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Continuous Plankton Records

Preliminary notes on sampling between St. John's Newfoundland, and Boston, Mass.

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During the last two years the Continuous Plankton Recorder survey has been progressively extended across the Atlantic to North America. In 1961 this extension was assisted further by the award of a contract (62558-2834, NR 104-601) from the United States Office of Naval Research.

In July 1961, as part of the contract programme, two new routes were started from R.M.S. NEWFOUNDLAND (by permission of Messrs Furness Withy and Co. Ltd.) The Recorders are towed at the depth of 10 m which has always been the standard throughout the survey; the methods of analysis of the material are the same as those used since 1948 during the survey of the eastern North Atlantic and the North Sea. The new routes are:

Ea - from St. John's, Newfoundland, to Halifax, Nova Scotia.
Eb - from Halifax to Boston, Mass.

The mileage sampled so far is as follows:-

		Ea	Eb	
1961	July	361	451	
	Aug.	449	358	
	Sept.	0	356	
	Oct.	440	344	
	Nov.	331	347	
	Dec.	260	339	
1962	Jan.	0	0	(Ship did not visit U.S.A. in this month)
	Feb.	463	349	(Not yet analysed)
Totals		2,304	2,544	miles
Grand total		4,848		miles

One of the major objectives of the Plankton Recorder survey is the study of fluctuations in the abundance, distribution and composition of the plankton. Results from the European part of the survey, since 1948, have shown the danger of attempting this kind of analysis from material collected over a short period of time. In general, three years sampling appears to be the barest minimum required and after five years the value of the results begins to increase in a striking way.

It would be most unwise, therefore, to attempt to generalize about the plankton on the new routes, Ea and Eb, on the basis of 6 months' sampling. These preliminary notes are offered here so that members of ICNAF may be aware of the kind of material which is being collected and analysed.

Figure 1 shows the positions of the Recorder routes during the last six months of 1961. Each route is divided into 10 mile "samples" whic are numbered, consecutively, from the eastern ends of the routes. Alternative, odd-numbered, samples are subjected to a form of routine analysis, the remaining samples being used for specialist purposes only (e.g. for fish larvae and eggs). Two Records were treated as "qualitative" as a result of malfunctioning of the Recorder mechanism; in November because there was an escape of plankton; in December because the positions of the 10-mile sampes are rough estimates.

Figures 2 - 5 show the distributions of a few selected organisms. It should be remembered that the Recorder samples at a depth of 10 metres. The broken line in the charts shows the position of the 100-fathom depth contour.

In Figure 2, the green colour of the filtering silks provides a rough measure of total phytoplankton which was most abundant off the southern tip of Nova Scotia (in July, August, October and December) and off southern Newfoundland (in October and November). Young fish and eggs were found mostly in July and August. We were specially interested in the specimens of young redfish (Sebastes) which were the first collected by the Recorder with the caudal pigment spots said by some workers to characterize the mentella type. All the Sebastes collected in the open Atlantic during the last seven years have been without this pigment and have been identified as the marinus type.

Figure 3 shows the numbers of "total copepods" and of Calanus finmarchicus. These charts show a feature which is seen also in Figures 4 and 5; a scarcity of plankton over the deep channel of the Cabot Strait connecting the Gulf of St. Lawrence with the Atlantic Ocean. In many of the charts the region of scarcity is flanked by a zone of abundant plankton over the shallow waters of the shelf on both sides of the channel; see, for example, the distribution of "total copepods" in August, or Ceratium fusus in October. Of the organisms plotted in the charts, only C. fusus in August was more abundant over the deep channel than over the continental shelf. This kind of sharp contrast at the edge of the continental shelf has been a constant feature of Plankton Recorder sampling in European waters.

Figure 4 shows the scarcity of Temora longicornis in the Gulf of Maine, compared with its relative abundance between Halifax and Newfoundland. In the European part of the Recorder survey this species is abundant in the North Sea but relatively rare over the Atlantic shelf and restricted to the colder northern waters of the oceanic Atlantic (Colebrook, John and Brown, 1961). Another copepod, Centropages typicus (fig. 5), was more abundant in the Gulf of Maine than elsewhere on the 'E' routes although it extended eastwards along the Nova Scotian shelf in October. In the European survey this species is common in the oceanic waters of the Atlantic but it is widespread in the North Sea where it is sometimes regarded as an indicator of the inflow of mixed oceanic and coastal water. Frost (1938) associated Ceratium fusus with mixed or Atlantic water (but not with Arctic water) off the Newfoundland coast. In the Recorder material (Fig. 5), it was found in October and November over the north-eastern part of the Nova Scotian Shelf and off the southern coast of Newfoundland. In the European part of the survey it is common throughout the North Sea and in the oceanic waters of the Atlantic (Robinson, 1961).

One of the advantages of sampling across the Atlantic using a standard technique is that it provides special opportunities for comparative studies of the plankton in European and American shelf waters and over the deep ocean. In general the plankton of the American shelf is similar to that of European waters but the present limited sampling suggests that there may be large differences in the seasonal cycles of production on the two sides of the Atlantic. The full ocean

survey has been in operation for a very short time but it has confirmed that the plankton over the shelves is quite distinct from that over the deep ocean with a rich standing crop and few species in the cold northern water and a lower crop and a great variety of species in the warmer water between Newfoundland and the United Kingdom.

PLANS FOR THE FUTURE

With the continued assistance of H.M. Treasury and the U.S. Office of Naval Research, it is hoped that the Plankton Recorder survey of the North Sea and the eastern North Atlantic will be continued, as previously, together with the cross-ocean routes introduced during the past two years. The new sampling over the North American Shelf ('Ea' and 'Eb' routes) will be continued and it may be possible to add other routes in the western North Atlantic.

In March 1962, a new route (G) was introduced between Scotland and Greenland from M.V. UMANAK (with the permission of the Royal Greenland Department of Trade). This route will be financed partly from British funds and partly from the O.N.R. contract.

Figure 6 shows the routes which will be sampled, at monthly intervals where possible, during 1962. Requests for information concerning these routes should be addressed to the Officer-in-Charge, Oceanographic Laboratory, Craighall Road, Edinburgh 6, Scotland.

This survey of the North Atlantic would not be possible without the assistance of colleagues in other laboratories who supervise the equipment and arrange for the return of the collecting silks to the Edinburgh laboratory. We are particularly grateful to Mr. David Miller of the Woods Hole Laboratory of the U.S. Bureau of Commercial Fisheries and to Mr. Ingvar Hallgrimsson of the Reykjavik Fisheries Laboratory.

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Frost, Nancy. 1938. The genus Ceratium and its use as an indicator of hydrographic conditions in Newfoundland waters. Nfld. Dept. Nat. Res., Res. Bull. No.5, pp.12.

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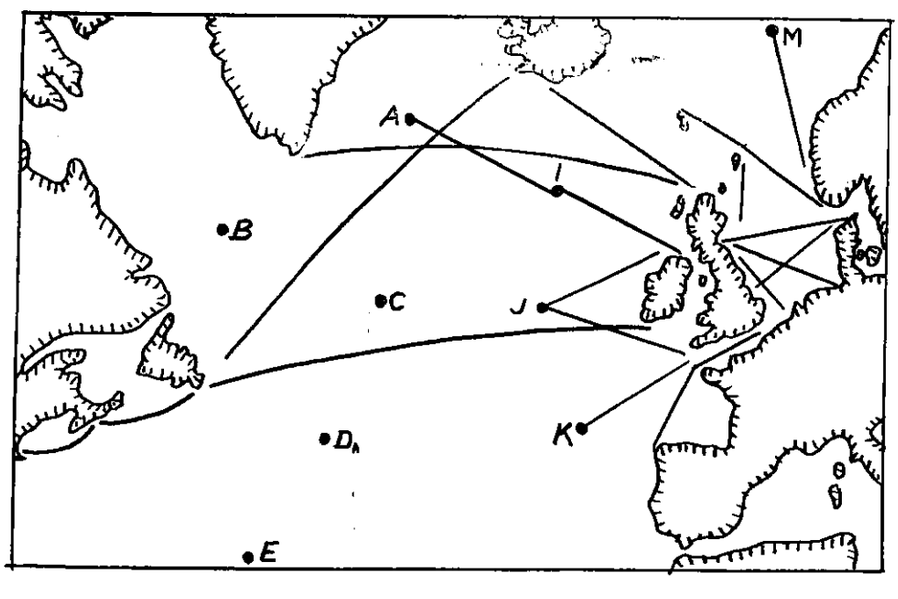

Fig. 6. Edinburgh Plankton Recorder Survey in March 1962. Capital letters indicate the position of Ocean Weather Stations.

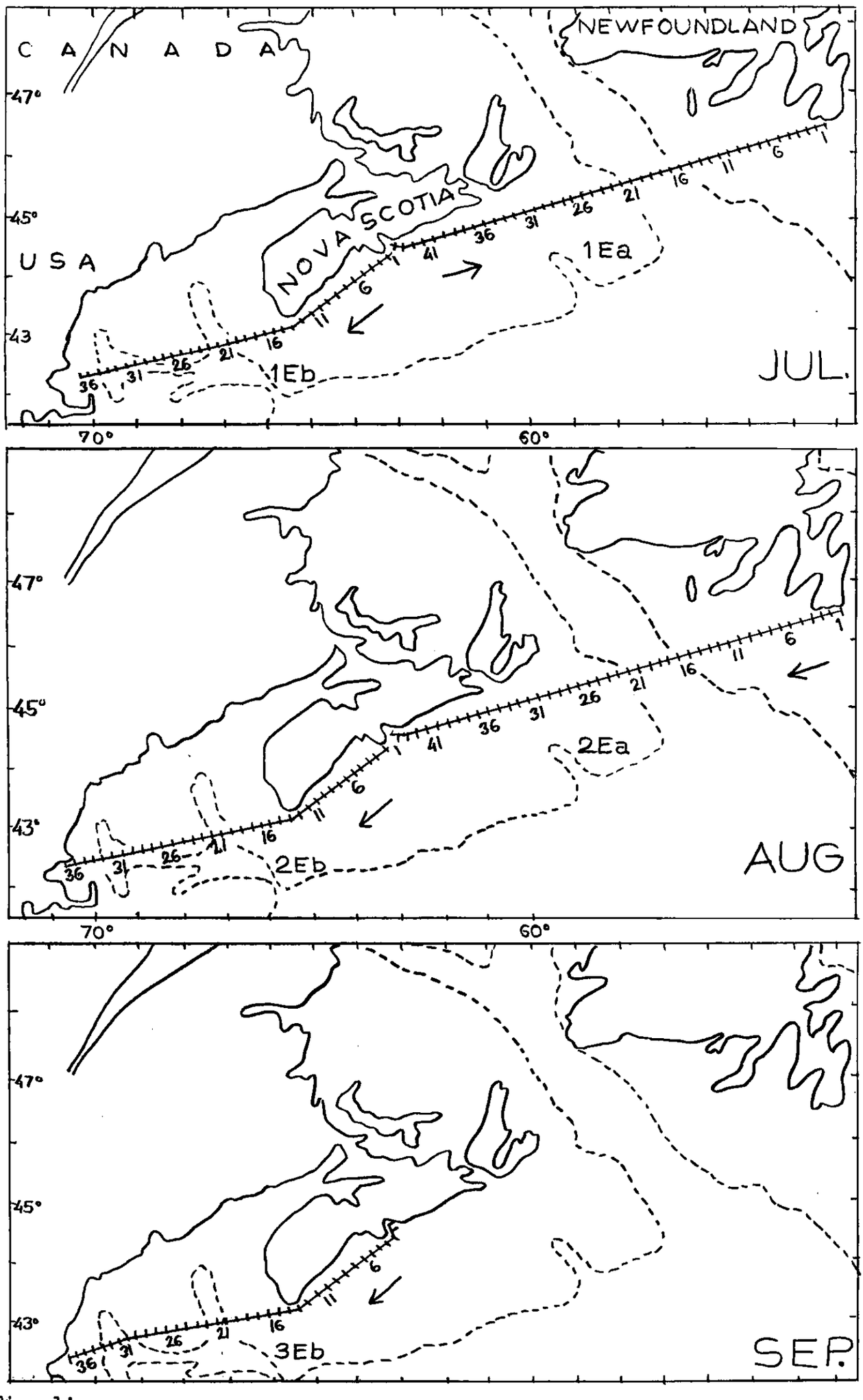
CANADA
NEWFOUNDLAND
NOVA SCOTIA
USA
47°
45°
43°
70°
60°
1Ea
1Eb
JUL.
2Ea
2Eb
AUG
3Eb
SEP.

Fig. 1

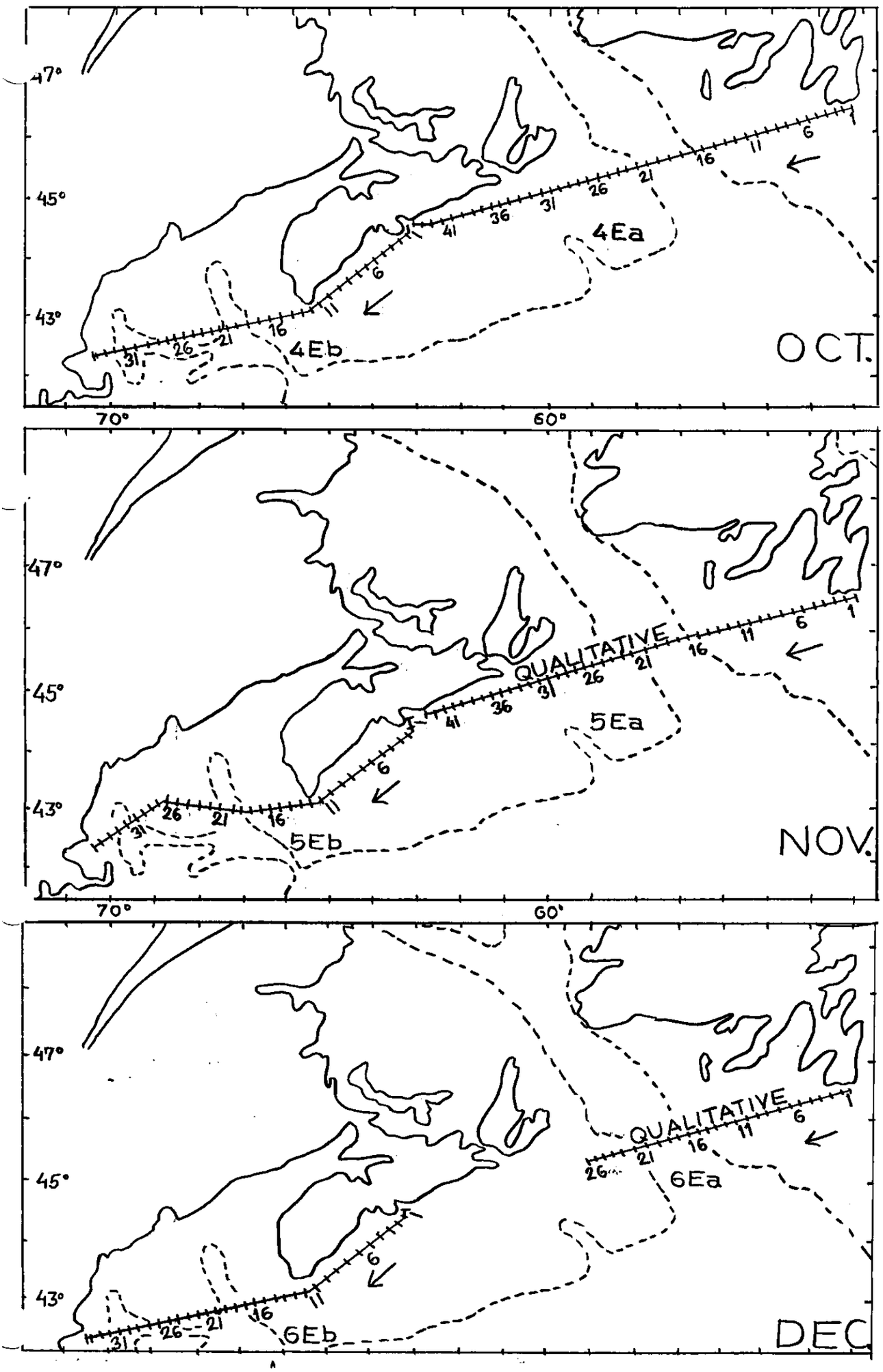

Fig. 1"

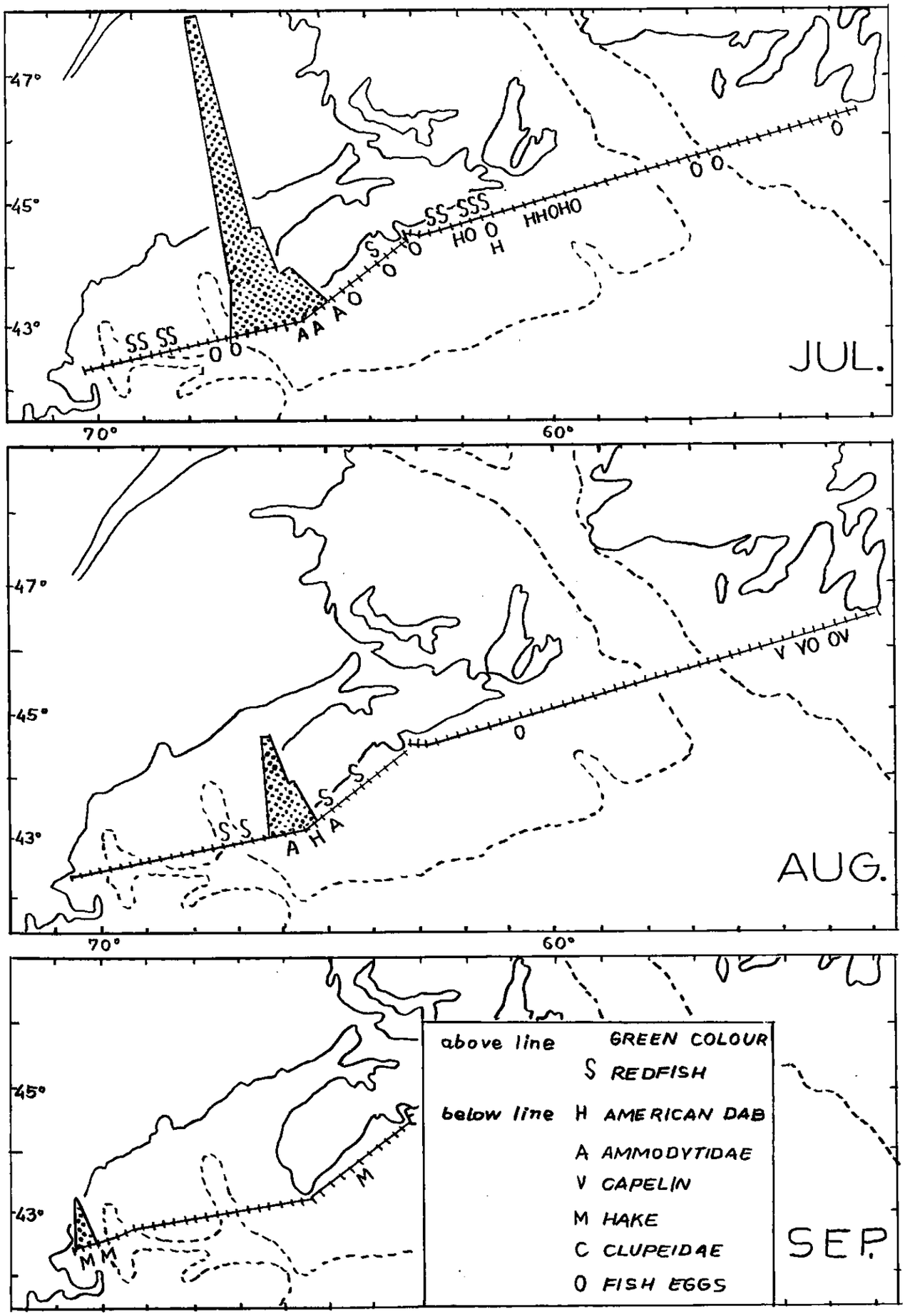
47°
45°
43°
70°
60°
JUL.
AUG.
SEP.
above line GREEN COLOUR
S REDFISH
below line H AMERICAN DAB
A AMMODYTIDAE
V CAPELIN
M HAKE
C CLUPEIDAE
O FISH EGGS

Fig. 2

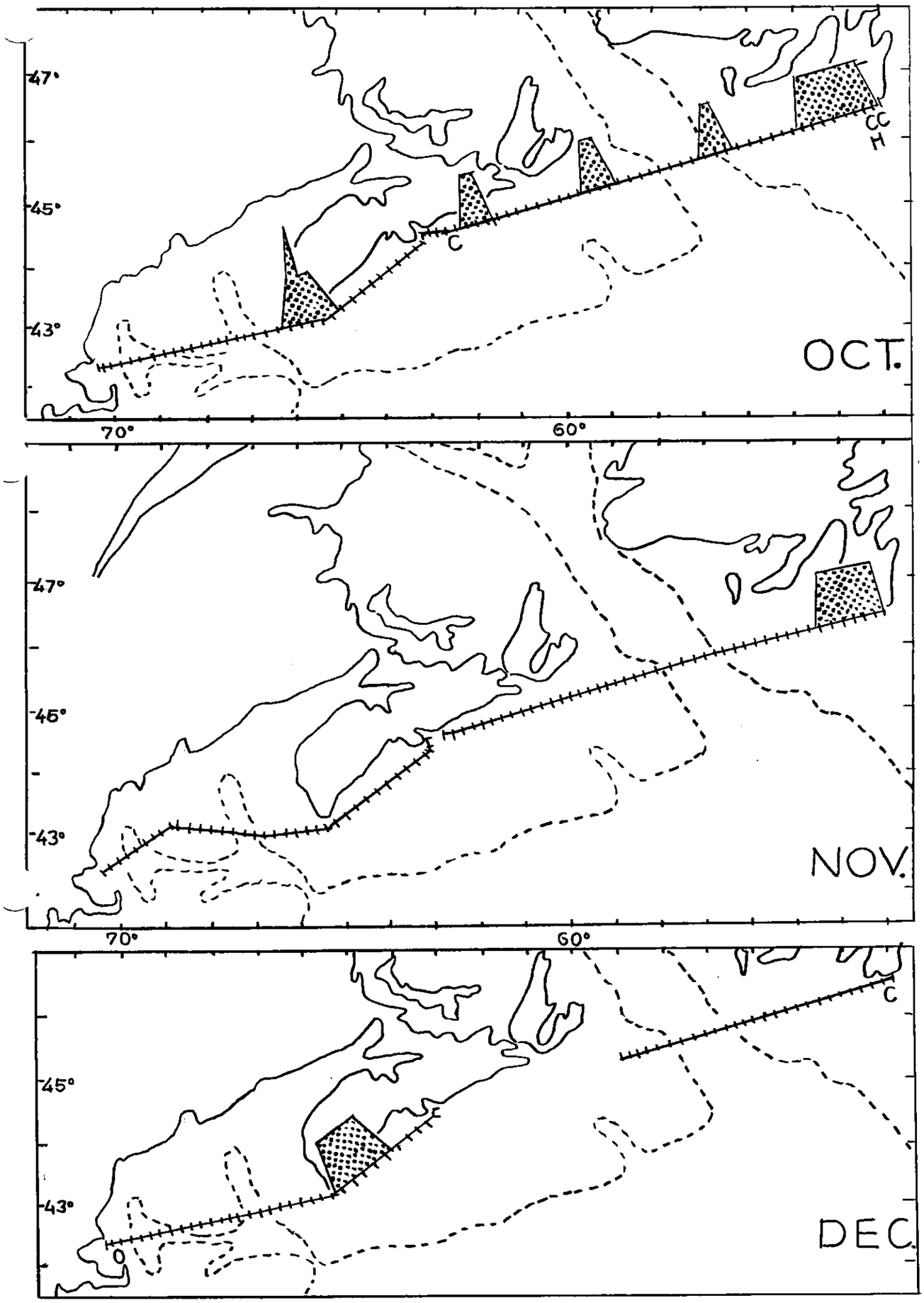

Fig. 2"

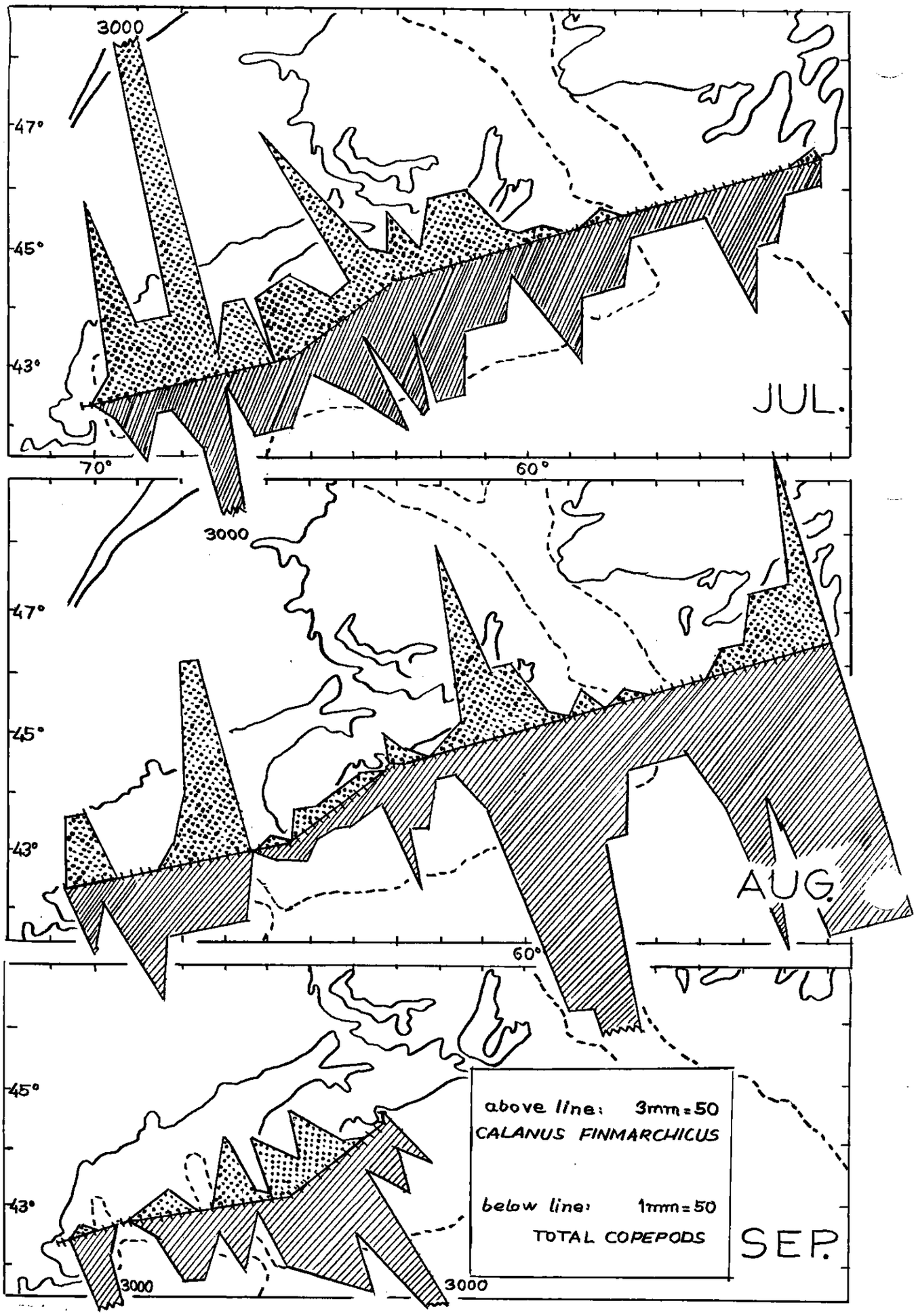
3000
47°
45°
43°
JUL.
70°
60°
3000
47°
45°
43°
AUG.
60°
45°
43°
above line: 3mm=50
CALANUS FINMARCHICUS
below line: 1mm=50
TOTAL COPEPODS
SEP.
3000
3000

Fig. 3

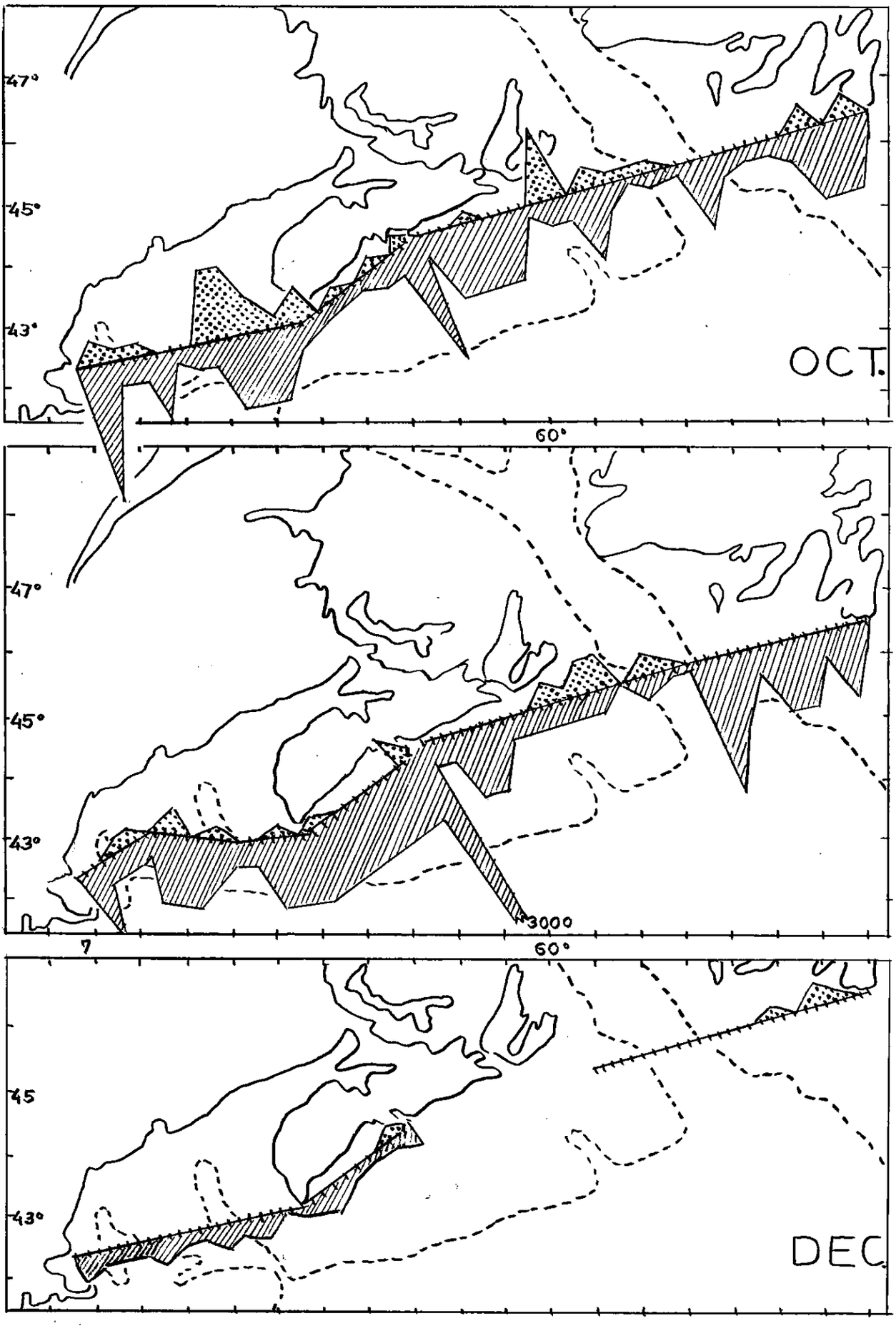

Fig. 3"

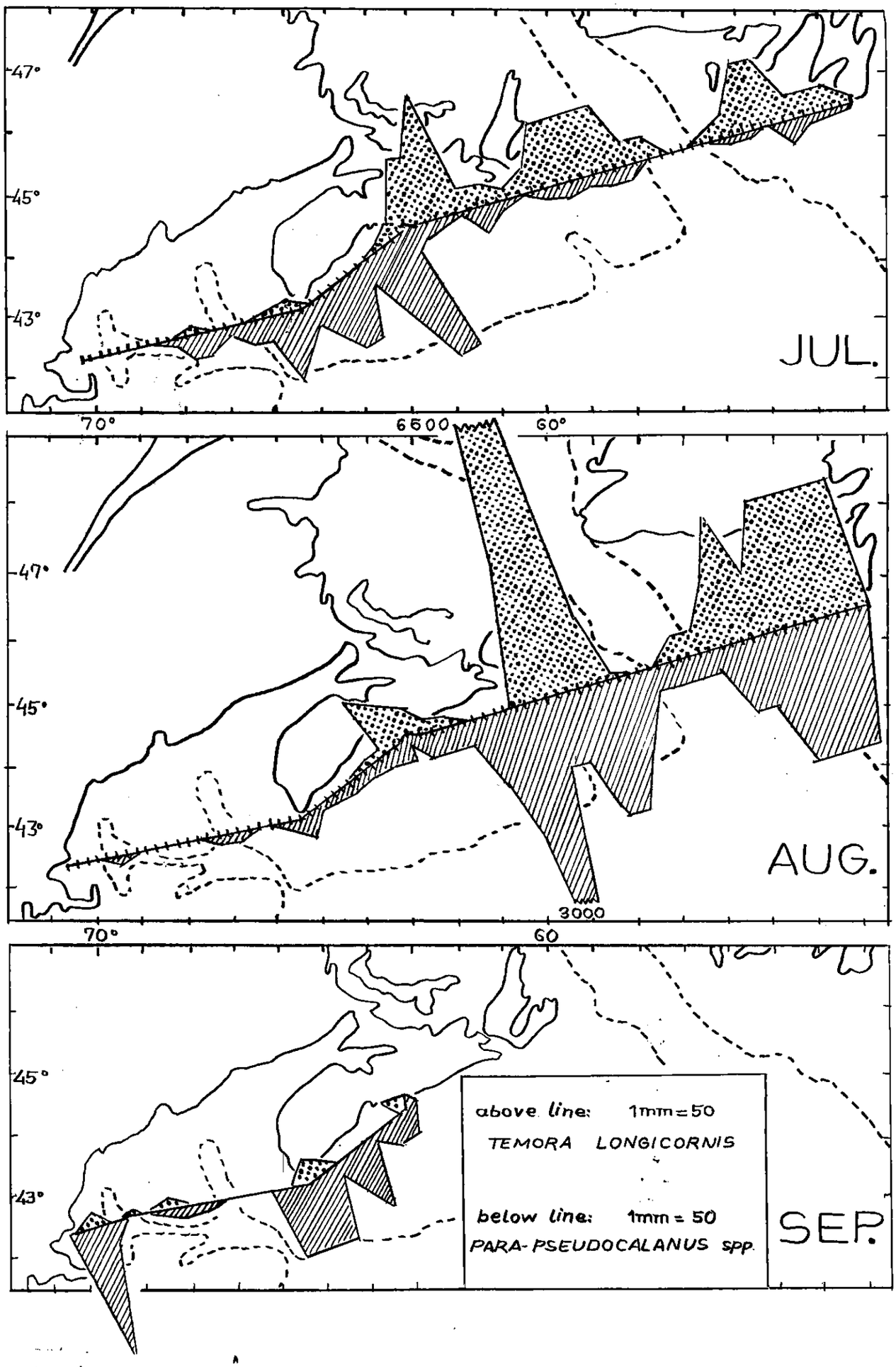
47°
45°
43°
JUL.
70°
6600
60°
47°
45°
43°
AUG.
3000
70°
60
45°
43°
above line: 1mm=50
TEMORA LONGICORNIS
below line: 1mm = 50
PARA-PSEUDOCALANUS spp.
SEP.

Fig. 4

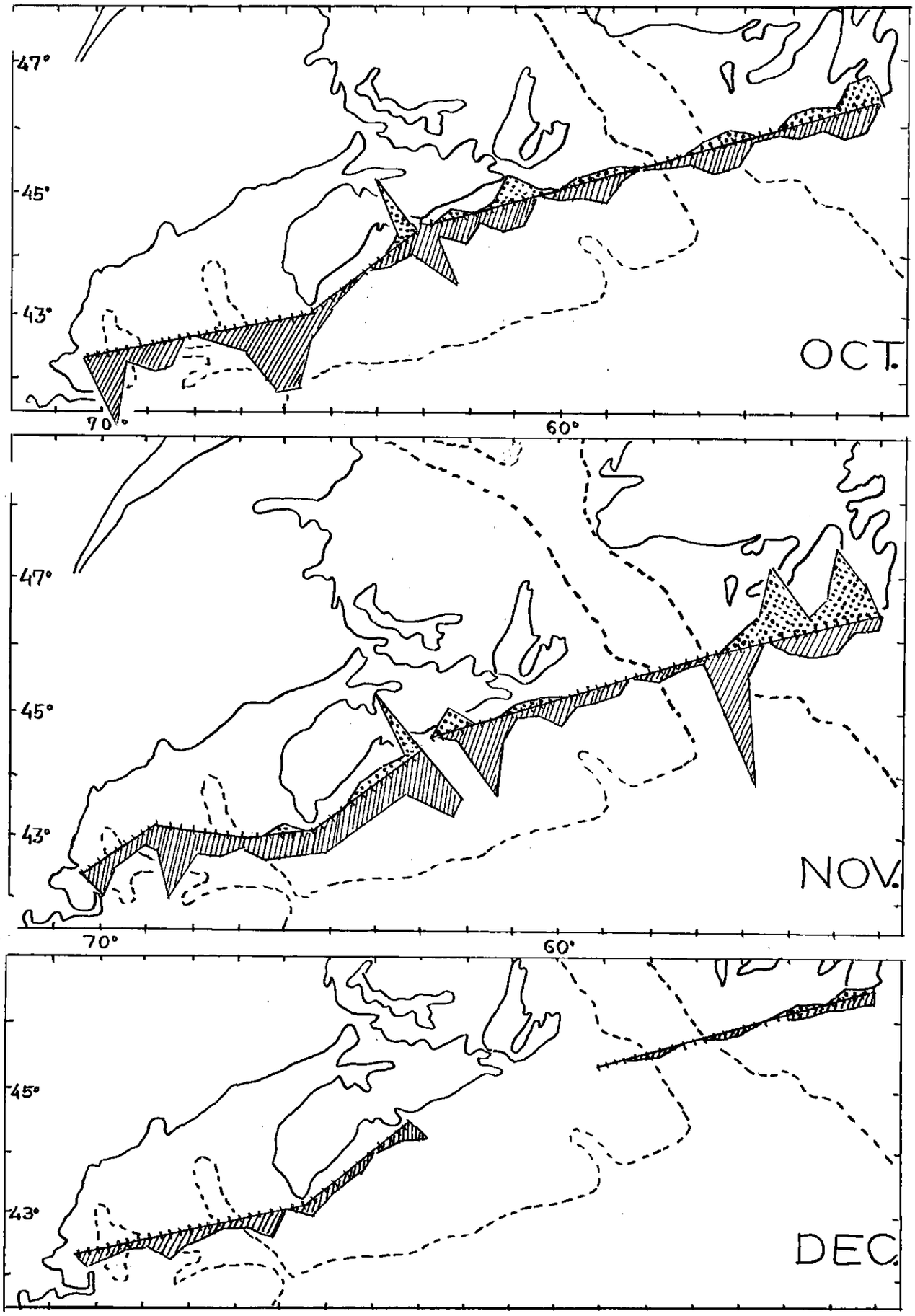

Fig. 4m

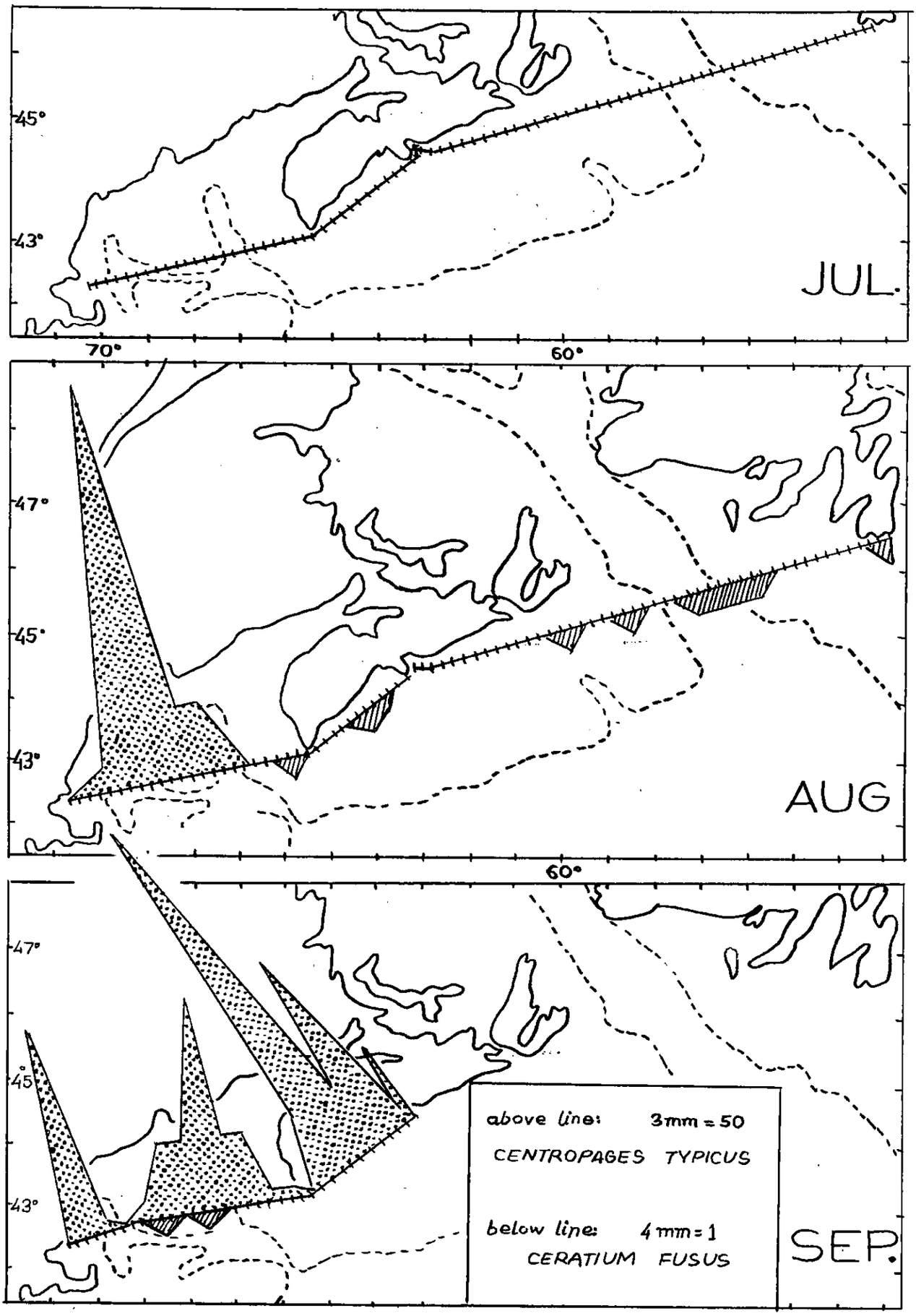
45°
43°
JUL.
70°
60°
47°
45°
43°
AUG
60°
47°
45°
43°
above line: 3mm = 50
CENTROPAGES TYPICUS
below line: 4mm = 1
CERATIUM FUSUS
SEP.

Fig. 5

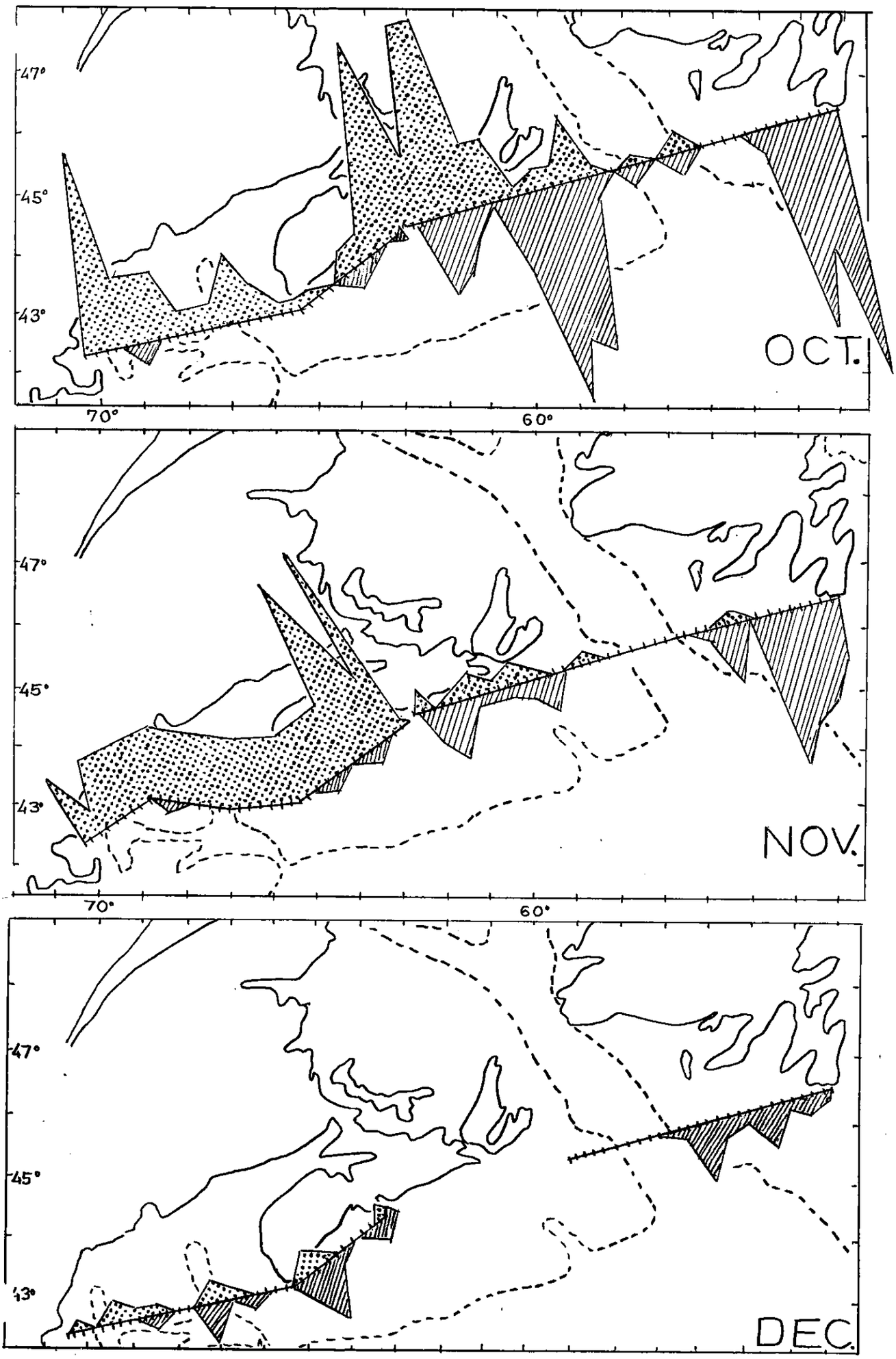

Fig. 5ⁿ