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R.V. ERNEST HOLT

Report for Cruise 4/1968

Staff

Duration

P. G. W. Jones		23 April-21 May
J. G. Cattley		
N. Reynolds		
D. J. Smith		
A. J. Jones		
J. Wooltorton		
B. N. Kotenyov) PINRO, Murmansk	
S. D. Melnikov		(part-time)

Aims

1. To collect core samples from the Barents Sea for the chemical analysis of various constituents in the sediment.
2. To collect water samples from the Barents Sea for the counting, culture and identification of algal flagellates.
3. To work the west Bear Island section, using the expendable bathythermograph and G.E.K. (towed electrodes).
4. To work the hydrographic section along the 66°00'N parallel in the Norwegian Sea between 06°00'E and 01°30'W.
5. To test a 100 kHz high-power transmitter echo sounder.

Narrative

ERNEST HOLT departed from Grimsby at 1430 hours GMT on 23 April. At noon the following day, the Aberdeen pilot disembarked Mr. Johns, the representative of Thomas Walker and Son, and Mr. Cattley joined the ship. The vessel then proceeded to Tromsø, trials of coring, hydrographic and plankton techniques being made on passage. The ship was at Tromsø from 1200/28 to 1400/29 May. Fuel and water were taken, repairs were made to the corer, and divers removed the ship's log that had been damaged on passage. Course was then set for Bear Island, and the west Bear Island section was worked between 2027/30 April and 0346/1 May. The coring and flagellate survey was started in the west Barents Sea at 1445 on 1 May. The ship called at Honingsvag between 1230 and 1500 on 3 May to collect a new log. However, the wrong-sized instrument had been supplied. At 1800 on 6 May the survey of the west Barents Sea was completed and the ship proceeded to Murmansk to embark two Soviet observers for the remainder of the coring survey. The vessel was at Murmansk from 0920/7 to 1850/8 May. During this period exchanges of scientists took place between ERNEST HOLT and the PINRO Laboratory. At 0425 on 9 May the coring and flagellate survey of the east Barents Sea commenced with Dr. Kotenyov (geologist) and Mr. Melnikov (interpreter) from PINRO on board. The grid was completed at 0440 on 11 May and the Soviet observers were disembarked by the Murmansk pilot at 1200 the same day.

During the survey of both the east and west Barents Sea low air temperatures were often encountered and moderate icing of parts of the ship from sea spray occurred on 1 and 10 May. The survey covered an area between the ice edge to the north and the Norwegian and Russian

coasts to the south. The ice edge was well to the south of its average position for the time of the year.

After leaving the Kola Inlet, the ship proceeded to Tromsø, taking water samples for flagellate counts on passage. Fuel and water were taken at Tromsø between 0650 and 1310 on 13 May, and a new ship's log was installed. The 66°N hydrographic section was worked between 0040/16 and 1820/17 May. The ship then made a good passage to Leith with a following wind, arriving at 2350 on 19 May. The core samples were collected by the Geology Department, University of Edinburgh, and the vessel departed at 0520 on 20 May, reaching Grimsby at 0020 on 21 May.

During the whole cruise no time was lost through adverse wind when steaming or working.

Results

Aim 1

Forty-three core samples were collected over a wide area at a variety of depths in an attempt to obtain a general coverage for this first survey.

The corer, which was operated from the warp on the centre drum of the trawling winch, was lowered with 225 lb of lead weight. The instrument was allowed to fall under gravity from 60 metres above the sea bed. Most samples were collected with the 3 ft barrel, but the length of core obtained varied from approximately 9 inches in sand to $2\frac{1}{2}$ ft in mud and soft clay. A few drops were made with the 6 ft barrel but this did not produce a longer sample. It appeared that extra weight would be required to obtain an increase in core length when using the longer barrel. The corer was used satisfactorily in winds of up to force 8, but with the present rig difficulty was often experienced in launching and retrieving the gear over the ship's side. The cores were retained in a plastic tube of $2\frac{1}{2}$ inches diameter and were preserved by deep freezing.

At each coring station water samples for the analysis of dissolved oxygen were taken at 9 and 29 metres above the bottom. The Granton trawl was operated at two stations in the west Barents Sea. It is possible that both the oxygen content of the bottom water and the demersal fish population may show a correlation with the chemical content of the sediment. Analysis of the cores will be made in the Geology Department of the University of Edinburgh. Manganese and iron are two constituents that will be analysed first.

Aim 2

Samples were obtained from 138 stations over an area approximately the same as the coring survey.

At each station water samples for flagellate counts were taken from the surface by means of a plastic bucket, and at 10 metres with an N.I.O. plastic water bottle. Samples were also taken when the ship was underway, either from the cooling water pump in the engine room or by trailing a plastic tube over the ship's side. The light intensity and water temperature were recorded on every occasion that samples were collected.

Flagellates were counted with a haemocytometer used in conjunction with a Reichert microscope (16 x objective 10 x eyepiece). A total volume of 10 μ litres of water from each sample were examined. When counts were low, attempts were made to concentrate the sample by centrifuging at 2500 r.p.m. for five minutes. This treatment, however, appeared to rupture some of the cells. Counts of particles in the water

were also made with a model A Coulter counter. The threshold control was kept at 30 and duplicate counts were made with aperture current settings at 10, 9, 8, 7, 6 and 5. Attempts were made to culture the organisms in a variety of media for a later examination at the Lowestoft laboratory. Cultures were incubated in an illuminated cabinet at approximately 5°C.

The highest concentration of flagellates was found to the north of Norway, where counts exceeded 10 organisms per 10 μ litre. This area was surveyed twice with an interval of 9-10 days. At one locality, an increase from 20 to 55 counts was recorded over this period. On a station at 71°55'N 28°56'E, samples were examined from 0, 5, 10, 15 and 20 metres. Flagellate counts per 10 μ litres were 19, 17, 29, 17 and 9 respectively. The low value at 20 metres may have represented a true decline in numbers with increase in depth.

Considering the survey as a whole, probably at least 90 per cent of the flagellate flora was composed of about six types, which included both coloured and colourless forms.

A comparison of the haemocytometer counts and the Coulter counts showed that the latter generally gave the higher value. This is reasonable, since the instrument counts silt and detritus as well as flagellates.

Aim 3

Both the expendable bathythermograph and the towed electrodes were faulty whilst the west Bear Island section was being worked. The precision of the data collected was therefore considerably reduced.

Aim 4

Bergen Nansen reversing bottles and new German reversing bottles were used at alternate depths at each station on the 66°N hydrographic section.

The G.E.K. was used between stations on the first part of this section although a fault developed which eventually made the electrodes unusable.

Aim 5

The transducer of the 100 kHz high-power transmitter echo sounder was mounted in a tin tow net. Record and sensitivity readings were made at various depths during the cruise.

Selected ship meteorological observations were made during the cruise.

P. G. W. Jones

23 May 1968

Initialled: HAC
Seen in draft: EAB, WJS

Distribution

Basic list, plus the following:

Scientific staff on cruise

Dr. Jones

Mr. Cattley

Dr. Reynolds

Mr. D. J. Smith

Mr. A. J. Jones

Mr. Wooltorton

Dr. Kotenyov)
Mr. Melnikov) PINRO, Murmansk