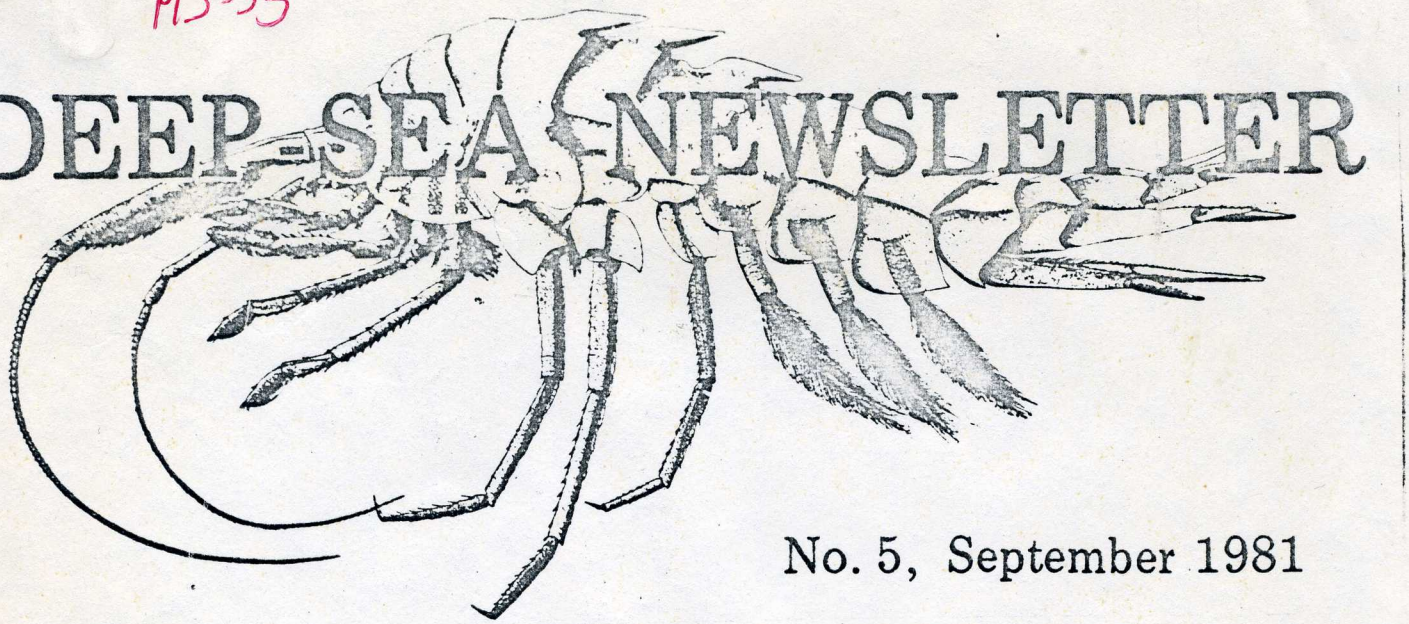
DEEP-SEA NEWSLETTER



No. 5, September 1981

THE INTERNATIONAL SYMPOSIUM ON DEEP-SEA BIOLOGY, NOVEMBER 1981

The International Symposium on Deep-Sea Biology (La Jolla, California; 4 - 6 November, 1981) continues to move forward. Approximately forty people (list below) have indicate they would come, and another ten are unsure, but are trying to make it. Thirty-four people declared an interest in speaking.

We have decided that the best format is one with formal talks in the morning and informal presentations and discussions in the afternoon. Accordingly, there will be time for six 20-minute talks (with an additional 5-10 minutes for discussion) each morning. This will allow two coffee breaks. I am choosing the total eighteen speakers randomly.* Attendees will be given notification individually on their speaking status.

The first and third afternoon sessions will be devoted to informal discussions. Here, we can pursue issues brought out in the morning or introduce new topics. I encourage every attendee to bring a few favorite slides, overhead transparencies or movies that show data, equipment or the deep sea itself. There will be plenty of opportunity to show them to the group and tell us about them. Here is a chance for those who have not had the opportunity to speak formally to tell us what they have been doing, and to show us some of the things that have excited them. This is also a time to discuss future programs, plans or collaborations.

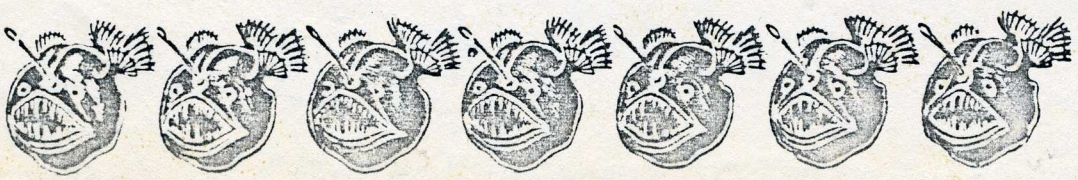
The second afternoon has been reserved for an informal presentation about the hydrothermal vent community. Many of the participants in that program will be at the meeting, creating an ideal opportunity to bring everyone up to date on what has been happening and on future plans. All this with the usual spectacular slides, movies and videotapes.

There will be plenty of coffee at all sessions, and at the end of each day we will have a wine and beer mixer on a balcony overlooking the Pacific.

I am becoming very enthusiastic about the meeting and think those who come will be glad they did. It is not too late for others who decide they would like to come after all, although they will not be able to give a formal talk. Just write to me and I will send the information. Or if it gets too late to write, just come. Registration will be at 0800-0900, 4 November, Wednesday, at the Marine Biology Conference Room (room 4500 MBB), Scripps Institution of Oceanography, La Jolla, California, 92093.

*There will be one exception to choosing speakers randomly; we will guarantee the opportunity to speak to anyone who must give a talk in order to receive travel funds from his government.

Robert R. Hessler



International Symposium on Deep-Sea Biology - List of participants (incl. tentative)

Canada
R. Brinkhurst
V. Tunnicliffe

Denmark
T. Wolff

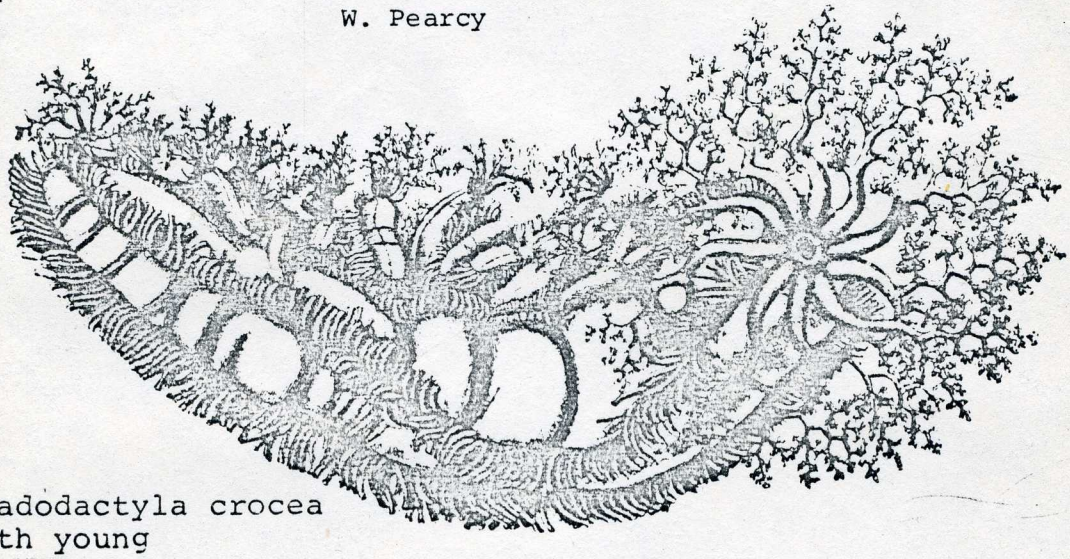
Federal Rep. of Germany
H. Felbeck
H. Flügel
O. Pfannkuche
H. Thiel
H. Weikert

Norway
T. Brattegard

Sweden
J.-O. Strömberg

United Kingdom
J. Gage
J. Gordon
P. Tyler

United States
B. Burnett
A. Carey
R. Carney
J. Childress
R. Colwell
E. Cutler
J. Deming
K. Fauchald
R. George
F. Grassle
B. Hecker
R. Hessler
S. Honjo
C. Ingram
H. Jannasch
P. Jumars
R. Morita
K. Nealson
J. Nichols
D. Pawson
W. Pearcy
L. Pequegnat
W. Pequegnat
M. Rex
B. Robison
G. Rowe
H. Sanders
J. Siebenaller
C. Smith
K. Smith
J. Snider
L. Snider
G. Somero
M. Taviani
D. Thistle
G. Wilson
K. Wishner
A. Yayanos



Cladodactyla crocea
with young

Investigations of the deep-sea bottom fauna

by the P.P. Shirshov Institute of Oceanology of the Academy of Sciences of the USSR in 1980 - 1981

In 1980-81 the Benthos Laboratory of the Institute carried out deep-sea investigations of aspects such as biological structure of the ocean, quantitative biocoenotic and zoogeographical studies of the deep-sea bottom fauna as well as its adaptations to its environment.

"Deep-sea bottom fauna of the Pacific Ocean" was published as vol. 115 of the Transactions of the P.P. Shirshov Institute of Oceanology, "Nauka", Moscow, 1981; this volume includes the results of studies on various groups of deep-sea animals from the Pacific and other oceans, collected on expeditions of the Institute. The papers give species compositions of the fauna, distribution and importance of different species in the fauna of the regions studied, and some data on species ecology; faunistic connections between the oceans are discussed.

This volume contains the following papers: N.B.Keller: "Intraspecific variability of Caryophyllia (Madreporaria) in connection with the environment". R.Ja. Levenstein: "Some peculiarities of the distribution of the family Polynoidae from the Canadian Basin

of the Arctic Ocean". N.V. Kucheruk: "On regularities in the geographical distribution of the abyssal polychaetous annelids of the eastern coast of the Pacific Ocean". V.G. Chavtur: "On the systematic position of the modern Ostracoda in the family Polycopidae (Ostracoda, Cladocopina)" and "New species of deep-sea Ostracoda (Polycopidae) from the Kurilo-Kamchatka trench". G.B. Zevina: "Deep-sea Cirripedia of Australian and New Zealand waters". O.E. Kamenskaya: "The amphipods (Crustacea) from deep-sea trenches in the western part of the Pacific ocean". R.K. Kudinova-Pasternak & F.A. Pasternak: "Tanaidacea (Crustacea, Malacostraca) collected by the Soviet Antarctic Expedition during the years 1955-1958 and the correlation of the ranges of the Tanaidacea obtained in the South Ocean and their bathymetrical distribution". V.Ya. Lus: "On the abyssal species Sipho danielsseni and Mohnia mohni (Gastropoda, Buccinidae)", and "New species of Tacita (Prosobranchia, Buccinidae) with wide distribution in the northwestern part of the Pacific Ocean". O.N. Zezina: "New and rare cancellothyroid brachiopods". G.M. Belyaev & A.N. Mironov: "Some new deep-sea species of the Myriotrochidae (Holothurioidea) from the northern and southwestern parts of the Pacific Ocean". A.N. Mironov: "Deep-sea echinoids of the genus Plesiodiadema (Echinoidea, Aspidodiadematidae)". M.A. Gureeva: "Pogonophora of the Caribbean Sea".

In M.N. Sokolova's paper: "On characteristic features of the deep-sea benthic eutrophic regions of the World Ocean" is given a schematic map of the deep-sea trophic regions for macrobenthos of the World Ocean, and differences between these regions, based on some biological and geological characters, are described. In the distribution of trophic regions on the floor of the World Ocean, latitudinal and circumcontinental zonality are clearly manifest.

In 1981, "Biology of the Pacific Ocean depths", materials of the XIV Pacific Science Congress (Khabarovsk, August 1979), Marine biology, 3, Vladivostock, Acad. Sci. USSR, Ed. N.G. Vinogradova, will be published as a separate book; this volume will contain materials prepared for the Symposium F IIb 1"Biology of the Pacific Ocean depths" as well as those reported at other symposia of the Khabarovsk Congress. It includes the following reports: M.N. Sokolova: "Trophic large-scale regions on the World Ocean floor and characters of their population". N.V. Kucheruk, N.B. Keller, R.K. Kudinova-Pasternak, R.Y. Levenstein, F.A. Pasternak & Z.A. Filatova: "New data on the distribution of some groups of bottom invertebrates and the zoogeographical division of the abyssobenthal of the Pacific Ocean". O.N. Zezina: "On the formation of the recent brachiopod fauna on the shelves and slopes of the Pacific Ocean". J.G. Tchindonova: "New data on taxonomic pertinence of some deep-sea mysids (Mysidacea, Crustacea) and their distribution in the World Ocean". M. Bacescu: "Contribution to the knowledge of some Mysidacea (Mysidacea, Crustacea) from the Peru-Chile Trench, the Californian coast and the Philippine Sea". O.E. Kamenskaya: "Ultraabyssal (hadal) amphipods from the trenches of the Pacific Ocean". G.M. Belyaev: "New data on the fauna of deep-sea trenches". M.A. Rex & A. Warén: "Evolution in the deep sea: the taxonomic diversity of gastropod assemblages". T. Abe, S.P. Applegate, J. Toda, Y. Kakizawa, K. Fukui, J. Fujii & H. Shimma: "Deep-sea sharks and squalene. 1. Notes on the basking and ragged-tooth shark". W.C. Pearcy, D.L. Stein & R.S. Carney: "The deep-sea benthic fish fauna of Cascadia and Tufts abyssal plains and adjoining continental slope in the northeastern Pacific Ocean". N.V. Parin & V.E. Becker: "Patterns of geographical distribution of mesopelagic fishes in the Pacific Ocean (as exemplified by the Myctophidae)". A.V. Parin & V.V. Fedorov: "Comparison of the midwater fish faunas of the Northwestern and Northeastern parts of the Pacific Ocean".

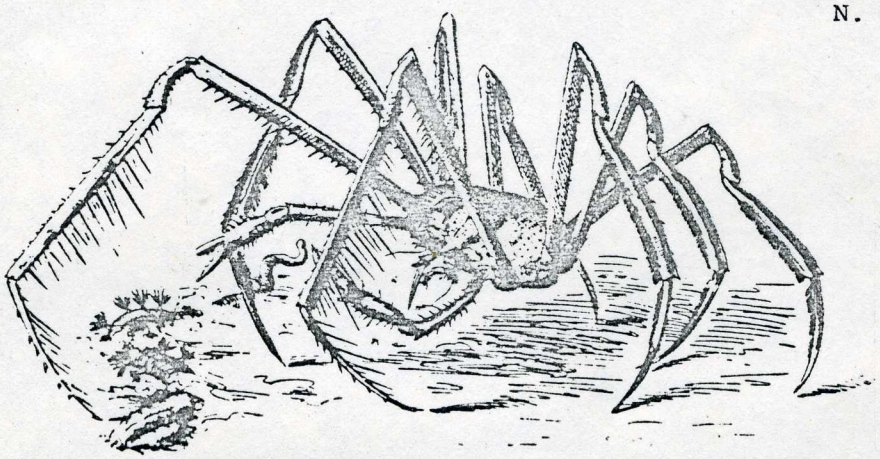
Unfortunately, a very interesting report by R.D. Turner (USA): "Wood Islands and Thermal Vents as centers of diverse communities in the deep sea", Marine Biology, 1, 1981, Vladivostok, Acad. Sci. USSR, was not included in this book and was published in the Soviet periodical "Biologia morja", N 1, 1981.

In November 1979 - March 1980 on board the R/V "Akademik Kurchatov" (30th cruise) in cooperation with two other Institute of Oceanology's research vessels, R/VV "Professor Shtockman" and "Aquanaut", an expedition mainly aimed for research of Red Sea - Aden Rift zone by means of manned submersible "Pisces" and towed systems of underwater photography, television, side-scan sonars, etc., was carried out in the Red Sea. Besides the main geological, geophysical and hydrophysical studies, some biological investigations were carried out. The latter included a study of deep-sea benthos of the Red Sea by means of visual observations from off "Pisces" (down to 2000 m), underwater photography and videntate recording (videomagnetic records), as well as trawling and sampling by grabs. The main polygon where the expedition worked was located within the central portion of

the Red Sea - Aden Rift zone at 18°N. Bottom fauna was sampled on different forms of bottom relief chosen in advance. A transect was made from the uppermost continental slope of Africa through the sea up to the same horizon of the Arabian Peninsula at 360-1600 m depth. Benthic biomass varied from 5.3 g/m^2 at minimal depth to 0.02 - 0.05 g/m^2 in the rift zone, irrespective of the depth. Bottom fauna was represented by few species of polychaetes, bivalve molluscs, decapods and echinoderms. Trawl samples were poor and monotonous. However, visual observations from off board the "Pisces" showed relative abundance of nectobenthic carnivorous shrimps, small and unusually mobile amphipods and bottom fishes. Other organisms or traces of their life were observed only in some cases during 28 dives. Steep rocks and outcrops of basalt actually lack epifauna. The area studied contained a great number of small hillocks surrounded by numerous (up to 50 - 70) holes with a diameter of 1 - 3 cm. The origin of these holes is not clear since no burrowing animals were found; the possibility of a thermal origin is difficult to support as the holes occur everywhere.

Late in February 1981, a new R/V of the Institute of Oceanology, the "Akademik Mstislav Keldysh" of 6200 tons displacement and built at the Finnish shipyard "Hollming", started her virgin cruise. This vessel is designed for hydrophysical, geological, geophysical and hydrobiological research and is equipped with a complex automatic computer center, sounding and other modern gears. In all there are 18 laboratories on board. The program for this cruise includes investigations of the deep-sea bottom fauna (quantitative biocoenologic studies) in the "Bermuda Triangle" and in deep-sea trenches of the Caribbean Sea.

N. Vinogradova



Platymaia wyvillethomsoni

Recent French Research Activity

The deep-sea biology research team of Centre Océanologique de Bretagne has conducted a cruise in the Cape Verde basin during the fall of 1980, in the framework of a program on the feasibility of high toxicity radioactive wastes disposal in the sea-bed. Some preliminary data on the biomass, density of organisms and importance of bioturbation and composition of organic matter have been obtained, using bottom pictures, spade corers, trawls and autonomous traps.

A second experiment on the study of settlement dynamics and growth rates of abyssal benthic organisms has been achieved with success. The total duration of the experiment, conducted in the same area of the Gulf of Biscay, was eleven months on the bottom, at a depth of 2100 m.

Some technological activity has been dealing with the design and building of different tools for the submersible Cyana (capability 3000 m depth). This equipment is needed for several biological experiments from the simple action of picking up a soft animal to some more sophisticated measurements (O_2 consumption). These tools are developed in view of two new biological programs using the submersible Cyana: one in the Biogas sampling area of the Gulf of Biscay with a preliminary cruise in 1982, another one on the East Pacific Rise for the study of the "Hydrothermal benthic Community", in the spring of 1982.

Lucien Laubier

Recent papers

Costa, R., P.M. Bisol & M. Sibuet: Genetic variability in deep sea holothurioids. International Echinoderm Conference, Tampa, Sept. 1981.

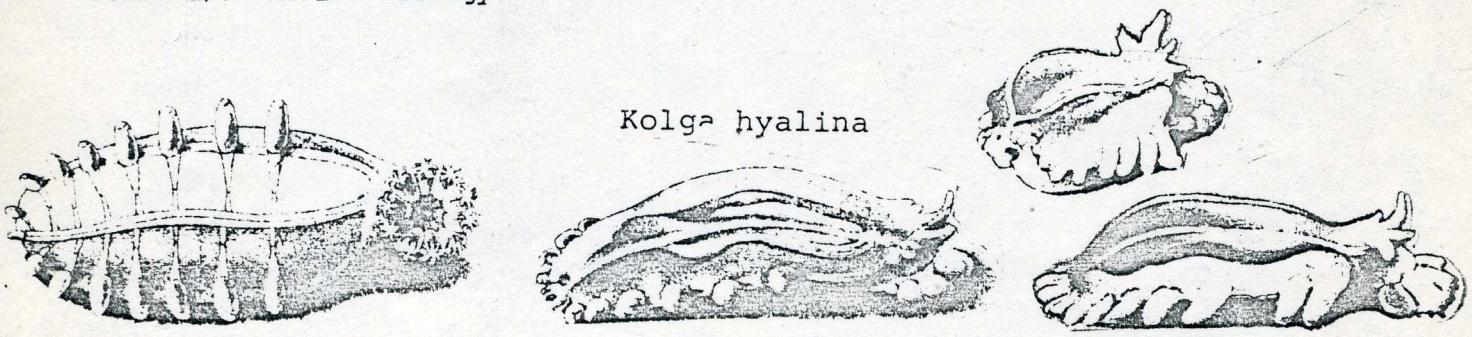
Desbruyeres, D. & L. Laubier: Paralvinella grasslei, new genus, new species of Alvinellinae (Polychaete Ampharetidae) from the Galapagos rift geothermal vents. Proc. Biol. Soc. Washington.

Fatton, E. & M. Roux, 1981: Modalités de la croissance et de la microstructure de la coquille de Calyptogena (Vesycomyidae Lamellibranche) en relation avec les sources hydrothermales océanique. C.R. Acad. Sc. Paris 292 D: 55-60.

Lambert, C.E., A. Monaco, M. Sibuet, P. Buat-Menard, A. Khripounoff & M. Chesselet: First steps of the prediagenetic processes on the sediment floor. 10th International Meeting on Organic Geochemistry, Bergen, 14-18 September 1981.

Mauviel, A., H. Nguyen, M. Chesselet, M. Sibuet, G. Auffret & Y. Yokoyama: Etude des variations de taux de bioturbation par la spectrométrie gamma non destructive (G e HP) dans trois sites sédimentaires de l'Atlantique Nord, à 2000 m et à plus de 4000 m de profondeur. Colloque International sur les Environments Sédimentaires de l'Atlantique Nord au Quaternaire (22-25 septembre 1981 à Bordeaux).

Sibuet, M. & J. Laurence: Organic content and biomass of abyssal holothuroids (Echinodermata). Marine Biology.



Holothurian swarms in the Porcupine Seabight

Previous reports from the IOS work in the Porcupine Seabight have briefly mentioned the occurrence of dense populations of the holothurian Kolga hyalina. The whole story started with two epibenthic sledge hauls taken during the RRS Discovery cruise in April 1978 at depths of about 3700-4000 m. The 1-mm mesh central bag of both sledges contained a total of 36,000 specimens measuring 3 to 6 mm in length. Based on the distance covered by the sledge and on time-lapse photographs taken simultaneously by a camera mounted on the sledge superstructure, the density of the animals was calculated to be 35 to 50 per square meter with aggregations reaching 700 m^{-2}.

Subsequent cruises to the Seabight yielded additional material. Two hauls in June and two in September 1979 collected nearly 22,000 specimens. The specimens were larger than the year before, measuring 5-10 mm. It is tempting to speculate about growth rate but we cannot be sure that we have samples exactly the same populations.

A strictly mono-modal size distribution characterizes all six populations. The same pattern of size distribution was found during re-examination of about 1300 specimens from the Ingolf (6 stations from the Norwegian Sea and south and south-west of Greenland) and the Godthaab (1 station in Baffin Bay). The Ingolf specimens measured 8-25 mm, those of the Godthaab 25-50 mm. A mono-modal size distribution also applies to the numerous specimens taken at two stations of the Norwegian North-Atlantic Expedition, as we have been kindly informed by Dr. Johanne Kjennerud of the Bergen Museum. Evidently, a population once settled prevents further settlements in the area should they occur.

Even the smallest specimens in the Porcupine Seabight have fully differentiated and developing gonads. This is in contrast to the deep-sea bivalve Tindaria callistiformis, studied by Allen (1979), in which gonadial development starts at the age of 30-40 years. The early gonadial development combined with the faculty of colonizing an area through a mass settlement indicates that K. hyalina is an opportunistic species, and is typical of an r-strategist adapted to an unstable and unpredictable environment. Canyon and channels represent such an environment in the deep sea. The location of the Kolga stations in the vicinity of the Gollum Channel System in the Seabight is interesting in this connection

In contrast to the aggregated distribution of the specimens in April 1978 the specimens taken in June 1979 approached randomness in their distribution. Three months later the specimens again showed an aggregated distribution. The variation in the pattern of distribution seems to be a temporal one, but the causes of the variation can only be conjectured. A reproductive purpose can be excluded at any rate for the aggregations in April 1978 when gonadial development had only just started. Temporal variations in the supply of nutrients to the bottom or in the accumulation of nutrient matter due to the combined action of currents and bottom topography is a possible cause. Further explorations in the Seabight are needed to elucidate this problem.

Many other aspects of the biology of K. hyalina await further sampling. We still do not know 1) what induces spawning, 2) whether reproduction is seasonal or not, 3) the growth rate of the animals, 4) the age at first reproduction, 5) the number of times an individual reproduces in a life-time, 6) the fecundity and the maximum egg size, 7) the development from egg to bottom stage (specimens 2 mm long already have the morphological features of the adults), and 8) how far and in what manner the juveniles are transported from the adult population.

We eagerly look forward to more samples from the Seabight, but although further specimens were taken in 1980 the RRS Challenger cruise in May 1981 failed to collect any specimens of Kolga. Have the specimens completely disappeared from the scene? If so, we wonder whether they have been able to produce the next generation before vanishing.

Bent Hansen
Zoological Museum
Copenhagen, Denmark

David Billett
IOS, Wormley
United Kingdom

Allen, J.A., 1979: The adaptations and radiation of deep-sea bivalves. Sarsia 64: 19-27.

Infaunal Xenophyophores from the Ogasawara and Japan Trenches

The Xenophyophoria are an enigmatic group of deep-sea, giant rhizopods ranging in size from a few millimetres to 25 cm. They have commonly been overlooked because of fragility or resemblance to broken or decayed parts of other animals such as forams, sponges, coelenterates, bryozoans and ascideans, or to inorganic concretions (Tendal & Lewis, 1978). Several species are known to live on the seabed (Tendal & Lewis, 1978). Until now, evidence of infaunal xenophyophores has been lacking.

During the sorting of meiofauna from subcores of a box core taken in the Ogasawara Trench in March 1980 (sample depth 8260 m), one of the members of our division (Y. Shirayama) found what subsequently proved to be fragments of an infaunal, tube-dwelling xenophyophore. The organism occurred at depths in the sediment ranging from 0 to 9 cm with most fragments occurring in the 3-6 cm sampling interval. More complete specimens of the tubes of the organism were subsequently found by another member of our division (D.D. Swinbanks) in X-ray radiographs of subcores intended for trace fossil analysis. The xenophyophore is a new genus and new species of the family Syringamminidae (Tendal, 1972). A manuscript describing the systematics of this organism along with notes on its ecology and possible trace fossil analogies is in preparation (Tendal, Swinbanks & Shirayama, in preparation).

The finding of an infaunal xenophyophore was of particular interest to one of us (D.D. Swinbanks) because it opened up the possibility that infaunal xenophyophores with polygonal networks of anastomosing sediment tubes (cf. epifaunal Syringammina) might exist and these could be the makers of the well-known trace fossil Paleodictyon. Such an infaunal xenophyophore with a polygonal network of mucous-bound sediment tubes bearing a strong resemblance to Paleodictyon has since been found by Swinbanks in a box core collected from a depth of about 6400 m in the Japan Trench in July 1981. A description of the organism is in preparation. The organism has many of the characteristics of the family Syringamminidae, but some tube fragments (~20%) have xenophyae (sediment grains) incorporated with and attached to protoplasm and stercomare within the sediment tubes, which is more typical of the family Psamminidae (Haeckel, 1889). Thus this organism may raise some problems in classification.

References

Haeckel, E., 1889: Report on the Deep-sea Keratosa. Challenger Rep. 32: 1-92.
Tendal, O.S., 1972: A monograph on the Xenophyophoria. Galathea Rep. 12: 1-99.
Tendal, O.S. & K.B. Lewis, 1978: New Zealand xenophyophores: upper bathyal distribution, photographs of growth position, and a new species. N.Z. Jl mar. Freshwat. Res. 12: 197-203.

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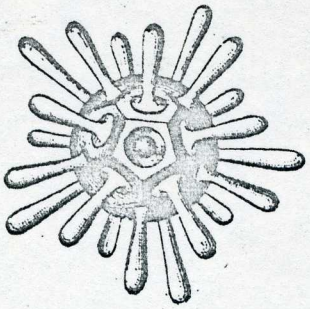

Histological and enzymological approach to the nutrition of abyssal sea anemones

The similar localization of the internal digestive tracts and the similar repartition of phagocytic and zymogen cells in intertidal and abyssal sea anemones (Tribe of Thenaria) allow us to assume that digestive processes are of the same kind.

In the intertidal sea anemone Actinia equina L. variations of amylase activity and the amylase/chymotrypsin ratio show the seasonal contribution of phytoplankton in the food of this sea anemone.

It was very interesting to compare the variations in these enzymatic activities and their ratio in different abyssal sea anemones to test the hypothesis that microalgae falling down from the su face could be a real source of food for deep-sea species.

Seasonal variations of amylase activity, Actinia equina (intertidal sea anemone), mUI/mg of protein.

June	October	February	April	June	July
70 ± 4	31 ± 1	20 ± 6	25 ± 6	64 ± 26	51 ± 31

Variations of amylase activity in different deep-sea species

2300 m (June)	4900 m (Sep.)	4500 m (May)	5300 m (May)
53 ± 13	15 ± 5	19 ± 3	18 ± 4

The results obtained on abyssal sea anemones permit us to conclude that microalgae could be a source of food for some deep-sea species (Phelliactes robusta, Paracalliactis stephensoni) living at 2000 m in the Gulf of Biscay. For the species living from 4500 m to 5300 m amylase activity is remarkably low, below the winter values of Actinia equina! We hope that the cruise Biogas XI in September 1981 will enable us to confirm our present results on species trawled from 4000 m to 2000 m.

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THE DEADLINE FOR THE NEXT ISSUE OF D.-S.N. IS 1 APRIL 1982

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