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Hydrografiska avdelningen, Göteborg

COMPILED CRUISE-REPORTS FROM THE BALTIC YEAR 1969 - 70

by Stig Carlberg

May 1970

The Baltic Oceanographers

THE Baltic Year 1969-70 Cruise - Reports

Göteborg May 1970

COMPILED CRUISE-REPORTS FROM THE BALTIC YEAR 1969-70

When this is written, the Cooperation Programme of the Baltic Oceanographers - the Baltic Year - has come to its end.

The Baltic Year fortunately started when a new great inflow of salt water to the Baltic had begun in November 1968. The continuous Baltic cruises carried out during the whole 1969 and the spring of 1970 will give us an extremely good opportunity to follow the inflow in details. This will certainly greatly increase our possibilities to learn to understand the mechanism of the water-exchange in the Baltic Deep Water. Therefore we urgently stress the importance of data exchange. Until now only the Finnish and Swedish data have been made available to all participants.

Twenty cruises have been carried out (only one had to be cancelled - due to severe ice-conditions).

In order to give the interested reader an idea of all the work that has been carried out - sometimes in very hard weather and during unfavourable working-conditions - we have here collected the reports from all the cruises.

The programme contained 37 stations, of which each ship had to try to work out as many as possible. On one of the stations (BY 15A - the Gotland Deep) an one-week anchoring with sampling and analysis every third hour day and night has been carried out when the conditions permitted.

Before all data have been distributed among the participants it is almost impossible to know how many analysis have been done. However the salinity-determinations might be some 20.000 and the same figures for oxygen- or hydrogensulphide- and phosphate-analysis. To that we can add numerous analysis of total-phosphorous, silicate, pH, alkalinity and different forms of nitrogen.

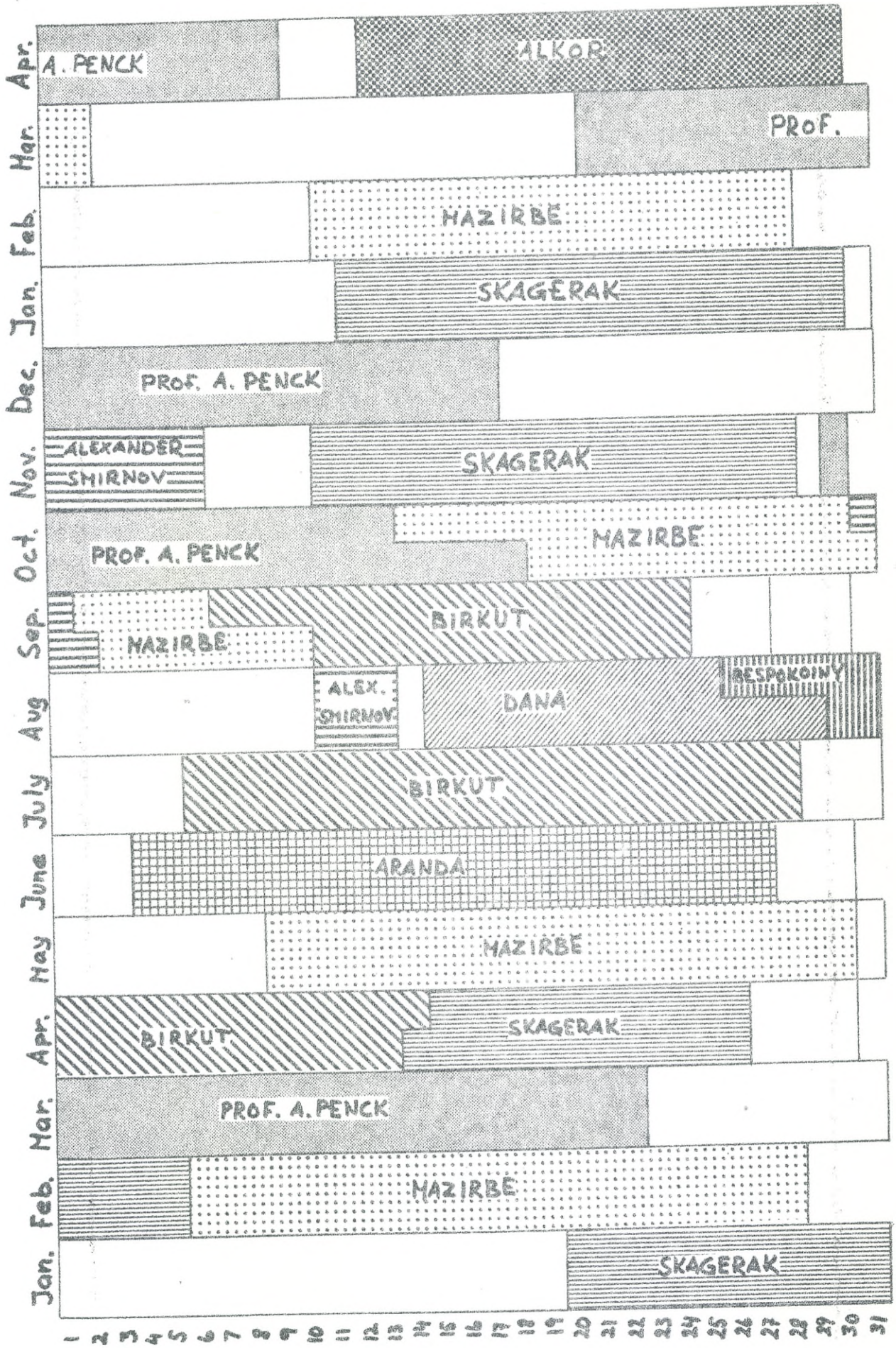
On most of the cruises zooplankton has been sampled. On some cruises phytoplanktonsampling, bottomsampling and ^{14}C-productivity measurements have been carried out. Additionally samples for tritium, chlorophyll, trace elements and radioisotopes have been taken. Current-measurements have also been carried out at station 15A on a few cruises.

The marking-buoy which was anchored at the Gotland Deep by R/V "Skagerak" in April 1969 was lost, probably in September. We would very much appreciate if somebody can give us information about its fate.

Göteborg, May 1970.

Stig Carlberg

Swedish Secretary for the Baltic Year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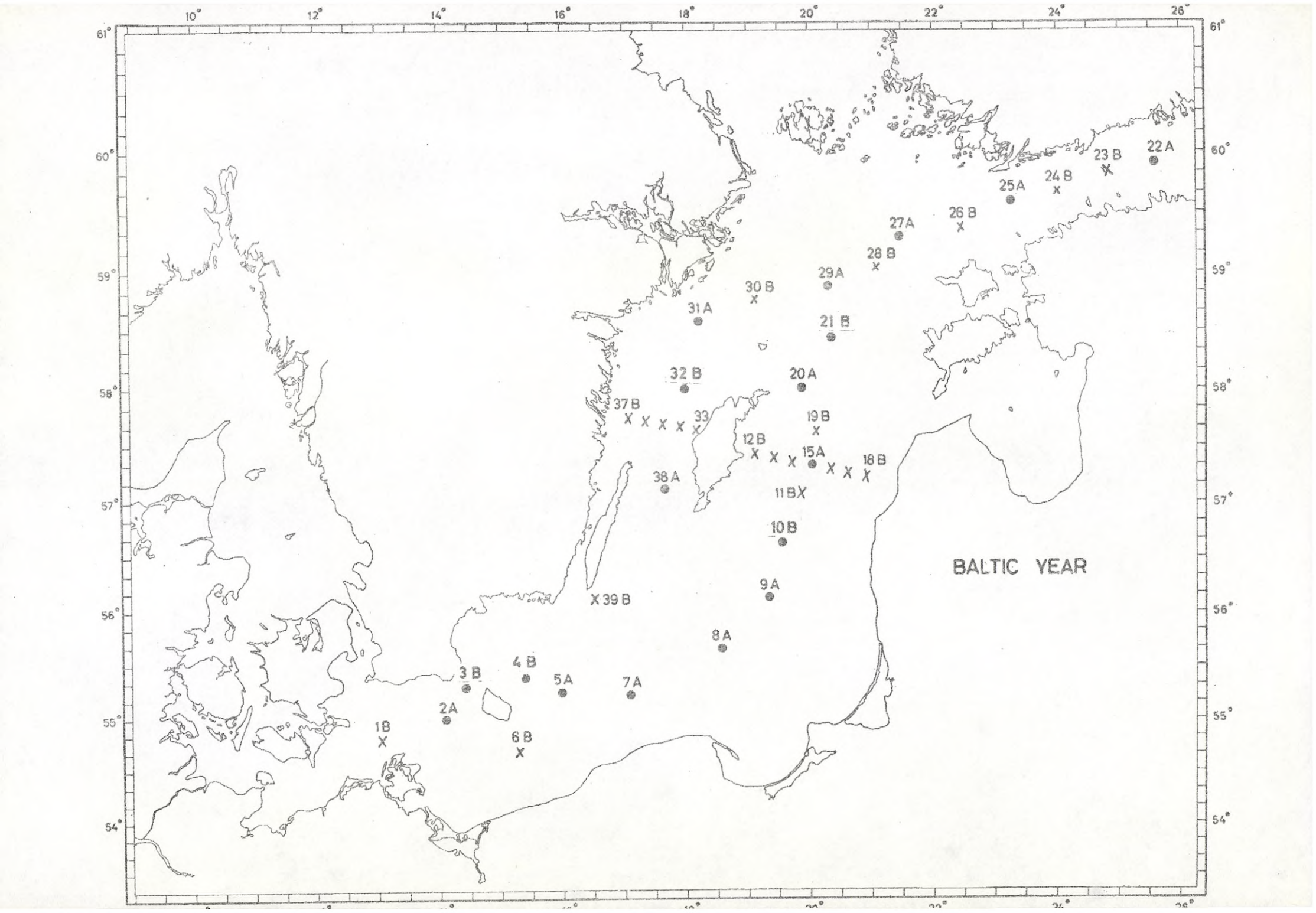
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BALTIC YEAR

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The Baltic Year Cruise January 20-February 5, 1969

by

R/V "Skagerak"

The expedition left Göteborg January 20 at 10.30. The stations "Fladen", "Lilla Middelgrund" and "Kullen" were worked in Kattegat on the way to the Baltic. The "Skagerak" arrived to the station BY-1B the 21 of January at 8.00. The stations in the southern Baltic were worked to BY-5A. Because of the bad weather it was decided to proceed west of Gotland. A breakdown of the radar made it necessary to go to Nynäshamn for two hours reparation work. From there we proceeded towards the Gulf of Finland. Bad weather with easterly winds and temperatures below zero made it necessary to go with half speed in order to avoid overicing. In the Gulf of Finland the temperature was -14°C and the sea was freezing fast. South of Hanko the ice forced us to turn back. The "Skagerak" is not fitted for work in thick ice. An extra station called L 12 was taken at the turning point.

It was now decided to proceed to the Gotland Deep to the anchor station BY-15A. The weather had improved and the weather report on the radio gave hope for good weather at least for some days. The "Skagerak" anchored at BY-15A January 25 at 17.00 GMT. On the station batythermograph sounding was carried out every hour. The water sampler series were taken every third hour. The weather was rather good but the temperature was below zero and some difficulties were encountered due to ice in the meter wheel. January 26 at 18.00 the wind had increased to 15 m/s and it was considered necessary to weigh anchor. The work was continued with the ship standing by on the station. January 27 the weather had improved and we anchored again at 14.00. The temperature increased now to about zero and it was possible to clear away the ice from deck.

Because of the ice situation in the Gulf of Finland and the observed frequent two boat surface trawling in the neighborhood it was decided not to anchor the surface buoy. This will instead be done during the next expedition in April.

H_2S was observed on the stations 38A, 34B, 32B, 31A, 29A, 28B, 27A, 21B, 20A, 19B, 15A, 11B and 10B. The great variations observed by "Alkor" in the Gotland Deep during the summer 1968, were not found during the 5 days we were on the station.

Permission to go to Ventpils for water and oil had been requested from the Soviet authorities, but no answer had arrived during our stay at the station. Therefore it was decided to proceed south to station 8A and from there to Karlskrona. We arrived there the 21 of January. The ship again left Karlskrona

February 3. The stations BY-7A, 5A, 6B, 2A and 1B were worked. The expedition was finished in Göteborg February 5.

The stations and the samples taken are listed below:

Station	S‰	t°C	O_2	H_2S	pH	PO_4	tot.P	NO_3	Si	A	Trit.	Phyto.P.	Zoop.	Bottomsamp.
BY-1B	x	x	x		x	x	x	x	x				x	
BY-2A	x	x	x		x	x	x	x	x	x	x	x	x	
BY-3B	x	x	x		x	x								
BY-4B	x	x	x	x	x	x	x	x	x	x				
BY-5A	x	x	x	x	x	x	x	x	x	x	x			
BY-39B	x	x	x		x	x								
BY-38A	x	x	x	x	x	x	x	x	x	x	x	x	x	x
BY-34B	x	x	x	x	x	x								
BY-32B	x	x	x	x	x	x								
BY-31A	x	x	x	x	x	x	x	x	x	x		x	x	
BY-30B	x	x	x	x	x	x								
BY-29A	x	x	x	x	x	x	x	x	x	x				
BY-28B	x	x	x	x	x	x								
BY-27A	x	x	x	x	x	x	x	x	x	x		x	x	
BY-26B	x	x	x	x	x	x								
L-12	x	x	x		x	x	x	x	x	x				
BY-21B	x	x	x	x	x	x								
BY-20A	x	x	x	x	x	x	x	x	x	x				
BY-19B	x	x	x	x	x	x								
BY-15A	x	x	x	x	x	x	x	x	x	x	x	x	x	x
BY-11B	x	x	x	x	x	x								
BY-10B	x	x	x	x	x	x								
BY-9A	x	x	x	x	x	x	x	x	x	x				
BY-8A	x	x	x	x	x	x	x	x	x	x				
BY-7A	x	x	x		x	x	x	x	x	x				
BY-6B	x	x	x		x	x								
BY-5A	x	x	x	x	x	x								
BY-2A	x	x	x		x	x								
BY-1B	x	x	x		x	x								

Unfortunately very few bottom samples could be taken due to the cold and bad weather. Also net hauling was difficult. The net closing mechanism was broken on station BY-15A.

Stig H. Fonselius

Chief scientist

Ministry of Fisheries of the USSR
Baltic Research Institute
on Marine Fisheries

The Baltic Year Cruise
February 5-28, 1969
r/v "Masirbe".

The expedition left Ventspils on February 5 at 13^{00}. Because of strong wind and negative temperatures r/v "Masirbe" occupied station 2A only on February 7 at 08^{00} GMT. When this station had already been accomplished the weather improved and stations 5A, 7A, 8A were made under rather favourable weather conditions.

Later the weather again became worse and station 9A was made on February 9 at 11^{00} under strong wind of 6 Beauf. and air temperature below zero. Next was the station 38A. The further advance of the ship to the North was difficult because of strong easterly wind and low air temperature of -14°C.

In spite of low cruising speed r/v "Masirbe" had to be stopped every 2-3 hours to clear away the ice. Stations 15A, 20A, 28B were made under such conditions. Approximately 5 miles to the North of station 28B floating ice appeared, slowing down the ship's advance still more. Station 27A was completed on February 14 at 12^{30} GMT.

From station 27A the vessel returned to Ventspils for refuelling.

R/v "Masirbe" left Ventspils again on February 18 at 10^{00} GMT and at the same day evening after unsuccesfull search of orange anchored buoy, which, according programme, had to be set up by the r/v "Skagerak", anchored on station 15A. Because of bad weather the water sampler series on this station could be lowered only every six hour. Twice the day samples of plankton were taken.

Works on station 15A were completed on February 25 at 18^{00} GMT. R/v "Masirbe" returned to Ventspils on February 28. The content of Oxygen (O_2) in the seawater had been determined on stations 38A, 15, 20A, 28B and 15A.

Because of cold, unfavourable weather collection of plankton samples by nets was quite embarrassing.

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Fahrtbericht über die 1. Meßfahrt des F.S. "Prof. A. Penck" anläßlich des Internationalen Ostseejahres (IBY) vom 1. bis 22. März 1969

1. Fahrtablauf

Die Arbeiten auf dieser Meßfahrt wurden maßgeblich durch zwei längere Schlechtwetterperioden mit Windstärken von 7-8 bzw. 8-10 Bf sowie durch ungünstige Eisverhältnisse beeinträchtigt. Die ersten Messungen wurden am 1. 3. in der Bornholmsee (Stationen 4 B und 5 A) und am 2. und 3. 3. in der südwestlichen Gotlandsee (Stationen 7 A - 11 B) durchgeführt. 10 Seemeilen südlich von Station 15 A traf das F.S. "Prof. A. Penck" auf 5-6 cm starkes Festeis, daß jedoch am 4. 4. bei zunehmenden W-SW-Winden in Treibeis überging. Am gleichen Tag konnte durch 3-stündiges Aufdampfen mit den Messungen auf Dauerstation 15 A angefangen werden. Im Verlauf des nächsten Tages hatte der Wind jedoch auf 7-8 Bf zugenommen, so daß die Messungen nach 30 Stunden abgebrochen werden mußten und das Schiff bei Gotland unter Landschutz ging. Am 7. 3. konnte erneut mit Messungen auf dieser Station bei nunmehr verankertem Schiff und eisfreier See begonnen werden. Aber auch dieses Mal mußten die Arbeiten nach 30 Stunden infolge Windzunahme auf 7-8 Bf abgebrochen werden.
Am 10. 3. wurden die Arbeiten auf den Stationen 19 B - 21 B in der nördlichen Gotlandsee fortgesetzt. 5 Seemeilen südwestlich von Station 28 B geriet das F.S. "Prof. A. Penck" am 11. 3. in dichtes Treibeis und mußte nach Station 29 A abdrehen. Im weiteren Verlauf der Reise wurden die Stationen 30 B - 37 B bearbeitet, bevor am 13. 3. Visby zur Aufnahme von Wasser und Proviant angelaufen wurde.
Die Untersuchungen wurden am 15. 3. auf Station 38 A fortgesetzt. Infolge einer längeren Sturmperiode mit Windstärken von 8-10 Bf mußte das F.S. "Prof. A. Penck" anschließend 3 Tage lang bei Gotland unter Landschutz liegen. Vom 18. bis 20. 3. wurden die Messungen im südwestlichen Gotlandbecken sowie in der Bornholmsee wiederholt. Am 21. 3. wurden die Station 2 A und 1 B in der Arkonasee bearbeitet und die Meßfahrt am 22. 3. 1969 beendet.

2. Vorläufige Ergebnisse und Beobachtungen

In der Bornholmsee wurde bei den Untersuchungen auf den Stationen 4 B und 5 A sowie auf einigen Zusatzstationen ein Salzwassereinbruch mit Salzgehaltswerten von 16-17,6‰ und Sauerstoffwerten von 5-6,7 ml/l im Tiefenwasser nachgewiesen. Diese Schicht wurde in 60-80 m Tiefe teilweise durch ein intermediäres Sauerstoffminimum (3 ml/l) sowie durch ein Phosphat - (1-1,5 µg-at/l) und Silikatmaximum (40-62 µg-at/l) überlagert. Der Einstrom salz- (>12‰) und sauerstoffreicheren (3 bzw. 1ml/l) sowie nährstoffärmeren (1,3 bzw. 1,9 µg-at PO_4-P/l, 52 bzw. 58 µg-at SiO_4-Si/l) Tiefenwassers ließ sich auch auf den Stationen 8 A und 9 A sowie auf einigen Zusatzstationen im südwestlichen Gotlandbecken nachweisen, wiederum überschichtet von sauerstoffärmeren (1,2 bzw. 0,3 ml/l) und nährstoffreicherem (1,9 bzw. 2,1 µg-at PO_4-P/l, 65 bzw. 61 µg-at SiO_4-Si/l) Wasser.

Das in das Gotlandbecken einströmende Wasser war jedoch salzärmer als das Tiefenwasser auf Station 10 B. Wie der etwas erhöhte Sauerstoffgehalt (0,8 ml/l gegenüber 0,4 ml/l in 70-100 m Tiefe) zeigte, schichtete es sich seiner Dichte entsprechend unmittelbar über dem H_2S-haltigen Bodenwasser in 125 m Tiefe ein.

Als die Untersuchungen im südwestlichen Gotlandbecken sowie in der Bornholmsee gegen Ende der Meßfahrt wiederholt wurden, konnte eine ähnliche Sauerstoff- und Nährstoffverteilung wie zu Beginn der Reise nachgewiesen werden. Es scheint allerdings, daß im Bornholmbecken die Schicht des intermediären Sauerstoffminimums und des Nährstoffmaximums etwas abgesunken war, was sich zwanglos durch ein teilweises Abfließen des eingeströmten Salzwassers erklären läßt.

In der Gotlandsee wurde auf den Stationen 10 B, 11 B, 15 A, 19 A, 20 A, 21 B, 29 A, 30 B, 31 A, 32 B und 34 B ab 125-150 m Tiefe Schwefelwasserstoff angetroffen. Ein Höchstwert von 2,2 mg/l wurde auf Station 15 A am Boden gemessen.

Parallel mit der H_2S-Bildung und der Abnahme des pH-Wertes stieg der Gehalt an PO_4-P (Maximum von 8,6 µg-at/l auf Station 15 A) und NH_4-N (Maximum von 8,6 µg-at/l auf Station 15 A), während der Nitratgehalt sprunghaft auf Null absank.

Die Untersuchungen über die kurzzeitigen Veränderlichkeiten einiger hydrographischer und chemischer Parameter auf Dauerstation 15 A führten nur zu unbefriedigenden Ergebnissen. Einerseits ist die Berechnung der wahren Meßtiefen aus den Drahtwinkeln, die stets vorhanden sind, wenn das Schiff infolge schlechten Wetters nicht ankern kann sondern aufdampfen muß, nicht ausreichend genau. Aus diesem Grunde sollte die Dauerstation 15 A nur als Ankerstation durchgeführt werden, da dann im allgemeinen keine oder nur geringe Drahtwinkel auftreten und die Tiefenbestimmung keine Schwierigkeiten bereitet.
Andererseits fehlten die wichtigen, in der Sprungschicht gelegenen 60 und 90 m Tiefen. Bei Fortfall der im IBY-Handbuch empfohlenen 10 und 175 m Tiefen, die in weitgehend homogenen Schichten liegen, könnten 2 weitere, in der Sprungschicht gelegene Meßtiefen mituntersucht werden. Da die Lage der Sprungschicht von der Jahreszeit abhängig ist, sollte die Festlegung der engabständigen Meßtiefen speziell für jede Meßfahrt nach Durchführung der ersten Meßserie erfolgen.

Zu den biologischen Untersuchungen sei bemerkt, daß - wie die Ultrafilter erkennen ließen - die Frühjahrsentwicklung des Phytoplanktons noch nicht begonnen hatte. Die Schließnetzfänge ergaben eine deutlich differenzierte Planktonverteilung in den verschiedenen Wasserschichten.

Abschließend sei darauf hingewiesen, daß auf einigen Stationen Abweichungen von den im IBY-Handbuch angegebenen Bodentiefen auftraten, so auf

Station:	11 B	Handbuch:	213 m	gefunden:	175 m
"	19 B	"	160 m	"	138 m
"	30 B	"	115 m	"	141 m
"	32 B	"	205 m	"	160 m

3. Bearbeitete Stationen und durchgeführte Messungen

Stat.		T°C	S°/oo	O_2	H_2S	PO_4	NO_2	NO_3	NH_4	SiO_4	pH	Alk.	Chloro.	^{14}C	Plankton Zoo	Plankton Phyto	Benth.	Sest.
4	B	x	x	x		x	x	x	x	x	x	x	x	x			x	x
5	A	x	x	x		x	x	x	x	x	x	x	x	x			x	x
7	A	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x
8	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
9	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
10	B	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
11	B	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
15	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
19	B	x	x	x	x	x	x	x	x	x	x	x	x					
20	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
21	B	x	x	x	x	x	x	x	x	x	x	x	x					
29	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
30	B	x	x	x	x	x	x	x	x	x	x	x	x		x		x	x
31	A	x	x	x	x	x	x	x	x	x	x	x	x	x		x		
32	B	x	x	x	x	x	x	x	x	x	x	x						
37	B	x	x	x		x	x	x	x	x								
36	B	x	x	x	x	x	x	x	x	x								
35	B	x	x	x		x	x	x	x	x	x	x						
34	B	x	x	x	x	x	x	x	x	x			x	x	x		x	x
38	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
9	A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x
8	A	x	x	x		x	x	x	x	x	x	x						
7	A	x	x	x		x	x	x	x	x	x	x						
5	A	x	x	x		x	x	x	x	x	x	x	x		x			
4	B	x	x	x		x	x	x	x	x	x	x	x					
6	B	x	x	x		x	x	x	x	x	x	x						
2	A	x	x	x		x	x	x	x	x	x	x	x		x			
1	B	x	x	x		x	x	x	x	x	x	x	x				x	

Warnemünde, 25. 3. 1969

Dr. D. Nehring
Fahrtleiter

Report from the Cruise of m.s. "BIRKUT" 23.III-16.IV. 1969
within the Framework of the Baltic Year - P o l a n d

The expedition began leaving the port of Gdynia March 23 at 11.00 GMT. Work was commenced March 24 at 4.30 beginning with station 6B, and then continued on the stations: 1B, 2A, 5A and 7A.

On the station 5A, salinity of the bottom layer amounted from 12,5 ‰ at the depth of 60 m to 17 ‰ at the bottom. At the depth of 70 m, an intermediate layer of small oxygen content (2,8 ml/l), and high phosphate amounts (1,6 µgat/l) was found. The ship went with half speed because, with north-east wind of force 4-5°B, the rolls and pitches would make the work in the deck laboratory impossible.

On March 26, the ship called at Ustka for water (between 10.20 and 15.00) continuing thereafter the work on stations: 8A, 9A, 10B, 11B, 15A, 19B. On station 8A the salinity was 12,9 ‰, on station 9A - 11,9 ‰. At the depth of 80 m an intermediate layer with oxygen content below 1 ml/l (minimal value in the whole water column) and with a great quantity of phosphates - 1,2 - 2,0 µgat/l was found. In the Gotland Deep (st. 15A), water salinity in the layer 70-125 m was 10-11,5 ‰, and below 125 m increased up to 12,5 ‰. Beginning with the depth of 70 m oxygen content fell below 1 ml/l, and the quantity of phosphates increased to 2 µgat/l (to the depth of 125-150 m). In the layer 150-175 m, the oxygen decay was observed, hydrogen sulphide appeared and the amount of phosphates increased (maximal values of 8,9 µgat/l at the bottom).

On March 28, at 10.30 , ice was encountered between stations 19B and 20A, at first open pack ice, later close pack ice and ice fields separeted by strips of open water. The thickness of the ice reached 30 cm. About 4 n.miles south of station 20A, ice fields were encountered of 40-50 cm thickness making further sailing impossible. At the ice edge, a supplementary station 20C was carried out (57°56'N, 19°56'E), drifting.

Further work was conducted on section Östergarn-Sarnatie, east of Gotland, with omission of station 12B covered by close pack ice. On station 13B, a failure of the anchor chain aggregate occurred, so that measurements on stations 14-18 were carried out drifting. During those measurements, the state of sea was "zero" and the drift was very small. With an absolutely smooth water surface, on March 29, forming of a thin coat of new ice was observed.

On March 29, at 17.00, the work on anchor station 15A at a depth of 242 m began. Till 11.00 of March 30 the depth diminished to 231 m as a result of the drift of the ship. In consequence, anchor was weighed and the ship's position improved, anchoring again at a depth of 240 m. From March 30 till the completion of measurements on station 15A the depth did not undergo any more major changes. All in all 43 measurement series were carried out.

On April 5, at 5.00, the ship called on Gdynia and remained there till April 9. On this day, at 11.00, it left to proceed to station 39B, working underway extra measurements in the Gulf of Gdańsk.

Measurements began on April 10, at 14.40, on the station 39B and were continued on stations: 38A, 37B, 36B, 35B, 34B, 32B, 31A, 30B, 29A, 28B, 27A and 26B. On April 13, at 20.00, floating pack ice was encountered between stations 26B and 25A. At the turning point of the ship, at 22.00, an extra station - 25C- was taken (59°32'N, 23°06'E). Work was completed on April 14, at 2.25.

Hydrogen sulphide was found on stations: 10B, 11B, 15A, 19B, 20A, 13B, 14B, 16B, 17B, 32B, 31A, 29A, 28A and 27B, beginning with the level 125-150 m. On stations: 10A, 19B, 17B (near the bottom), 31A, 29A and 27A, small quantities of hydrogen sulphide were observed already at the depth of 100 m. The maximal concentration occured in the Gotland Deep, near the bottom (66.8 µgat/l).

Similar to the previous cruise of the ship "Prof.A.Penck", Democratic Republic of Germany, rather great discrepancies were

stated in the depth of the stations indicated in the programme of the Baltic Year and those measured, particularly, on stations in the area of Gotland, for instance

Station	Depth	
	acc. to BY programme	measured
8 A	109	97
19 B	160	137
27 A	176	135
28 A	178	199
30 B	115	132

As the bottom in this region is very irregular (slopes up to 15°) it must be taken into account that the mentioned discrepancies will continue to appear, even when the position of the vessel would be taken very accurately.

Gdynia, 19th April 1969.

A. Majewski

K. Zagrodzki

The stations and the determinations /or samples/ taken during the Baltic Year Cruise March 23 - April 16, 1969 by m/s "Birkut" - Poland

Station	Day	$T^{o}C$	Cl^{o}/oo	O_2	H_2S	PO_4	Si	NO_2	NO_3	NH_4	A	P_H	Plankt.	^{137}Cs	^{90}Sr	^{40}K
6 B	24.III	x	x	x		x	x	x	x		x	x	x			
1B	"	x	x	x		x	x	x	x		x	x	x			
2 A	"	x	x	x		x	x	x	x	x	x	x	x	x	x	x
3 B	25.III	x	x	x		x	x	x	x		x	x	x			
5 A	"	x	x	x		x	x	x	x	x	x	x	x	x	x	x
7 A	26.III	x	x	x		x	x	x	x	x	x	x	x	x	x	x
8 A	27.III	x	x	x		x	x	x	x	x	x	x	x	x	x	x
9 A	"	x	x	x		x	x	x	x	x	x	x	x	x	x	x
10 B	"	x	x	x	x	x	x	x	x	x	x	x	x			
11 B	"	x	x	x	x	x	x	x	x		x	x	x			
15 A	28.III	x	x	x	x	x	x	x	x		x	x	x	x	x	x
19 B	"	x	x	x	x	x	x	x	x		x	x	x			
20 A	"	x	x	x	x	x	x	x	x		x	x	x	x	x	x
13 B	29.III	x	x	x	x	x	x				x	x	x			
14 B	"	x	x	x	x	x	x				x	x				
16 B	"	x	x	x	x	x	x				x	x				
17 B	"	x	x	x	x	x	x				x	x				
18 B	"	x	x	x		x	x				x	x				
39 B	10.IV	x	x	x		x	x	x	x		x	x				
38 A	11.IV	x	x	x		x	x	x	x		x	x				
37 B	"	x	x	x		x	x				x	x				
36 B	"	x	x	x		x	x				x	x				
35 B	"	x	x	x		x	x				x	x				
34 B	"	x	x	x		x	x				x	x				
32 B	12.IV	x	x	x	x	x	x	x	x		x	x				
31 A	"	x	x	x	x	x	x	x	x	x	x	x		x	x	x
30 B	"	x	x	x	x	x	x	x	x		x	x				
29 A	13.IV	x	x	x	x	x	x	x	x		x	x		x	x	x
28 B	"	x	x	x	x	x	x	x	x		x	x				
27 A	"	x	x	x	x	x	x	x	x		x	x		x	x	x
26 B	"	x	x	x	x	x	x	x	x		x	x				
25 A	"	x	x	x	x	x	x	x	x		x	x		x	x	x
15 A	29.III	x	x	x	x	x	/x/				/x/	/x/		Anchor st.		

/x/ - sporadic determinations

The Baltic Year Cruise April 14 - 26, 1969

by

R/V Skagerak

The vessel left Göteborg in the morning on April 14. The stations were visited in the following order: W. Vinga, L:a Middelgrund and Kullen in the Kattegat and then BY 1, 2, 3, 6, 4, 5, 7, 8, 9, 10, 38, 34, 32, 31, 30, 29, 28, 27, 26 and L 12. At this last mentioned station the ship met ice, partly very close pack ice impossible to force by our vessel. Therefore the expedition continued with the stations 21, 20 and 19. At station 15 the continuous measurements started on April 19 at 0800 GMT and went on without any break until April 24 at 0900 GMT. Work at the stations 11 and 39 ended the expedition . (Arrival in Göteborg on April 26 in the morning.)

The weather was good for work all the time.

After the January expedition there has occured a strong inflow of oxygen-rich water to the southern Baltic. The oxygen concentration in the bottom water of the Bornholm basin is now above 6 ml/l. In November 1968 H_2S was present in the deep water and in January 1969 there was 2.3 ml/l oxygen. The oxygen-rich water has proceeded to the north in the eastern Gotland basin to station BY 10 (3.6 ml/l oxygen at 140 m in comparison to 12.8 µg-at H_2S/l in January). The conditions in the Gotland Deep have not changed. The oxygen conditions in the bottom water of the other stations in the northern Baltic proper have improved slightly but in the Landsort Deep there is now H_2S from 175 m to the bottom in comparison to 300 m in January. The H_2S concentration has decreased in the Norrköping Deep (BY 32 B) and in the area west of Visby and at BY 38 A the H_2S has disappeared.

Sven G. Engström

Leader of Expedition

	Temperaure	Salinity	Oxygen	H_2S	pH	PO_4-P	Tot.P	NO_3	Si	Alkalinity	Phytoplankton	Zooplankton	Bottom sample	BT
W. Vinga	10	10	10		10	10								x
Fladen	10	10	10		10	10	10	10	10					x
L:a Middelgrund	12	12	12		12	12								x
Kullen	5	5	5		5	5	5	5	5					x
BY 1	7	7	7		7	7								x
2	8	8	8		8	8	8	8	8	8	6	x	x	x
3	8	8	8		8	8								x
6	9	9	9		9	9								x
4	11	11	11		11	11	11	11	11					x
5	12	12	12		12	12	12	12	12	12	6	x	x	x
7	11	11	11		11	11	11	11	11	11			x	x
8	12	12	12		12	12	12	12	12	12	6	x	x	x
9	14	14	14		14	14	14	14	14	14			x	x
10	14	14	14		14	14								x
38	14	14	14		14	14	14	14	14	14	6	x	x	x
34	13	13	13		13	13								x
32	17	17	17	3	17	17								x
31	20	20	20	5	20	20	20	20	20	20	6	x		x
30	14	14	14	1	14	14								x
29	15	15	15	1	15	15	15	15	15	15				x
28	16	16	16	3	16	16								x
27	16	16	16		16	16	16	16	16	16	6	x	x	x
26	13	13	13		13	13								x
L 12	11	11	11		11	11	11	11	11	11	6	x	x	x
BY 21	14	14	14	2	14	14								x
20	17	17	17	4	17	17	17	17	17	17				x
19	15	15	15	3	15	15								x
15	19	19	19	5	19	19	19	19	19	19	6	x	x	x
15 anchor	12	12	7	6		12								x
11	17	17	17	2	17	17								x
38	8	8	8		8	8								x

BT every hour
Hydrogr. cast every 3rd hour
C^{14}-Prim. Prod. April 21, sunrise - noon and noon - sunset

Translation from Russian

Baltic Fishery Research
Institute
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Report on the Cruise of the R/V "Mazirbe",U.S.S.R., 8 - 30 May, 1969 (Baltic Year-- 1969 Programm)

The expedition left the port of Riga on May 8, 1969. Because of heavy fog the R/V "Mazirbe" arrived at station 7 A at 2000 GMT on May 10.

From station 7 A to station 2 A and further to station 5 A the ship continued in heavy fog, with a speed of 4 - 5 knots.

After completed work on station 5 A on May 12, stations 8 A and 9 A were carried out on May 13.

On May 15 the R/V "Mazirbe" called at the port of Klaipeda for water, fuel and provisions.

On May 16 the R/V "Mazirbe" left the port of Klaipeda and at 1500 GMT on May 17 the work began on station 38 A. Further station 15 A, 20 A, 27 A and 28 B were carried out. Stations 27 A and 28 B were fulfilled under nothern winds with the force of 6°B.

On May 21 the R/V "Mazirbe called at the port of Ventspils for water, fuel and provisions and left on May 22.

At 0000 GMT on May 23 the work began on anchor-station 15 A. The work on this station continued till 1200 GMT on May 29. During this work the ship was lying on anchor at a depth of 234 m in the vicinity of the buoy laid out by the R/V "Skagerrak".

On May 30 the R/V "Mazirbe" returned to the port of Riga.

Acting Head
Laboratory of Oceanography
M.Kaleis

Baltic Year 1969

R/V Aranda, Finland

Cruise Report, June 4 - 27.

The expedition left Helsinki on June 4th at 01 GMT. During the first part of the cruise the following stations were visited: BY 22A, 23 B, 25 A, 26 B (80m-), 27 A (80m-), 28 B (125m-), 29 A (150m-), 31 A (140m-) and 15 A (140m-). The ship anchored close to the buoy at the last mentioned station, the Gotland Deep, early in the morning on June 7th. Starting at 03 GMT hydrographic casts were perfprmed every 3th hour until June 12th at 03 GMT.

After the anchor station the following stations were visited: BY 11 B (160m-), 10 B, 9 A, 8 A, 7 A, 5 A, 4 B, 3 B, 2 A and 1 B. Additionally 3 stations, DS 1 - 3, were taken on the way from 1 B to Copenhagen, where the ship arrived on June 14th.

At all stations were determined t°, S ‰, pH, Oxygen and H_2S and additionally at the A stations PO_4-P, Total-P, Silicate, NO_3-N, NO_2-N, NH_3-N , alkalinity, zooplankton and chlorophyll. The depth in brackets after the station number indicates were the H_2S layer began. At the Gotland Deep t°, S, pH, Oxygen, H_2S and PO_4-P were determined every 3th hour, and additionally Total-P every 6th hour.

The ship left Copenhagen for the second part of the cruise on June 16th at 17 GMT. The hydrographic stations were now visited as follows: DS 1 - 3, 1 B, 2 A , 3 B, 4 B, 5 A, 7 A, 8 A, 9 A, 10 B, 11 B (140m-), 18 B, 17 B, 16 B (140m-), 15 A (145m-), 14 B, 13 B, 12 B, 20 A (135m-), 38 A (90m-), 37 B, 36 B, 35 A (97m-),

34 B (90m-), 33 B (95m-), 32 A (120m-), 31 A (125m-), 30 B, F 69 (A-station), Extra station, 59°12.5′, 21°36.5′, depth 103m H_2S from 85m , 29 A (120m-), 28 B (90m-), LL 15 (90m-), 27 A (80m-), 26 B (75m-), LL 12 (75m-), 25 A, 24 B (60m-), 23 A, LL 3 (A-station) and 22 A . Arrival to Helsinki on June 27th at 05 GMT.

The parameters determined during the second part of the cruise were those already mentioned in the first part. At the underlined stations measurements of primary production by the C-14 method was carried out, including sampling of phytoplankton.

Regular BT-measurements could not be performed according to the program because of bad slides. The gold film on the slides appeared to be too hard. (The slides were 4 years old).

The buoy anchored at the Gotland Deep had lost its radar reflector.

Folke Koroleff

Chief scientist

Report from the 2nd Cruise of M/S "Birkut" 6-28.VII.1969
in the Framework of the Baltic Year - Poland

The second cruise of M/S "Birkut" commenced on 6.VII.1969 at 0900 CMT (sailing from Gdynia harbour). Work began on station 6B, then, parting from station 1B, continued along the principal longitudinal profile from west to east. After measurements on station 3B on 8.VII. from 0300 - 0800, the ship anchored near Allinge, Bornholm. Windforce SW was then 7°B. After wind-lessening, work continued on stations 4B and 5A. In consequence of an error of the bearing finder "Decca", work was interrupted on 8.VII. at 2030, and course taken towards Swinoujscie. The halt at this port lasted from 0820 on 9.VII? till 1800 on 10.VII. Hereafter work was continued on stations 7A, 8A and 9A. On 12.VII. at 1200 serial measurements were commenced on station 15, lasting till 1030 on 17.VII. (40 series of measurements).

In the days 18.VII. 1100 - 19.VII. 1100, the ship remained i Gdynia in order to complete stores and water. After this interruption, work was continued on the principal section - from station 10B trough station 29A to station 22 in the Finnish Gulf and mensurements on the lateral profile between Östergarn and Sarnatie.

Further investigations were conducted from station 30B to 39B, including the section between Visby and Västervik.

The completion of those works took place on 26.VII.

In the days 27-28.VII. investigations were carried out of the waters of the Gulf of Gdansk. The cruise ended on 28.VII. at 2330.

Atmospheric conditions were favourable for the execution of measurements which allowed the full completion of the programme.

In the Arcona Deep, the salinity of water near the bottom amounted to 18,6 °/oo (st 1B) and 17,6 °/oo (st 2A), in the Born-

holm Deep - 17,0 °/oo, in the Gotland Deep - 12,5 - 12,6 °/oo, on station 3B - 10,3 °/oo.

Hydrogen sulphide appeared on stations 15A (150 m), 11B (175 m), 20A (150 m), 13B (100 m), 14B (175 m), 19B (125 m), 29A (100 m), 28B (100 m), 27 A (80 m), 26B (80 m), 30B (125 m), 31A (125 m), 32B (100 m), 38A (100 m).

The greatest quantity of hydrogen sulphide was contained in the demersal waters of st. 15A, 11B and 20A, Maximum concentration about 69 µgat/l.

Gdynia, 2nd of September 1969

A.Majewski
K.Zagrodzki

The stations and the determinations(or samples) taken during the Baltic Year Cruise July 6-28, 1969 by M/S "BIRKUT" - Poland

Station	Day	T°C	Cl°/oo	O_2	H_2S	PO_4	Si	NO_2	NO_3	NH_4	A	pH	Plankt.	^{137}Cs	^{90}Sr	^{40}K
6 B	7.VII	x	x	x		x	x	x	x		x	x				
1 B	"	x	x	x		x	x	x	x		x	x				
2 A	"	x	x	x		x	x	x	x	x	x	x	x	x	x	x
3 B	8.VII	x	x	x		x	x	x	x		x	x				
4 B	"	x	x	x		x	x	x	x		x	x				
5 A	"	x	x	x		x	x	x	x	x	x	x	x	x	x	x
7 A	11.VII	x	x	x		x	x	x	x	x	x	x	x	x	x	x
8 A	"	x	x	x		x	x	x	x	x	x	x	x	x	x	x
9 A	12.VII	x	x	x		x	x	x	x	x	x	x	x	x	x	x
10 B	20.VII	x	x	x	x	x	x	x	x		x	x				
11 B	"	x	x	x	x	x	x	x	x		x	x				
12 B	"	x	x	x	x	x	x				x	x				
13 B	"	x	x	x	x	x	x									
14 B	21.VII	x	x	x	x	x	x	x	x		x	x				
15 A	"	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
16 B	"	x	x	x	x	x	x				x	x				
17 B	"	x	x	x	x	x	x				x	x				
18 B	"	x	x	x	x	x	x				x	x				
19 B	"	x	x	x	x	x	x				x	x				
20 A	"	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
21 B	22.VII	x	x	x	x	x	x	x	x		x	x				
29 A	"	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
28 B	"	x	x	x	x	x	x									
27 A	"	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
26 B	"	x	x	x	x	x	x					x				
25 A	23.VII	x	x	x		x	x	x	x		x	x	x	x	x	x
24 B	"	x	x	x		x	x					x				
23 B	"	x	x	x		x	x					x				
22 A	"	x	x	x		x	x	x	x		x	x	x	x	x	x
30 B	24.VII	x	x	x	x	x	x					x				
31 A	25.VII	x	x	x	x	x	x	x	x		x	x	x	x	x	x
32 B	"	x	x	x	x	x	x					x				
34 B	"	x	x	x	x	x	x					x				
35 B	"	x	x	x	x	x	x					x				
36 B	"	x	x	x	x	x	x					x				
37 B	26.VII	x	x	x	x	x	x					x				
38 A	"	x	x	x	x	x	x	x	x		x	x	x	x	x	x
39 B	"	x	x	x		x	x	x	x		x	x				
15 A	12-17.VII	x	x	x	x	x	(x)	(x)	(x)		(x)	(x)	(x)			

(X) - sporadic determinations

Report from a cruise with the R/V "Aleksander Smirnov"
according to the Baltic Year -69 Programme.

The work was started on the 11th of August at the station 25A and finished on the 13th of August at the station 22A.

It was a weak and moderate sea at that time. The middle-height of the waves was 0.25 m and the highest 0.5 m. Sea was mostly mixed with predominance of ripples of northwestly, southerly and westerly directions. Then were also ripples and swelling of westerly direction.

Investigations were carried out in the leeway.

The "standard" - depths were 0, 5, 10, 15, 20, 30, 40, 50, 60 m and bottom. At the surface the temperature ranged from 18.2 °C in the west to 19.6°C in the east. Minimum of the temperature was observed at the depth 40 m (about 1.4 °C). The temperature of the water was about 4°C at the bottom.

The greatest changes in concentration of the chemical parameters were observed at the depth 50 m.

At the station 25A salinity was 5.72‰ at the sea surface, it was 8.24‰ at the depth 50 m and it was 10.35‰ at the bottom. The concentration of oxygen was 4.47 ml/l at the depth 50 m and about 0.00 ml/l at the bottom. The concentration of phosphate-phosphorous was 1.03 µg-at/l at the depth 50 m and 4.13 µgat/l at the bottom.

At the station 23B salinity was 4.09‰ at the sea surface, it was 8.06 ‰ at the depth 50 m and it was 9.58 ‰ at the bottom. The concentration of oxygen was 5.18 ml/l at the depth 50 m and 6.70 ml/l at the bottom. The concentration of phosphate-phosphorous was 1.29 µgat/l at the depth 50 m and 0.77 µgat/l at the bottom.

At the station 22A salinity was 4.36 ‰ at the sea surface, it was 8.39 ‰ at the depth 50 m and it was 9.61 ‰ at the bottom. The concentration of oxygen was 2.27 ml/l at the depth 50 m and 0.21 ml/l at the bottom. The concentration of phosphate-phosphorous was 3.00 µgat/l at the depth 50 m and it was 4.84 µgat/l at the bottom.

Phosphate-phosphorous wasn't detected at the sea surface at all the stations.

A. Nömm

Leader of Expedition

BALTIC YEAR INVESTIGATIONS.

Report from R/S DANA's cruise 15th-29th August 1969.

Dana left Copenhagen on 15th August 1969 at 15.00 GMT taking the route north of Sjælland through Storebælt. 4 stations were taken in the northern Øresund and 6 stations were taken in Storebælt and Femern Bælt.

During the first part of the cruise the following stations were visited: 1B, 2A, 3B, 4B, 5A, 7A, 8A, 9A,10B, 11B, 17B, 16B, 15A, 14B, 13B, 20A, 21B, 28B, 26B,25A, 24B, 23B, 22A. Between 4B and 5A one day, the 18th August, was spent for herring investigation.

Dana left Helsinki on August 24th at 09.00 GMT. During the last part of the cruise the following stations were visited: 27A, 29A, 30B, 31A, 32B, 34B, 35B, 36B, 37B, 38A. In the northern Baltic an extra station was made on recommondation of the laboratory of Helsinki. In the southern part of Øresund 3 stations were taken. At all stations temperature, S‰, PO_H, O_2 and H_2S were determined. Si was determinated at nearly all stations. Total phosphorous was determinated on all the A-stations. Furthermore our guest scientist R. Sen Gupta determinated NO_2, NO_3, NH_4 and total nitrogen and also made some C_{14}- analyses. pH was not determinated because the meter had a break down.

Bad weather and a break down of the steering machine caused that we lost the stations 6B and 39B.

Hydrogen sulfide was found on the following stations and below the mentioned depth: 11B-150 m, 16B-193 m, 15A-175 m, 14B-140 m, 28B-150 m, 25A-60 m, 24B-60 m, 23B-60 m, 22A-60 m, 27A-125 m, 59°12,5 N -20°26,5 E (extra station)-89 m, 29A-150 m, 31A-100 m, 32B-100 m, 34B-80 m, 35B-80 m, 36B-100 m, 38A-100 m.

F. Hermann
O. Vagn Olsen

The Baltic Science-Research
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Report about Cruises

R/V "Bespokoiny" 26.8 - 6.10 1969 and R/V "Mazirbe" 1.9. 1969 according to the programme of the "Baltic Year -69".

In August the R/V "Mazirbe" didn't go to sea because of repair work. On the 25th of August the R/V "Bespokoiny" went to sea. On the 27th - 28th of August the R/V "Bespokoiny" couldn't begin its work, because the power of the wind in those days reached 18 - 21 m/sec.

On the 29th of August at 0800 GMT the R/V "Bespokiony" began its work on the hydrographic station 27A. On the same day the stations 28B and 21A were fulfilled. On the 30th of August the oceanographic works at the stations 20A and 15A were fulfilled, and on the 31st of August at the stations 9A and 8A. On the 1st of September when the west wind was 14 m/sec the hydrpgraphic station 7A was worked. On the 2nd of September station 5A, and later the same day at 2100 GMT station 2A were worked. On the 6th of October the R/V "Bespokoiny" returned to Riga.

On the 1st of September the R/V "Mazirbe" left Riga. On the following day at 1700 GMT the work began at the anchor-station 15A. This work was finished on the 9th of September at 1100 a.m. On the 10th of September the R/V "Mazirbe" returned to Riga.
The works which were fulfilled in the cruise-period by R/V "Bespokoiny" and R/V "Mazirbe" according to the programme of the "Baltic Year -69" (29th of August - 9th of September, 1969).

Stations	Date	t°	O_2	H_2S	PO_4	Si	NO_2	Alk	pH
27A	29.8	+	+	+	+	+	+	+	+
28B	29.8	+	+	+	+	+	+	+	+
21A	29.8	+	+	+	+	+	+	+	+
20A	30.8	+	+	+	+	+	+	+	+
15A	30.8	+	+	+	+	+	+	+	+
9A	31.8	+	+	+	+	+	+	+	+
8A	31.8	+	+	+	+	+	+	+	+
7A	1.9	+	+	+	+	+	+	+	+
5A	12.10	+	+	+	+	+	+	+	+
2A	21.10	+	+	+	+	+	+	+	+
15A	2-9.9	+	+	+	+	+	+	+	+

The Chief of the oceanographic laboratory
(M. Kaleys)

Report from the 3-rd cruise of m/s "BIRKUT" 7-24.IX.1969
in the frame of the Baltic Year - P o l a n d

The third and last Polish cruise in the frame of the Baltic Year 1969/70 began on the 7.IX. at 9:oo GMT with the sailing of the vessel from Gdynia port. Measurements were begun at station 8A the same day at 23:oo, continued in direction west at stations 7,5,6,2,1, then directed towards east and north-east /2-4, 39-34, 32-29/, returning to the direction south-west at station 8A /22-29, 21-19, 17-13, 11-8/. This period was finished on the 16.IX. at 2o:3o. On the 17.IX. the ship called at the port of Gdynia in order complete the water reserve.

After having again put to sea on the 18.IX., the ship encountered a big reverse wave which diminished its speed to four knots, In the evening hours of 19.XI. the weather continued to get worse, the wind force reached 7^{o}B. The ship's speed fell to 2 knots. At diurnal station 15A work was began consequently only on 20.IX. at 8:oo at wind NNE 5,4 m/s. Serial measurements were carried out till 22.IX. 9:oo /17 series/. On that day storm warning was received, and at 10:oo the wind speed accelerated till 16 m/s and work was interrupted in consequence. In the evening hours the wind force reached 10^{o}B. On the next day the vessel seeked shelter at the shore of Gotland, and, the next day, 24.IX. at 12:3o, it returned to Gdynia. During the storm, 1 case with water samples drawn at station 15A were lost. The buoy marking the place of station 15A has not been found.

Hydrogen sulphide appeared at the following stations: 10B /125 m/, 11B /150 m/, 13B /119 m - near the bottom/, 14B /125 m/, 15A /125 m/, 16B /100 m/, 20A /150 m/, 21B /70 m/, 28B /100 m/, 27A /100 m/, 29A /80 m/, 30B /70 m/, 31A /100 m/, 32B /80 m/, 34B /80 m/, 35B /80 m/, 36B /80 m/, 37B /70 m/, 38A /80 m/. The maximal concentration of hydrogen sulphide at station 15A amounted near the bottom 72,8 µgat/l.

The salinity near the bottom was at station 2A - 17,2 °/oo, 5A - 16,5 °/oo, 15A - 12,3 °/oo and 31A - 11,1 °/oo.

A. Majewski

Gdynia, 23rd October, 1969

K. Zagrodzki

The stations and the determinations /or samples/ taken during the Baltic Year Cruise 7-24.IX. 1969 by m/s "BIRKUT" - P o l a n d

Station	Day	Depth	T°C	Cl°/oo	O_2	H_2S	PO_4	Si	NO_2	NO_3	HN_4	A	P_H	Radioact.	Plankt.
8A	8.IX	96	x	x	x		x	x	x	x	x	x	x	x	x
7A	"	91	x	x	x		x	x	x	x	x	x	x	x	x
5A	"	90	x	x	x		x	x	x	x	x	x	x	x	x
6B	9.IX	64	x	x	x		x	x	x	x		x	x		
1B	"	46	x	x	x		x	x	x	x		x	x		
2A	"	48	x	x	x		x	x	x	x		x	x	x	x
3B	"	48	x	x	x		x	x	x	x		x	x		
4B	10.IX	91	x	x	x		x	x	x	x		x	x		
39B	"	51	x	x	x		x	x	x	x		x	x		
38A	"	110	x	x	x	x	x	x	x	x	x	x	x	x	x
37B	11.IX	77	x	x	x	x	x	x	x	x		x	x		
36B	"	130	x	x	x	x	x	x	x	x		x	x		
35B	"	91	x	x	x	x	x	x	x	x		x	x		
34B	"	107	x	x	x	x	x	x	x	x		x	x		
32B	"	193	x	x	x	x	x	x	x	x		x	x		
31A	"	458	x	x	x	x	x	x	x	x	x	x	x	x	x
30B	12.IX	128	x	x	x	x	x	x	x	x		x	x		
29A	"	170	x	x	x	x	x	x	x	x		x	x	x	x
22A	13.IX	70	x	x	x		x	x	x	x	x	x	x	x	x
23B	"	92	x	x	x		x	x	x	x	x	x	x		
24B	"	72	x	x	x		x	x	x	x		x	x		
25A	14 "X	70	x	x	x		x	x	x	x	x	x		x	x
26B	"	103	x	x	x	x	x	x	x	x		x			
27A	"	160	x	x	x	x	x	x	x	x	x	x		x	x
28B	"	163	x	x	x	x	x	x	x	x		x			
29A	"	161	x	x	x	x	x	x	x	x	x	x			
21B	"	123	x	x	x	x	x	x	x	x		x			
20A	15.IX	198	x	x	x	x	x	x	x	x	x	x		x	x
19A	"	143	x	x	x	x	x	x	x	x		x			
17B	"	100	x	x	x	x	x	x				x			
16B	"	172	x	x	x	x	x	x				x			
15A	"	238	x	x	x	x	x	x	x	x	x	x		x	x
14B	"	174	x	x	x	x	x	x				x			
13B	16.IX	121	x	x	x	x	x	x				x			
11B	"	212	x	x	x	x	x	x	x	x		x			
10B	"	139	x	x	x	x	x	x	x	x		x			
9A	"	122	x	x	x		x	x	x	x	x	x		x	x
8A	"	99	x	x	x		x					x			
15A	20-22.IX	240	x	x	x	x	x	/x/	/x/	/x/		/x/	/x/	Anchor st.	

/x/ - sporadic determinations

Fahrtbericht über die 2. Messfahrt des F.S. "Prof. A. Penck" anlässlich des Internationalen Ostseejahres (IBY) von 28.9. - 18.10. 1969.

Das F.S. "Prof. A. Penck" verliess Rostock am 30.9. 1969 zu seiner 2. Messfahrt im Rahmen des IBY. Am Abend des 30.9. und am Morgen des 1.10. wurden die Stationen 1B und 2A bearbeitet. Dann frischte der Wind auf 6 - 8 Bft auf, so dass das Schiff 2 Tage lang bei Bornholm unter Landschutz gehen musste. Am 3.10. wurden Untersuchungen auf den Stationen 4B und 5A durchgeführt. Während des 4./5.10. erfolgten Messungen auf den Stationen 7A, 8A, 9A, 10B und 11B. Von 6.10./ 3.00 GMT bis 11.10./ 3.00 GMT wurde auf Dauerstation 15A geankert. Die dort vom R.V. "Skagerak" ausgelegte Boje wurde trotz genauer Navigation und intensiver Suche nicht gefunden. Alle 3 Stunden - insgesamt 42 mal - wurden Wasserproben entnommen. Zwischenzeitlich (8./9.10.) frischte der Wind vorübergehend auf 5 - 6 Bft auf, wodurch das Schiff geringfügig vertriftete (2,5 nm). Dadurch nahm die Wassertiefe von ursprünglich 243 m auf 239 m ab. Vom 11.10. biz 13.10. wurden die Stationen 19B, 20A, 21B, 30B, 31A, 32B, 36B und 38A bearbeitet, bevor am 13.10. Visby zur Ergänzung von Wasser und Proviant angelaufen wurde. Am 15.10. wurde die Station 20A wiederholt. Anschliessend erfolgten Messungen auf den Stationen 29A, 28B, 27A, 26B, 25A, 24B und 23B, die am 16.10. auf Station 22A beendet wurden. Am 17.10./18.10. hielt sich das F.S. "Prof. A. Penck" in Helsinki auf. Während der Heimreise wurden am 20.10. die Untersuchungen auf den Stationen 15A und 11B wiederholt.

Da bereits zu Beginn der Arbeiten unser pH Meter ausfiel, konnten auf dieser Messfahrt keine pH-Werte bestimmt werden.

2. Vorläufige Ergebnisse und Beobachtungen

Nach dem im Frühjahr 1969 beobachteten Salzwassereinbruch haben sich die hydrographisch-chemischen Verhältnisse im Bornholmbecken wieder normalisiert, der Salzgehalt des Tiefenwassers ist auf 16 - 16,5 ‰ abgesunken und die intermediären Sauerstoffminima sowie Phosphat-und Silikatmaxima sind abgebaut. Der O_2-Gehalt

des Tiefenwassers betrug 2.5 - 3,5 ml/l. Der Jahreszeit entsprechend treten starke Temperaturinversionen mit Gradienten von 5 - 6°C pro 10 m Tiefe auf. Eine wesentliche Verbesserung der Sauerstoffverhältnisse wurde im östlichen Gotlandbecken beobachtet. Auf den Stationen 8A, 9A und 10B wurden in den bodennahen Schichten 2,5 - 3,5 ml O_2/l gemessen. In 70 - 80 m Tiefe war dagegen noch ein intermediäres Minimum von 0.8 - 1.5 ml/l zu beobachten, das mit einem Phosphat- und Silikatmaximum (1,5 - 2 µg-at-PO_4-P/l und 50 - 62 µg-at. SiO_4-Si/l) korreliert war. Auf Station 11B trat ab 175 m Tiefe zunächst noch Schwefelwasswerstoff zusammen mit einer starken Zunahme des Phosphat-, Silikat- und Ammoniumgehalts auf, während Nitrat verschwand.

Die wohl interessantesten Ergebnisse während dieser Messfahrt wurden auf der Dauerstation 15A erzielt. Wie Tabelle 1 zeigt, wechselten im Tiefenwasser oxydierende und reduzierende Verhältnisse verbunden mit extremen Änderungen in der Nährstoffverteilung einander ab. Der Saltzgehalt, der im gesamten östlichen Gotlandbecken in der Tiefen 12 - 12,6 ‰ betrug, änderte sich dagegen kaum. Eine Zunahme der Trübungswerte im Tiefenwasser wird auf die Ausscheidung von Schwefel zurückgeführt.

Bei den Werten in Tabelle 1 handelt es sich um eine willkürliche Auswahl. Die Übergänge zwischen den einzelnen Messserien erfolgten kontinuierlich. Zur Deutung der in Tabelle 1 beobachteten Variabilitäten wurden Strommessungen auch in 200 und 235 m Tiefe durchgeführt.

T a b e l l e 1

Varisbilitäten im Tiefenwasser auf Danerstation 15 A

	Tiefe (n)	Datum 6.10./6.00	8.10./3.00	9.10./6.00	11.10./3.00
O_2	150	2.12	0,17	0,20	0,34
	175	0,00	0,00	0,00	0,00
ml/1	200	0,00	0,34	0,06	0,00
	225	0,41	0,00	0,00	0,00
	Boden	0,33	"	1,29	0,00
H_2S	150	0,00	0,00	0,00	0,00
	175	0,09	0,75	0,67	0,46
ml/1	200	0,42	0,00	0,00	0,75
	225	0,00	0,35	0,40	1,60
	Boden	0,00	0,90	0,00	1,60
PO_4-P	150	1,83	3,15	2,91	3,04
	175	,64	6,13	5,51	5,81
µg-st./1	200	5,59	5,16	4,59	6,83
	225	5,10	6,13	5,70	8,77
	Boden	5,01	7,14	3,14	8,06
WO_3-N	150	3,94			3,81
	175	0,09			0,17
µg-at./3	200	0,02	—	—	0,13
	225	0,66			0,18
	Boden	1,21			0,18
NN_4-N	150	0,2			0,2
	175	4,4			4,4
µg-at./1	200	5,7	—	—	6,3
	225	5,6			8,3
	Boden	5,8			9,3
SiO_4-Si	150	61,79			82,24
	175	95,38	—	—	98,18
µg-st./1	200	101,41			103,13
	225	93,44			124,66
	Boden	90,64			122,94
T ° C	150	4,9	5,5	5,4	5,3
	175	4,5	5,6	5,7	5,6
(unkorr.)	200	5,5	5,3	5,4	5,6
	225	5,2	5,3	5,3	5,7
	Boden	5,1	5,4	4,9	5,7

Eine gering schwefelwasserstoffhaltige Zwischenschicht in 150 - 175 m Tiefe wurde auch auf Station 20A und in 125 m Tiefe auf Station 19B angetroffen. Die Wiederholungsmessungen auf den Stationen 15A und 11B während der Heimreise ergaben auf der 1. Station wiederum eine H_2S-haltige Zwischenschicht in 175 und 200 m Tiefe während auf 11B überhaupt kein H_2S mehr angetroffen wurde. Die Gesamtheit dieser Beobachtungen deutet darauf hin, dass sich im östlichen Gotlandbecken umfangreiche oceanologische Umschichtungen im Tiefenwasser vollziehen und im Gotland-sowie im Fårö-Tief in naher Zukunft wieder oxydierende Verhältnisse vorliegen werden.

Im Gegensatz zum östlichen Gotlandbecken sind die Sauerstoffverhältnisse westlich der Insel nach wie vor ungünstig oder haben sich weiter verschlechtert. So wurde auf den Stationen 38A (70m) x), 36B (80m), 32B (100m), 31A (125m) und 30B (125m) Schwefelwasserstoff nachgewiesen. Eine leichte Besserung scheint dagegen auf den nordöstlichen Stationen 29A (100m), 28B (125m) und 27A (110m) einzutreten, während auf den Stationen 26B und 25A gegenüber finnischen und polnischen Beobachtungen kein Schwefelwasserstoff mehr angetreffen wurde. Die Phosphat- und Ammoniumkonzentrationen in der schwefelwasserstoffhaltigen Tiefenschicht erreichten mit 2,5 - 3,5 µg-at. PO_4-P/l bzw. 1,4 - 3,4 µg-at. NH_4-N/l nicht so hohe Werte wie im östlichen Gotlandbecken (vgl. Tab.1). Der Salzgehalt des Tiefenwassers lag im westlichen Gotlandbecken zwischen 10,5 - 10,9 ‰, während im nordöstlichen Teil Werte von 11 - 11,3 ‰ erreicht wurden.

Im finnischen Meerbusen ist der gegenüber den anderen Ostseeregionen höhere Mikronährstoffgehalt im Oberflächenwasser (Station 22A: 0,3 µg-at. PO_4-P/l und 1,2 µg-at.NO_3-N/l) auffällig.

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x) Die in Klammern stehenden Zahlen geben die oberste Messtiefe an, in der H_2S auftrat.

Nördlich von Station 10B wurde in den oberen 25 m eine Blüte von Aphanisomsnon (Cyanophycene) festgestellt. Lediglich auf Station 38A fanden wir die Alge nicht. Das Zooplankton war gewöhnlich ebenfalls in der Schicht 0 - 25 m am stärksten vertreten. Benthos konnte nördlich der IBY-Station 8 A nicht mehr nachgewiesen werden.

An Bord, d. 25.10.1969

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Warnemünde, Seestr. 15

3. Bearbeitete Stationen, durchgeführte Messungen und Zahl der gesammelten Proben

Stat.	$T^{\circ}0$	S°/oo	0_2	H_2S	PO_4	NH_4	NO_2	NO_3	SiO_4	Alk.	Chloro.	^{14}C	Plankton Zoo-	Plankton Phyto-	Benth.	Sest.
1 B	8	8	8	-	4	8	8	8	8	5	5	5	2	-	1	6
2 A	8	8	8	-	8	8	8	8	8	5	5	-	-	5	1	6
4 B	10	10	10	-	10 xx)	10	10	10	10	10	7	5	3	5	1	8
5 A	12	12	12	-	10 xx)	11	12	12	12	10	7	5	3	-	1	8
7 A	12	12	12	-	12	12	12	12	12	10	7	5	3	5	1	8
8 A	13	13	13	-	13	13	13	13	13	11	7	5	3	5	1	8
9 A	14	14	14	1	14	14	14	14	14	10	7	5	3	-	1	8
10 B	14	14	14	2	14	14	14	14	14	12	7	5	4	5	1	10
11 B	16	16	15	4	16	16	16	16	16	14	7	5	4	-	1	11
15 A	19	19	19	6	19	19	19	19	19	13				5	1	12
15 A	19	19	19	6	19	19	19	19	19	15				-	-	-
19 B	14	14	14	2	14	14	14	14	14	12	7	-	4	-	1	10
20 A	17	17	17	3	16	17	17	17	17	13	7	5	4	5	1	11
21 B	13	13	13	1	13	13	13	13	13	10	7	-	4	-	1	9
30 B	12	12	12	2	12	12	12	12	12	12	7	-	4	-	1	10
31 A	19	19	19	7	19	19	19	19	19	17	7	5	4	5	-	13
32 B	13	13	13	4	13	13	13	13	13	12	7	-	4	-	1	10
36 B	11	11	11	5	11	11	11	11	11	10	7	-	3	-	-	9
38 A	14	14	14	8	14	14	14	14	14	11	7	-	3	5	1	8
20 A	18	18	18	4	18	18	18	18	18	14	7	-	-	-	-	-

Stat.[x]	T°C	S°/oo	O_2	H_2S	PO_4	NH_4	NO_2	NO_3	SiO_4	Alk.	Chloro.	^{14}C	Plankton Zoo-	Plankton Phyto-	Benth.	Sest.
29 A	15	15	15	5	15	15	15	15	15	13	7	5	3	5	1	10
28 B	13	13	13	5	13	13	13	13	13	12	7	-	4	5	1	10
27 A	14	14	14	4	14	14	14	14	14	11	7	5	3	5	1	8
26 B	10	10	10	2	10	10	10	10	10	10	7	-	3	-	1	8
25 A	10	10	10	1	10	10	10	10	10	8	6	5	2	5	1	7
24 B	8	8	8	1	8	8	8	8	8	8	6	-	2	-	1	7
23 B	8	8	8	1	8	8	8	8	8	8	6	-	2	-	1	7
22 A	10	10	10	1	10	10	10	10	10	7	5	5	2	5	1	6
15 A	12	12	12	6	12	12	12	12	12	-	-	-	-	-	-	-
11 B	12	12	12	4	12	12	12	12	12	-	-	-	-	-	-	-

DS 15A 40 Serien mit jewells 12 Tiefen ($T^{\circ}C$, S°/oo, O_2, H_2S, PO_4) sowie 5 x 7 Chlorophyllproben, 75 in-situ- und Tankversuche nach der ^{14}C-Methode, 2 x 4 und 1 x 6 Zooplanktonstufenhols

x) In der Reihenfolge ihrer Bearbeitung; xx) Wasser für PO_4-Proben musste extra geschöpft werden.

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REPORT ABOUT CRUISE

r/v "Mazirbe" from 15.10.69 to 6.11.69
on the "Baltic Year -69" Programme.

On the 15th October the r/v "Mazirbe" left Riga. On October 18 at 06 GMT the r/v "Mazirbe" began its work on the hydrological station 2A. Station 5A was fulfilled the same day. On October 19 oceanographic work was fulfilled on the station 7A, 8A, 9A and the next day on station 38A.

From October 21 to 23 the oceanographic work was fulfilled on the stations 15A, 20A, 28B and 27A.

The meteorological conditions had been favourable so far, but on the ship's way to Klaipeda the wind gained power to 7-8 Beaufort.

On October 25 the r/v "Mazirbe" anchored at Klaipeda to get new supplies of fuel and provision. It remained in the port till October 31 became of stormy weather. Late in the afternoon of October 31, the weather improved and the r/v "Mazirbe" went to sea to fulfill the oceanographic work on the anchor station 15A.

On November 1 at 06 GMT the first series on this station was accomplished when the wind was 12.6 m/sec. The wind greatly increased in force. At 21 GMT it was 23.4 m/sec. and at 02 GMT on November 2 it was 30.3 m/sec. Thus the expedition failed to fulfill the work on this station.

The work on station 15A was resumed at midnight on November 3. Because the meteorological conditions had been very unfavourable, only ten series of observation could be made. On November 5 at midnight the last series of observation was completed at station 15A and on November 6 the r/v "Mazirbe" returned to Riga.

Work fulfilled during the cruise of r/v "Mazirbe" according to the programme of "Baltic Year -69" (15.X - 6.XI.69)

Station	Date	Kinds of observation							
		t°	S‰	O_2	PO_4	Si	NO_2	AL_k	pH
2A	18.X	+	+	+	+	+	+	+	+
5A	18.X	+	+	+	+	+	+	+	+
7A	19.X	+	+	+	+	+	+	+	+
8A	19.X	+	+	+	+	+	+	+	+
9A	19.X	+	+	+	+	+	+	+	+
15A	21.X	+	+	+	+	+	+	+	+
20A	22.X	+	+	+	+	+	+	+	+
27A	23.X	+	+	+	+	+	+	+	+
28B	23.X	+	+	+	+	+	+	+	+
38A	20.X	+	+	+	+	+	+	+	+
15A	3-5.XI	+	+	+	+	+	-	-	-

Report from an expidition with the r/v "Alexander Smirnov"
According of the Baltic Year 1969 Program

The work was started on the 31st of October at the station 25A and was continued during the 1st of November at the station 23 B. The investigations were interrupted because of the storm. The investigations were continued on the 5th of November at the station 22A. It was a moderate sea at that time. The middle hight of waves was 0.75-2.0 m.

The "standard" depths were 0.5.10.15.20.30.40.50.60 m and bottom.

At the sea surface the temperature was from 8.0°C in the west to 5.9°C in the east. At the bottom the temperature of the water was about 3.0°C.

The most changes in concentration of the chemical parameters were observed at the depth 60 m at the station 25A and at the depth 50 m at the stations 23B and 22A.

At the station 25A salinity was 6.46 ‰ at the sea surface, and 8.22 ‰ at the bottom. Minimum of oxygen was 3.27 ml/l at the bottom. Minimum of phosphate-phosphorus was at the depth 15-60 m. The concentration of phosphate-phosphorus was 2.20 µgat/l at the bottom.

At the station 23B salinity was 6.31 ‰ at the sea surface and 7.25 ‰ at the bottom. The concentration of oxygen was 4.85 ml/l at the bottom. Minimum of phosphate-phosphorus was at the sea surface and the concentration of phosphate-phosphorus was 1.32 µgat/l at the bottom.

At the station 22A salinity was 6.04 ‰ at the sea surface and 7.79 ‰ at the bottom. Maximum of oxygen was 8.14 ml/l at the depth 20 m and the concentration of oxygen was 3.40 ml/l at the bottom. The concentration of phosphate-phosphorus was 2.07 µgat/l at the bottom.

The stations and determinations carried out during the 1969 Baltic Year Program
on the 31th of October and the 1st and 5th of November 1969 by r/v "Aleksander Smirnov"- USSR

Station	Day	T	Cl	O_2	pH	Alk	PO_4	SiO_3	NO_2
25A	1/XI	x	x	x	x	x	x	x	x
23B	1/XI	x	x	x	x	x	x	x	x
22A	5/XI	x	x	x	x	x	x	x	x

The Baltic Year Cruise, November 11 - 28 1969

by

R/V "Skagerak"

Due to hard wheather the expedition didn't leave the port of Göteborg until November 11 at 1500 GMT. In Kattegatt the stations "SW Vinga", "Fladen", "Lilla Middelgrund" and "Kullen" were worked on our way to the Baltic. The "Skagerak" arrived at station BY-1B on November 12 at 1330 GMT. The stations 2A, 3B and 4B were worked, but at 4B the strong wind (SSW 9B) forced the expedition to go to Karlskrona for 24 hours. On November 14, we proceeded from station 5A up to station 21B, where we arrived on November 16 at noon. We then proceeded next day from station 22A to station 31A. Having completed the work on station 31A on November 18 the expedition arrived at Nynäshamn for some hours for water and fuel. Next day the work proceeded from station 32A to 37B and also one extra station on territorial water (station 13/9) was worked. The weather in the central Baltic was unsuitable for anchoring east of Gotland and the expedition waited for better weather in Västervik for 24 hours and then went to Slite and remained there until November 23 when the weather had improved. "Skagerak" achored at station 15A on November 24 at 0500 GMT. Bathythermograph sounding was carried out every hour and hydrographic series every third hour. Once a day we made a complete series as on "A-stations". During the first night the wind turned from NW to NE and increased. At 0900 GMT. next day it was 7 B and it was considered necessary to weigh anchor. Due to bad weather-forecast it was regarded impossible to continue work on station 15A and "Skagerak" left the station. On our way home the station 38A and 39B were worked. In order to get as many samples for productivity determinations as possible, one extra station in the Hanö Bay at N 55° 43', E 15° 18' was worked. The great variability observed at station 15A by the DDR-expedition in September - October was gone. At our two visits, November 15 and 24-25 no H_2S was detected. The oxygen-values showed a minimum between 150 m and 200 m (O_2 0.10 - 0.40 ml/l) and then a slight increase at 200-240 m (O_2 1.10-1.50 ml/l). In the Gulf of Finland no H_2S was detected.

Hydrogen sulphide appeared at the following stations (upper limit in brackets): 28B (125), 29A (150), 30B (125), 31A (125), 32B (90), 33B (70), 34B (80), 35B (80), 36B (90) and 38A (70).

The stations and samples taken are listed below.

Station	S ‰	t°C	O_2	H_2S	pH	PO_4	Tot.P	NH_2OH	NH_3	NO_2	NO_3	Tot.-N	Si	Alkal.	C^{14}	Trit.	Phyto P	Zoop.	Bottom-samp.
BY- 1B	x	x	x		x	x	x							x					
BY- 2A	x	x	x		x	x	x		x	x	x	x	x	x		x			x
BY- 3B	x	x	x		x	x													
BY- 4B	x	x	x		x	x													
BY- 5A	x	x	x		x	x	x		x	x	x	x	x	x		x	x	x	x
BY- 7A	x	x	x		x	x	x		x	x	x	x	x	x			x	x	x
BY- 8A	x	x	x		x	x	x		x	x	x	x	x	x			x	x	x
BY- 9A	x	x	x		x	x	x		x	x	x	x	x	x					x
BY-10B	x	x	x		x	x			x	x	x	x			x				
BY-11B	x	x	x		x	x													
BY-12B	x	x	x		x	x													
BY-13B	x	x	x		x	x													
BY-14B	x	x	x		x	x													
BY-15A	x	x	x		x	x	x		x	x	x	x	x	x		x	x	x	x
BY-16B	x	x	x		x	x													
BY-17B	x	x	x		x	x													
BY-18B	x	x	x		x	x													
BY-19B	x	x	x		x	x													
BY-20A	x	x	x		x	x	x		x	x	x	x	x	x	x		x		
BY-21B	x	x	x		x	x													
BY-22A	x	x	x		x	x	x		x	x	x	x	x	x	x				x
BY-23B	x	x	x		x	x													
BY-24B	x	x	x		x	x													
BY-25A	x	x	x		x	x	x		x	x	x	x	x	x					x
BY-26B	x	x	x		x	x			x	x	x	x							
BY-27A	x	x	x		x	x	x		x	x	x	x	x	x					
BY-28B	x	x	x	x	x	x										x			
BY-29A	x	x	x	x	x	x	x	x	x	x	x		x						
BY-30B	x	x	x	x	x	x		x											
BY-31A	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x			
BY-32B	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
BY-33B	x	x	x	x	x	x													
BY-34B	x	x	x	x	x	x	x						x	x					
BY-35B	x	x	x	x	x	x													
BY-36B	x	x	x	x	x	x			x	x	x	x							
BY-37B	x	x	x		x	x								x	x				
13/9	x	x	x		x	x													
BY-15A	x	x	x		x	x	x	x	x	x	x	x	x	x	x				
BY-38A	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
BY-39B	x	x	x		x	x			x	x	x	x							
N 55°43′ E 15°18′′	x	x			x									x	x				

Göteborg December 16, 1969

Sven G. Engström
Leader of Expedition

Fahrtbericht über die 3. Meßfahrt des FS. "Prof. Albrecht Penck" anläßlich des Internationalen Ostseejahres (IBY) vom 30.11. bis 17.12.1969

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1. Fahrtablauf

Am 30.11.1969 wurde bei Windstärken um 6 Bft. mit den Untersuchungen auf Station 7 A begonnen. Wegen weiterer Zunahme des Windes mußte die Meßtätigkeit vorübergehend eingestellt werden. Nach Wetterberuhigung wurden am 1.12. die Stationen 8 A und 9 A bearbeitet. Während des 2.12. erfolgten Messungen auf den Stationen 10 B, 11 B und 15 A, wobei die Arbeiten auf der letzten Station bereits wiederum bei Windstärken von 6 - 7 Bft. durchgeführt werden mußten. Nach Abflauen des Windes konnten am 3. und 4.12. die Stationen 19 B, 20 A, 21 B, 29 A, 27 A, 25 A, 24 B und 23 B bearbeitet werden. Am Vormittag des 5.12. wurden in Helsinki die auf der "Aranda" im Sommer gesammelten Phytoplanktonproben zur Bearbeitung übernommen.

Vom Abend des 5.12. bis zum Morgen des 8.12. wurden bei günstigem Wetter Messungen auf den Stationen 22 A, 26 B, 28 B, 30 B, 31 A, 32 B, 37 B, 36 B, 35 B und 38 B durchgeführt. Zur Übernahme von Wasser und Proviant wurde am 8. und 9.12. Visby angelaufen.

Am 10.12. wurden die Untersuchungen auf Station 38 A fortgesetzt. Anschließend wurde mit den Messungen auf Dauerstation 15 A begonnen. Durch den zeitweiligen Ausfall bei der Serienwinden und den dadurch bedingten Zeitverlust mußten die Untersuchungen auf dieser Station auf 2 Tage beschränkt werden.

Am 13.12. wurden die Stationen 39 B, 4 A und 3 B bearbeitet, und am 14.12. erfolgten Messungen auf Station 6 B. Anschließend war eine längere Schlechtwetterperiode mit starken Südost- bis Nordostwinden von 6 - 8 Bft., so daß das Schiff am 15. und 16.12. unter Landschutz gehen mußte. Am 16.12. wurde bei Windstärken von 16 m/s die Station 1 B bearbeitet. Die Meßfahrt wurde am 17.12. beendet, da das FS"Prof. A. Penck" am folgenden Tag zur Jahresdurchsicht in die Werft mußte.

2. Vorläufige Ergebnisse und Beobachtungen

Im Arkonabecken (Station 1 B) war der sehr niedrige Salzgehalt in Bodennähe auffällig, der mit etwa 10 °/oo nur halb so groß war wie bei früheren Untersuchungen. Vielleicht war hierfür die intensive Ostwindwetterlage während der Probeentnahme verantwortlich.

Im Bornholmbecken (Stationen 3 B u. 4 A) lag der Salzgehalt des Tiefenwassers bei 16,5 bis 17 °/oo, während der Sauerstoffgehalt mit 2 - 2,4 ml/l gegenüber Oktober weiter abgesunken ist. Dagegen haben sich die Sauerstoffverhältnisse im östlichen Gotlandbecken sehr gebessert. Schwefelwasserstoff wurde nicht mehr angetroffen. Auf Station 15 A lag der Sauerstoffgehalt in Bodennähe (240 m) bei etwa 1,3 ml/l. Darüber befand sich in 175 - 200 m Tiefe ein intermediäres Sauerstoffminimum mit 0,2 - 0,3 ml/l, das mit einem Phosphat- und Silikatmaximum (3,3 - 3,8 µg-at. PO_4-P/l und 90 - 100 µg-at. SiO_4-Si/l) korreliert war. Entsprechend den geringeren Tiefen wurden auf den Stationen 10 B, 11 B, 19 B und 20 A die niedrigsten Sauerstoffwerte in Bodennähe angetroffen. Außerdem war auf diesen Stationen sowie auf den Stationen 8 A und 9 A ebenso wie bei früheren Messungen in 80 - 90 m Tiefe ein intermediäres Sauerstoffminimum vorhanden, das sich auch auf Station 15 A noch nachweisen ließ.

Der Salzgehalt im östlichen Gotlandbecken lag in 150 - 240 m Tiefe zwischen 11,9 und 12,8 °/oo. Auf Station 20 A war in 90 - 110 m Tiefe ein ausgeprägtes Nitratminimum vorhanden, das vielleicht auf den Einstrom von Wasser aus dem nördlichen oder westlichen Gotlandbecken, in denen noch ungünstige Sauerstoffverhältnisse herrschten, zurückzuführen ist.

Nordöstlich und westlich von Gotland wurde auf den Stationen 29 A (sehr geringe Mengen nur in der 125-m-Zwischenschicht), 27 A (150m)*), 28 B (125 m), 31 A (175 m), 32 B (125 m),

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*) Die in Klammern stehenden Zahlenangaben geben die oberste Meßtiefe an, in der H_2S auftrat.

36 B (125 m), 34 B (98 m) und 38 A (90 m) Schwefelwasserstoff angetroffen. Dabei ist jedoch gegenüber unseren Messungen im Oktober der absolute Gehalt an H_2S wesentlich geringer geworden, und sauerstoffhaltiges Wasser ist in größere Tiefen vorgedrungen. Es ist damit zu rechnen, daß in naher Zukunft auch in diesen Gebieten in Bodennähe kein Schwefelwasserstoff mehr vorhanden sein wird.

Entsprechend der Jahreszeit war der Phosphatgehalt im Oberflächenwasser verhältnismäßig hoch. Es waren jedoch zwischen den einzelnen Gebieten deutliche Unterschiede vorhanden. So wurden in der Arkona- und Bornholmsee sowie im östlichen Gotlandbecken Phosphatkonzentrationen von 0,2 bis 0,25 µg-at./l an der Oberfläche gemessen. Im Finnischen Meerbusen stiegen die Werte von 0,44 µg-at./l (Station 24 B) auf 0,60 µg-at./l (Station 22 A) an. Nordöstlich und westlich von Gotland lagen die Oberflächenwerte bei 0,4 - 0,5 µg-at./l.

Auf den Stationen in der Gotlandsee und im Finnischen Meerbusen fielen erneut Konzentrationen von Aphanizomenon spec. in den obersten 20 m auf. Dazu waren häufig dichte Schwärme von Aurelia aurita zu beobachten. Im grundnahen Wasser stellten wir im Bornholmbecken Sagitta spec. in größerer Zahl fest.

Benthos fehlte in den tiefen Becken, auch wenn Sauerstoff über dem Grund nachzuweisen war, noch völlig.

Warnemünde, d. 19.12.1969

Dr. Nehring
Fahrtleiter

3. Bearbeitete Stationen, durchgeführte Messungen und Zahl der gesammelten Proben

Stat.*)	T°C	S°/oo	O_2	H_2S	PO_4	NH_4	NO_2	NO_3	SiO_4	Alk.	pH	Chloro.	^{14}C	Plankton- Zoo.-	Phyto-	Benth.	Sest.
7 A	12	12	12		12	12	12	12	12	10	12	7	5	3	5	1	8
8 A	13	13	12		13	13	13	13	13	9	13	7	5	3	5	1	8
9 A	15	15	15		15	15	15	15	15	2	15	7	5	3	5	1	8
10 B	14	14	14	2	14	14	14	14	14	14	14	7	5	4	5	1	10
11 B	16	16	16	5	16	16	16	16	16	14	15	7		5	5	1	11
15 A	20	20	20	6	20	20	20	20	20	16	20	7	5	4	5	1	12
19 B	14	14	14	4	14	14	14	14	14	12	12	7		4		1	9
20 A	16	16	16	4	16	16	16	16	16	15	14	7	5	5	5	1	11
21 B	13	13	13	4	13	13	13	13	13	11	13	7		4		1	11
29 A	13	13	12	5	13	13	13	13	13	13	13	7	5	5	5	1	10
27 A	12	12	12	4	12	12	12	12	12	12	12	7	5	4	5	1	8
25 A	10	10	10		10	10	10	10	10	8	10	5	5	2	5	1	6
24 B	8	8	8		8	8	8	8	8	8	8	5		2		1	6
23 B	8	8	8		8	8	8	8	8	8	8	5		2		1	6
22 A	10	10	10		10	10	10	10	10	8	10	5	5	2	5	1	6
26 B	12	12	12	1	12	12	12	12	12	12	12	7		2		1	8
28 B	13	13	13	5	13	13	13	13	13	13	13	7		3		1	10
30 B	13	13	13	6	13	13	13	13	13	12	13	7		3			9
31 A	17	17	17	8	17	17	17	17	17	15	16	7	5	5	5		13
32 B	13	13	13	5	13	13	13	13	13	13	13	7		4			10
37 B	8	8	8	1	8	8	8	8								1	
36 B	13	13	13	5	13	13	13	13	13	12	12	7		3			9

(Forts. s. Bl. 2)

Stat.*)	T°C	S°/oo	O_2	H_2S	PO_4	NH_4	NO_2	NO_3	SiO_4	Alk.	pH	Chloro.	^{14}C	Plankton- Zoo.	Phyto-	Benth.	Sest.
35 B	10	10	10	2	10	10	10	10									
38 A	12	12	12	4	12	12	12	12	12	11	12	7		3			8
39 B	6	6	6		6	6	6	6	6	6	6	5		2			7
5 A	12	12	12		12	12	12	12	12	10	12	6	5	3		1	8
4 B	10	10	10		10	10	10	10	10	10	10	7		4		1	9
6 B	8	8	8		8	8	8	8	8	8	8	5				1	
1 B	7	7	7		7	7	7	7	7	5	7	4			4		6

DS 15 A: 16 Serien mit jeweils 12 Tiefen (T°C, S°/oo, O_2, H_2S, PO_4) sowie 21 Chlorophyllproben
25 ^{14}C-Bestimmungen und 15 Zooplanktonhols

*) In der Reihenfolge ihrer Bearbeitung

The Baltic Year Cruise January 12-30, 1970

by

R/V Skagerak

The expedition left Göteborg at 10.00 on January 12. The stations W. Vinga, Fladen, L:a Middelgrund and Kullen were worked in the Kattegatt. Due to fog the work in the Baltic started late in the evening on January 13 at station BY 1. The stations were worked in the following order during the first week: BY 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 15, 19, 20, 21, 28, 26, 25. From station 8 the northerly wind increased and due to the danger of overicing the speed had to be reduced. The weather was cold, several degrees below zero and difficulties with ice on the meterwheel were encountered during the work. On some stations the bottom sampling and planktonsampling had to be cut out due to the bad weather and overicing. Before station BY 24 the ice conditions worsened and solid ice cover was encountered. It was decided to turn back at this point and an extra station BY Extra 1 was taken there. In order to remove the ice from decks and rigging the port of Hanko was wisited. The expedition left Hanko at noon January 19. The weather conditions had improved and the following stations were worked: BY 27, 29, 30, 31, 32, 37, 36, 35, 34, 33, 38 and the stations När I, II and III. The port of Slite was visited on the 22 for refueling. The ship left immediately again. The stations BY 12, 13, 14, 16, 17 were worked. Due to the heavy ice the station BY 18 could not be reached. An extra station BY Extra 2 was taken at the ice border. Then the ship went to station BY 15 and anchored at 246 m. January 23 early in the morning the anchor program was started at 06.00. The weather conditions were still good, but the wind increased during the 26:th and after 18.00 it was decided to weigh anchor and leave the station. Due to engine trouble it was decided to go to Karlskrona. The stations Segerstad I, II, III and BY 39 were worked on the way to Karlskrona. The engine could not be properly repaired in Karlskrona and it was decided to go directly home to Göteborg without visiting BY 6. The ship arrived to Göteborg January 30 at 21.00. Sampling of fish eggs and larvae was carried out on special stations.

No H_2S was found in the southern and eastern Baltic. Oxygen rich water is still present in the deep basins there. An intermediate layer of almost oxygen free water was observed. In the Landsort Deep (BY 31) H_2S was found from 300 m. H_2S was also found in the Norrköping Deep

(BY 32) and at station BY 36 between Visby and Västervik. From BY 38 the H_2S had disappeared. The conditions in the Baltic have still improved and soon all traces of H_2S will have disappeared. Most probably a new stagnation period will begin when the new oxygen has been used up.

Göteborg 9/2 1970

Stig H. Fonselius
Chief scientist

Station	+	S	O_2	H_2S	pH	PO_4-P	tot-P	Alk.	Si	NH_3	NO_2	NO_3	tot-N	C-14	Tritium	Trace metals	Phytopl.	Zoopl.	Bottom-samples
BY 1B	x	x	x		x	x													
2A	x	x	x		x	x	x	x	x	x	x	x	x				x		x
3B	x	x	x		x	x													
4B	x	x	x		x	x													x
5A	x	x	x		x	x	x	x	x	x	x	x	x	x	x		x	x	x
N55°10' E16°20'	x	x			x			x						x					
7A	x	x	x		x	x	x	x	x	x	x	x	x				x	x	x
8A	x	x	x		x	x	x	x	x	x	x	x	x				x	x	x
9A	x	x	x		x	x	x	x	x	x	x	x	x				x		x
10B	x	x	x		x	x													
11B	x	x	x		x	x													
15A	x	x	x		x	x	x	x	x	x	x	x	x			x			
19B	x	x	x		x	x													
20A	x	x	x		x	x	x	x	x	x	x	x	x				x		x
21B	x	x	x		x	x													
28B	x	x	x		x	x													
26B	x	x	x		x	x													
25A	x	x	x		x	x	x	x	x	x	x	x	x				x		x
N59°36' E23°28'	x	x			x											x			
27A	x	x	x		x	x	x	x	x	x	x	x	x				x		x
29A	x	x	x		x	x	x	x	x	x	x	x	x				x		x
30B	x	x	x		x	x													
31A	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x
32B	x	x	x	x	x	x	x	x	x	x	x	x	x		x		x		
37B	x	x	x		x	x													
36B	x	x	x	x	x	x			x										
35B	x	x	x		x	x													
33B	x	x	x		x	x													
N57°18' E17°47.7'	x	x			x									x					
38A	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x
12B	x	x	x		x	x													

13B	x	x	x		x	x													
14B	x	x	x		x	x													
16B	x	x	x		x	x													
17B	x	x	x		x	x													
18 ice N57°14.8' E20°49.5'	x	x	x		x	x													
15A	x	x	x		x	x	x	x	x	x	x	x	x				x	x	x
15A[x]	x	x	x			x								x[xx]					
39B	x	x	x		x	x													

x anchored xx twice

The Baltic Science Research Institute
of Fishery Department
Riga, Bezdeligy street, 1.

Report about the cruise.

r/s "Mazirbe" from 11/2 to 2/3 1970

according to the programme "Baltic Year -69".

On the night of February , 11 r/s "Mazirbe" left Liepae to fullfill work according to the international research programme "Baltic Year -69".

The route of the ship to the north was very hard due to the severe ice-conditions(the thickness of the ice layer in some places reached 8 - 9 balls) and somewhere in the middle of the route between station 27A and 28B the further advance became impossible and the ship turned back.

On February, 12 at 9.30 G.M.T. r/s "Mazirbe" started work at the oceanographic station 28B

During the period of February 13-20 under rather favourable meteorological and ice conditions oceanographic work was conducted at stations 20A, 15A, 38A, 9A, 8A, 5A.

It's interesting to note that from February 14- 15 r/s "Mazirbe" was foced to keep close to the shore not far from Ventspils due to stormy weather in the open sea.

The ice conditions in the south-western part of the Baltic Sea as well as in the north were very unfavorale. Some 14 miles to the north-east of station 2A the ship was obliged to make a stop, because of a very thick ice layer. Besides the south-eastern wind grew very strong(to 13.5 m/sec). In a small fairway under conditions of very strong drifting of the ship supplementary oceanographic station 2B (N55°11"0 and E 14°18"5) was accomplished.

On February,20 r/s"Mazirbe" headed for Klaipeda take in a supply of fuel and provision. On its way to Klaipeda the advance of the ship was hampered by stormy winds and ice formation the ship had to stop frequently in order to get rid of the icing.

OnFebruary 25, 1970 at 11.00 G.M.T. the first series of multi-day station was fulfilled. The multi-day station 15A was fulfilled while drifting, as ice thickness of different kinds increased with every day. The drifting of the ship made it more difficult tocarry out the the oceanographic work and in order to begin a new series of obsevation it was necessary to find patches of water free from ice.

On February,27 at 5.00 G.M.T. under very unfavourable ice-conditions the last series of obsevation was completed.

By the night of March 2,1970 r/s "Mazirbe" returned to the port of Liepaya.

Work done during the cruise of r/s "Mazirbe"
according to the programme of "Baltic Year-69"
(11.2 - 2.3 1970)

Station	Date	Types of observations							
		t°C	S‰	O_2	PO_4	Si	NO_2	Alk	pH
28B	12-13.2	+	+	+	+	+	+	+	+
20A	13.2	+	+	+	+	+	+	+	+
15A	16.2	+	+	+	+	+	+	+	+
38A	16.2	+	+	+	+	+	+	+	+
9A	18.2	+	+	+	+	+	+	+	+
8A	18.2	+	+	+	+	+	+	+	+
7A	19.2	+	+	+	+	+	+	+	+
5A	19.2	+	+	+	+	+	+	+	+
2B	20.2	+	+	+	+	+	+	+	+
15A	25.2-27.2	+	+	+	+	+	+	+	+

Fahrtbericht über die 4. Meßfahrt des FS "Prof. A. Penck" (DDR) anläßlich des Internationalen Ostseejahres (IBY) vom 21.3. - 10.4.1970

1. Fahrtablauf

Die Arbeiten auf dieser Meßfahrt wurden erheblich durch die ungünstigen Eisverhältnisse erschwert. Verschiedene Stationen konnten erst nach mehreren vergeblichen Versuchen erreicht werden. Andere, insbesondere nördlich von Gotland, waren noch vollständig durch Eis blockiert.
Zunächst wurden die Stationen 1B (21.3.), 2 A, 3 B (22.3.), 4 B, 5 A (23.3.), 6 B, 7 A (24.3.), 8 A (25.3.), 9 A, 10 B (26.3.), 11 B, 15 A (27.3.), 19 B, 20 A, 21 B und 29 A (28.3.) bearbeitet, wobei die Messungen immer wieder infolge Windzunahme auf 6 - 7 Bft. unterbrochen werden mußten. Unmittelbar nördlich von Station 29 A war dichtes Treibeis (60 - 100 cm stark) vorhanden, so daß die weiter im Norden gelegenen Stationen nicht bearbeitet werden konnten. Der Versuch, die Stationen 30 B und 31 A vom Osten her zu erreichen schlug infolge des Eises ebenfalls fehl. Aus dem gleichen Grunde konnte auch die Station 32 B vom Osten her nicht erreicht werden. Ferner gelang es zunächst nicht, Visby von Süden her zur Übernahme von Wasser und Proviant anzulaufen. Lediglich die Station 38 A wurde am 30.3. unmittelbar vor der Treibeisgrenze bearbeitet. Da insbesondere der Wasservorrat unbedingt ergänzt werden mußte, wurde am 31.3. Ventspils angelaufen. Ungünstige Windverhältnisse verzögerten den Auslauftermin bis zum 2.4. Am 3.4. wurde mit den Messungen auf Ankerstation 15 A begonnen. In den Morgenstunden des 4.4. frischte der Wind sehr schnell auf maximal 17,5 m/s auf, so daß die Meßtätigkeit nach 24 Std. eingestellt werden mußte. Infolge der rapiden Windzunahme ließ sich das Ankergeschirr nicht mehr gefahrlos bergen, so daß der Sturm vor Anker liegend abgewettertwerden mußte. Erst am Abend nahm der Wind vorübergehend auf 10 m/s ab und der Anker konnte aufgenommen werden.
Die Messungen auf Ankerstation 15 A konnten auch später nicht weiter fortgesetzt werden, da der Wind in der Nacht wiederum

auf 7 - 8 Bft zunahm. Das Schiff erreichte am 5.4. auf der Westseite Gotlands Landschutz. Hier wurde am gleichen Tage die Station 34 B bearbeitet. Unmittelbar westlich dieser Station begann dichtes Treibeis. Die Station 32 B konnte infolge ausgedehnter Treibeisfelder nur unter größten Schwierigkeiten ebenfalls am 5.4. erreicht werden. Am Morgen des 6.4. wurde Visby zur Ergänzung von Wasser und Proviant angelaufen. Anhaltende südöstliche Winde hatten das Eis inzwischen weiter westwärts zur schwedischen Küste abgedrängt, so daß am 7.4. auch auf Station 35 B Messungen durchgeführt werden konnten. Schließlich wurden am 7.4. mit Station 39 B unsere Untersuchungen im Rahmen des IBY abgeschlossen.

2. Vorläufige Ergebnisse und Beobachtungen

Als wichtigste Beobachtung dieser Meßfahrt ist der erneute Austausch des Tiefenwassers im Bornholmbecken zu verzeichnen. Dabei stieg in Bodennähe der Salzgehalt auf 17 - 17,8 °/oo und der Sauerstoffgehalt auf 4 - 5 ml/l an (Station 4 B und 5 A) In etwa 80 m Tiefe war ein schwach ausgeprägtes Sauerstoffminimum vorhanden, das mit einem ebenfalls nur schwach ausgeprägten Phosphat- und Silikatmaximum korreliert war. Offensichtlich hatte bereits das gesamte salzreiche Tiefenwasser des vermutlich wiederum Anfang Februar erfolgten Salzwassereinbruchs das Arkonabecken passiert; denn in diesem Becken betrug der Salzgehalt in Bodennähe nur noch rund 16 bis maximal 18 °/oo.
Im östlichen Gotlandbecken lag der Salzgehalt in 200 - 240 m Tiefe zwischen 12,6 und 12,9 °/oo (Stationen 11 B und 15 A) bzw. 12 °/oo (Station 20 A). Der Sauerstoffgehalt des Tiefenwassers war gering. Auf den Stationen im Südteil des Beckens (10 B - 15 A) waren ab 125 m Tiefe weniger als 1 ml O_2/l vorhanden, während auf den Stationen des Nordteils (20 A und 21 B) sowie auf Station 29 A bereits ab 80 m Tiefe weniger als 1 ml/l gemessen wurden.
In Grundnähe waren nur noch 0,3 - 0,5 ml O_2/l vorhanden, im Färötief sogar nur 0,14 ml O_2/l. Auf den Stationen 8 A - 19 B

war in 80 - 100 m Tiefe ebenso wie bei unseren früheren Untersuchungen ein schwach ausgeprägtes Sauerstoffminimum vorhanden. Außerdem zeichnete sich auf Station 8 A bereits der erneute Einstrom von sauerstoffreicherem Tiefenwasser (> 5 ml/l) ins östliche Gotlandbecken als Folge des Salzwassereinbruchs ab.
Der Phosphatgehalt des Tiefenwassers im östlichen Gotlandbecken hatte gegenüber unseren Messungen im Dezember 1969 weiter abgenommen, das intermediäre Phosphatmaximum in 150 - 200 m war jedoch noch vorhanden. Hier betrug der PO_4-Gehalt 2,8 - 2,9 µg-at./l, während er sich auf Station 15 A in Grundnähe bis auf 1,6 µg-at./l verringert hatte. Auch der Silikatgehalt hatte beträchtlich abgenommen. Die Höchstwerte lagen nur noch bei 60 bis 80 µg-at. SiO_4-Si/l.
Besonders ungünstig sind nach wie vor die Sauerstoffverhältnisse im westlichen Gotlandbecken. Auf den Stationen 32 B (ab 125 m), 34 B (105 m) und 38 A (110 m) wurde im Tiefenwasser Schwefelwasserstoff angetroffen, auf den beiden letztgenannten Stationen allerdings nur in sehr geringen Konzentrationen und nur unmittelbar über dem Grund. Gleichzeitig mit dem Übergang vom oxydierenden zum reduzierenden Milieu veränderte sich die Konzentration der Mikronährstoffe in charakteristischer Weise, d.h. die Phosphat-, Silikat- und Ammoniumkonzentrationen stiegen stark an, während der Nitratgehalt auf nahezu Null absank.
Da die Frühjahrsentwicklung des Phytoplankton östlich Bornholms nicht eingesetzt hatte, war der Gehalt an Phosphat und Nitrat im Oberflächenwasser verhältnismäßig hoch. Er betrug 0,4 - 0,5 µg-at. PO_4-P/l und 1,7 - 1,8 µg-at. NO_3-N/l westlich von Gotland. Östlich der Insel wurden 0,3 - 0,4 µg-at. PO_4-P/l und 2 - 3 µg-at. NO_3-N/l ermittelt. Ähnliche Werte wurden auch im Bornholmbecken gemessen.

Im Arkonabecken wurden insbesondere beim Nitratgehalt erheblich niedrigere Werte festgestellt (< 1 µg-at./l), während der Phosphatgehalt relativ hoch war (0,2 - 0,3 µg-at./l).

Wie die produktionsbiologischen Untersuchungen zeigten, war in diesem Seegebiet bereits eine erhöhte pflanzliche Produktion vorhanden.
In den übrigen Gebieten befand sich das Plankton offensichtlich noch im winterlichen Zustand oder die Entwicklung war unbedeutend. Auffallend war wiederum das Auftreten von Aphanizomenon auf fast allen Stationen besonders in der östlichen und nördlichen Ostsee.
Das Volumen der Zooplanktonfänge war sehr gering, wie nach dem Entwicklungszustand des Phytoplanktons nicht anders zu erwarten.
Erstmalig während des IBY konnte im Bornholmbecken und im Südteil des östlichen Gotlandbeckens wieder Makrobenthos von uns nachgewiesen werden. Diese Wiederbesiedlung geht sicher auf die Besserung der Sauerstoffverhältnisse durch den 1969-iger Salzwassereinschub zurück. Allerdings besteht der Neubesatz zunächst nur aus einer Art, Scoloplos armiger. Dieser Polychaet kam in recht hohen Abundanzen (bis 150/m^2) vor. Im Südteil des östlichen Gotlandbeckens wurde auf der Station 8 A eine gute Besiedlung angetroffen. Auf Station 9 A konnte lediglich noch Harmothoe sarsi festgestellt werden. Nördlich dieser Station ließ sich unterhalb 100 m kein Benthos mehr nachweisen.

An Bord, d. 11.4.1970

Nehring

Dr. Nehring
Fahrtleiter

3. Bearbeitete Stationen, durchgeführte Messungen*) und Anzahl der gesammelten Proben

Stat.**)	T°C	S°/oo	O_2	H_2S	PO_4	NH_4	NO_2	NO_3	SiO_4	pH	Chloro.	^{14}C	Plankton Zoo-	Phyto-	Benth.	Seston	CO_2
1 B	7	7	7		7	7	7	7	7	7	5	5	2		1	5	5
2 A	9	9	9		9	9	9	9	9	9	5	5	2	5	1	5	5
3 B	6	6	6		6	6	6	6	6	6	5	5			1	5	
4 B	10	10	10		10	10	10	10	10	10	14	10	3		2	7	5
5 A	12	12	12		12	12	12	12	12	12	14	15	6	5	2	7	10
6 B	8	8	8		8	8	8	8	8	8	6	5	2		1	6	5
7 A	12	12	12		12	12	12	12	12	12	7	10	3	5	1	7	5
8 A	12	12	12		12	12	12	12	12	12	7	10	3	5	1	7	5
9 A	15	15	15		15	15	15	15	15	15	7	10	3	5	1	7	5
10 B	14	14	14	1	14	14	14	14	14	14	7	10	4		1	7	5
11 B	16	16	16	3	16	16	16	16	16	16	7	5	5		1	10	5
15 A	19	19	19	6	19	19	19	19	19	19	7	5	4	5	1	11	5
19 B	14	14	14	1	14	14	14	14	14	14	7	5			1	8	5
20 A	16	16	16	3	16	16	16	16	16	16	7	5	5	5		10	5
21 B	13	13	13		13	13	13	13	13	13	7	5	4			8	5
29 A	13	13	13	3	13	13	13	13	13	13	7	5	4	5	1	7	5
38 A	13	13	13	2	13	13	13	13	13	13	7	10	4		1		
34 B	12	12	12	2	12	12	12	12	12	12							
32 B	16	16	16	5	16	16	16	16	16	16	7	10				9	
35 B	10	10	10	1	10	10	10	10		10							
39 B	6	6	6		6	6	6	6	6	6	5		2		1	5	

DS 15 A: 9 Serien mit jeweils 12 Tiefen ($T°C$, $S°/oo$, O_2, H_2S, PO_4) sowie 7 Chlorophyllproben, 10 ^{14}C-Proben und 12 Zooplanktonhols.

*) Alkalinitätsbestimmungen konnten aus innerbetrieblichen Gründen nicht erfolgen.

**) In der Reihenfolge ihrer Bearbeitung.

Cruise Report Baltic Year

RV "ALKOR" Institute for Marine Research Kiel
University 13. - 30. April 1970

RV "Alkor" left Kiel as planned with 10 scientists and technicians on Monday, April 13, and reached the first station at Slupsk Sill on Apri 14 at noon. From there the stations 6, 7a, 7b and 7c were occupied and the full hydrographical, chemical and biological programme could be carried out. The stations started with the hydrocast followed by the in situ registrations of oxygen tension and temperature. Large water samples were taken for fundamental investigations and finally the bio logical sampling for productivity and plankton was carried out. On mos of the stations sediment samples were taken for qualitative and quanti tative investigation of organic substance. After the station in the Gdansk Deep "Alkor" set course for a longitudinal section in the Got- land Basin. There the stations 8a, 9a, 10b, 11b and 19b were occupied. From there "Alkor" went to the station 15a in the central Gotland Basin where an array with 10 current meters was anchored. "Alkor" stayed at station 15a for five days. Every three hours a hydrographical cast and an oxygen temperature record was carried out. Every six hours biologi- cal sampling programme was done. Productivity measurements with in situ incubation and simulated daylight incubation were done once a day for three depths. Weather conditions were calm with heavy fog. The water temperature was below 1.5 degrees at the surface. Because of a bad weather forecast the current meters were recovered after five days instead of six days as planned. The last hydrocast was done on April 21 at noon. From there "Alkor" made the stations 17b, 16b, 15a as repeti- tion, 14b and 13b. In the meantime the wind had increased to force 6 to 7. Station 19b was repeated and after that the stations 20a, 21b and 30b were occupied. From there "Alkor" went to Stockholm from April 23 to 25. She left Stockholm on the 25 at noon and set course for station 22a in the Gulf of Finland. Fortunately the boundary of the packice was far enough to the north that the stations 22a, 23, 24, 25 and 26 could be worked with the full programme. "Alkor" continued the longitu- dinal section from east to west with the stations 27, 29, 30 and 31. The area of Landsort was still covered with heavy pack ice, but station 23a was just outside from the pack ice boundary. Because of the bad ice conditions the following stations 32, 34 and 38 could not be reached exactly at the preset positions, however, our stations were not farther than 2 miles away from the given positions. Fortunately the weather con- ditions allowed the cruising through the pack ice field between Gotland

and Öland. Only in the last part, "Alkor" had to break through a belt of pack ice to reach open water. Because of rather bad weather conditions the station 39 at Ölands Södra Grund was left out. When "Alkor" reached station 5a in the Bornholm Deep the weather conditions were reasonsable calm again that this station and stations 4b, 3b,2 and 1 could be worked with the full programme.

The maximal programme was carried out on all stations except the stations at the east-west sections across the Gotland Basin. "Alkor" reached Kiel in the evening of April 30.

The oxygen conditions in the whole Baltic were rather favourable. The surface layer and the intermediate layer down to 60 m were saturated or almost saturated as expected after the strong winter. Below the thermo halocline the oxygen dropped sharply down to low levels. In the deep water the oxygen content was only a few tenth of a milliliter. Hydrogensulphide could only be found at stations 34 and 38. Landsort Deep was free of hydrogensulphide, but the oxygen content was very low. According to the oxygen conditions the amount of ammonia and phosphat was relatively small in the deep water, however, the amount of nitrate has increased considerably. Because of the fact that the Swedish cruise could not find hydrogen sulphide at the station 38 it is believed that the oxygen conditions are on the way to become worse again.

K. Grasshoff