually low. There was no evidence to suggest that the detritus collected in May 1981 had been packaged in faecal pellets although it is conceivable that faecal pellets derived from salps, which could respond rapidly to the start of the phytoplankton bloom, had broken up while on the seabed. The gelatinous aggregations resemble the coccolithophorid-associated mucus packages observed by Honjo (Science 218, 1982) in the Panama Basin. It is uncertain whether the gelatinous matr was derived through the mucus-feeding activities of zooplankton or was produced by the palmelloid stages of the coccolithophorids.

The response of benthic organisms to the sedimentation of the spring bloom has been studied in shallow water. Graf et al (Marine Biology 67, 1982) calculated that the energy input was utilized within two to three weeks. A similar response might be expected by deep-sea organisms and this is currently being studied. Preliminary results on meiofaunal abundance, however, have not revealed a significant response (Dr. A.J. Gooday, I.O.S.). The seasonal production of planktotrophic larvae by deep-sea echinoderms (P.A. Tyler et al. Nature 300, 1982) is probably a response to the seasonal sedimentation of phytodetritus. The presence of the detritus on the seabed and the incorporation of patches into the sediment may cause seasonal changes in the behaviour of benthic megafauna. Bathysnap photographs indicate that the echinoid Echinus affinis forages actively for detrital accumulations while the dispersion pattern of the holothurian Kolga hyalina has been shown to change temporally (D.S.M. Billett & B. Hansen, Deep-Sea Research 29, 1982).

Details of this research have been submitted to Nature. A cruise is planned for April 1983 to study the dynamics of the spring bloom and the flux of phyto-detrital material.

David Billett, Richard Lampitt and Tony Rice

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Call for Taxonomists' Help!

As reported earlier (Deep-Sea Newsletter, No. 2), we have performed three expeditions to the Red Sea during the last few years, sampling between about 500 and 2000m depth. All the material is stored in the Senckenberg-Museum in Frankfurt. Most of it was distributed to specialists, but a few taxa are still dormant in the shelves. If any specialist should like to work on this material, we would be happy to send it. The dormant taxa are: Foraminifera, Nematoda, Nemertini, Echiurida, and Isopoda (Cymothoidea, Cirolanidae, Gnathiidae). The number of specimens is small except for the forams and the nematodes. The first four taxa are from grab samples, the isopods from trawls and traps. Interested specialists should contact

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Michael Türkay - Hjalmar Thiel

Die Tiefseefauna

From Carl Chun: Aus den Tiefen des Weltmeeres

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THE DEADLINE FOR THE NEXT ISSUE OF D.-S.N. IS 1 NOVEMBER 1983

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Universitetsparken 15, DK-2100 Copenhagen Ø, Denmark