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Preliminary research report on the plankton west of Greenland collected by R.V. DANA during NORWESTLANT cruises 11 and 111.

by

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The report presents a preliminary account of the zooplankton (other than fish eggs and larvae) in the Hensen net samples collected by the R.V. Dana. The methods of analysis and the tabulated results are given in Serial No. 1333, Document No. 38. Distributions of the more important species and groups are illustrated in a series of charts, in which the survey area has been divided into rectangles of 30' latitude by 1° longitude. The mean numbers of organisms per cubic metre in each rectangle are represented on the charts by the symbols shown in the keys.

Calanus finmarchicus (Figs. 1 and 2) was the predominant species at most stations. During NORWESTLANT 11 there was a marked contrast between the distribution of Calanus stages 1 - 1V and stages V - V1. Adults and stage V copepodites were most abundant in the southern area, over deep water, while beyond 62° N they occurred at less than 10 per cubic metre or were absent. Calanus stages 1 - 1V, on the other hand, were most frequent in the northern part of the area, with a maximum density at one station of 236 per cubic metre. During NORWESTLANT 111 Calanus V - V1 had a similar distribution to that during the previous cruise, but stages 1 - 1V had become abundant over the whole area, reaching a density of 600 per cubic metre at one station.

The delay in sampling a series of stations must be considered when interpreting the distributions of the Calanus stages; this amounted to about 3 weeks between the first and last Hensen net samples in each survey. It should also be borne in mind that differences in the standing crop obscure differences in the timing of reproduction. Detailed investigations started by one of us (J.B.L.M.) into the population structure of Calanus show that reproduction was earlier in the southern oceanic area than nearer the coast and in the north. The same trend was observed during the "Godthaab" expedition (Kramp, 1963).

Three other species had similar distributions to Calanus V - V1 during both cruises. These were Tomopteris (probably all T. septentrionalis), young Spiratella (probably only S. retroversa), and Pareuchaeta norvegica. All were most frequent in the deep water west of the continental shelf and south of the Holsteinsborg Ridge.

The Euphausiacea formed an important part of the zooplankton and, in addition to the counts of total euphausiids in the general analysis, one of us (L.T.J.) has made specific identifications. For this purpose all the 42 samples of NORWESTLANT II and 74 of the 84 samples of NORWESTLANT III have been examined.

In all, five euphausiid species were recorded, namely Thysanoessa longicaudata, T. inermis, T. raschii, Meganyctiphanes norvegica and Thysanopoda acutifrons. The only adults present were those of T. longicaudata which were found as far north as 66° N in waters of 200m or more. They were scarce and always occurred at less than one per cubic metre. The Hensen net does not, of course, give an adequate sample of adult euphausiids and it is noteworthy that sampling with the Continuous Plankton Recorder early in June off the continental shelf at 59° 30' N, 48° W indicated a density of 30 adults per cubic metre.

During NORWESTLANT II furcilias were absent around the south of Greenland but present in the north west, although always at a density of less than one per cubic metre. These furcilias were all early stages, having only recently moulted from calyptopes. Both nauplii and calyptopes were present throughout the whole area, and the apparent absence of furcilias in the southern area may have been due to the time difference in sampling noted previously.

The distribution and abundance of the furcilias of T. longicaudata and T. inermis during NORWESTLANT III are shown in Figure 3. T. longicaudata was most abundant west of the continental shelf and south of the Holsteinsborg Ridge across the Davis Strait. The converse distribution was shown by T. inermis, which was most frequent along the shelf and the Ridge but entirely lacking from most of the oceanic samples. These distribution patterns accord well with the relative distribution of the two species in other areas (Einarsson, 1945).

It seems likely that the Holsteinsborg Ridge, which forms a barrier between the Arctic and Atlantic Oceans for many abyssal species, may provide a link between the populations of T. inermis from Greenland and North American waters. This is the first suggestion that T. inermis may extend across the Davis Strait in large numbers; in other areas adults of this species have been found occasionally over deep water although characteristically it spawns over slope and shelf waters.

The remaining three euphausiid species were found only in small numbers. Larvae of Meganyctiphanes norvegica occurred during both surveys. In NORWESTLANT II only calyptopes were seen, but both calyptopes and furcilias were present during NORWESTLANT III as far north as 64° N. All except one calyptopis were found south of the Holsteinsborg Ridge and west of the 1000m contour. These would appear to be the first records of larval M. norvegica from west Greenland waters, although adults have been taken previously in this region (Kramp, 1963). The larvae of this species have been recorded from the central southern Labrador Sea, at weather station Bravo (Kielhorn, 1952). Furcilias of Thysanoessa raschii, a coastal and fjord species, were found at only one station (12.041) in waters of less than 200m due west of Holsteinsborg. Other very early furcilias (stages I and II) at two further stations in the area may have been of this species but separation from T. inermis is rarely possible at this stage. Euphausiid eggs, attributable to T. raschii on account of their relatively small size, were also found in this region. One furcilia of the deep water euphausiid, Thysanopoda acutifrons, was present in the sample from station 11.907 (NORWESTLANT II) at approximately 60° N, 45° W. The calyptopes and early furcilias of T. acutifrons characteristically appear in the near-surface plankton from May to August (Einarsson, 1945).

The remaining charts (Fig. 4) illustrate the distribution of larvae of benthic invertebrates (mainly echinoderms and cirripedes, but including small numbers of polychaetes, molluscs and decapods; see Tables I - III, Serial No. 1333, Document No. 38). These larvae were a characteristic feature of the plankton of the coastal stations. It is interesting, however, to record that significant numbers of larvae, particularly those of echinoderms, were found beyond the continental shelf; for example, they were present at station 11.980 (approximately 61° N, 53° W) during NORWESTLANT III. It seems possible that these larvae had been carried out from the shelf by currents setting in a westerly direction.

Species habitually associated with cold water, Calanus glacialis, C. hyperboreus, Metridia longa and Spiratella helicina, occurred only in small numbers and without any clear distribution pattern. Other components of the zooplankton, such as Oithona, small calanoid copepods and Larvacea, whilst numerous over the whole area, showed no clear distribution patterns.

To summarise, although the plankton of the survey area has no great diversity, there are several species or groups which show patterns of distribution, varying either from south to north or from shallow to deep water. These distributions can be studied in more detail when the hydrographic data are available.

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Kielhorn, W.V. 1952. The biology of the surface zone zooplankton of a boreo-arctic Atlantic Ocean area. J. Fish. Res. Bd. Canada, 9: 223-264.

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Figures 1 - 4. Distribution charts for selected species and groups in west Greenland waters sampled by the R.V. DANA during NORWESTLANT II & III.

The symbols represent the mean numbers of organisms per cubic metre in each of the sampled rectangles. The key for *Calanus finmarchicus* is shown in Figure 1 (left), that for the two species of *Thysanoessa* in Figure 3 (left) and that for the larvae of bottom invertebrates in Figure 4 (left).

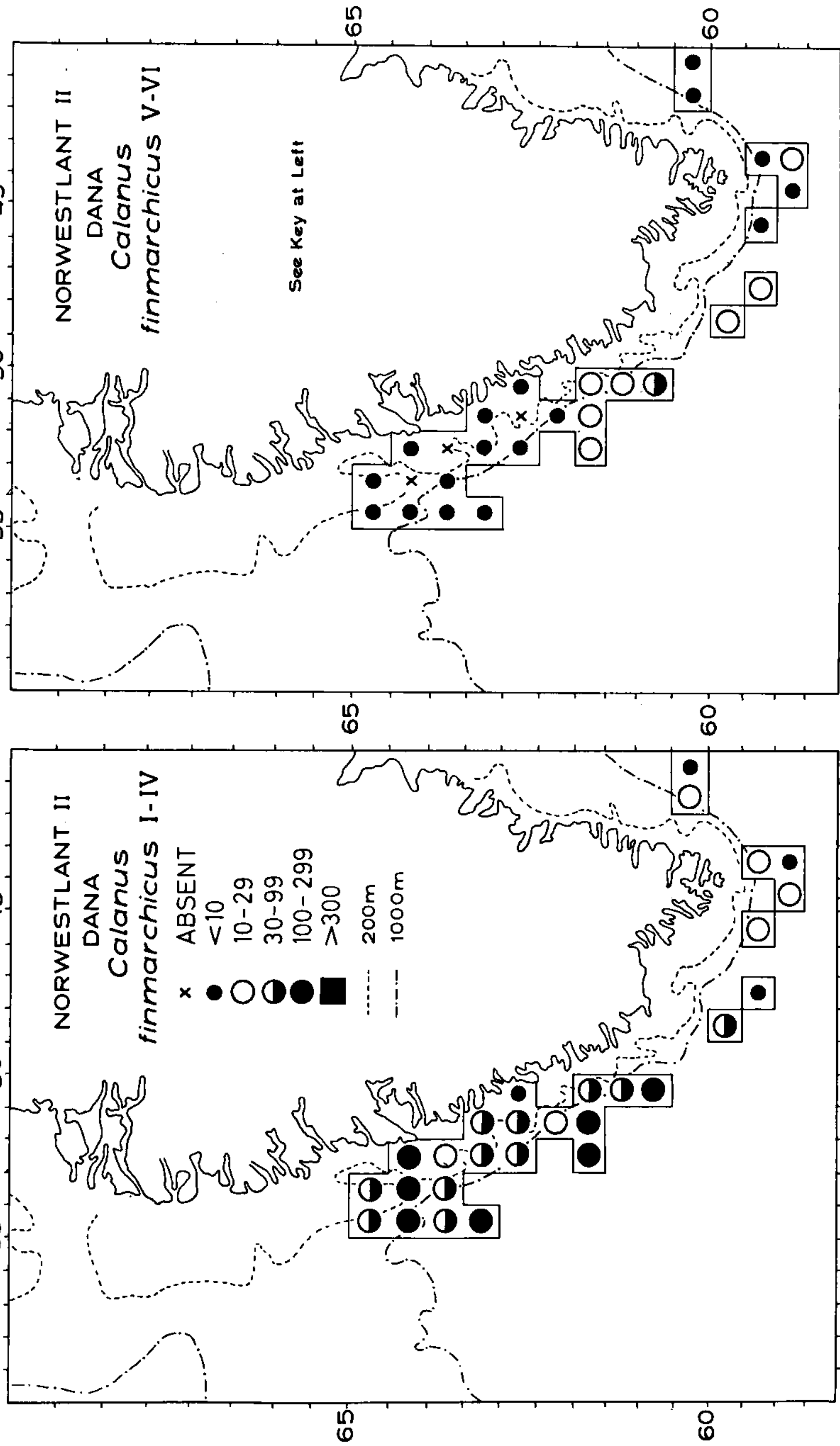
NORWESTLANT II
DANA
Calanus
finmarchicus I-IV
× ABSENT
<10
10-29
30-99
100-299
>300
200m
1000m
NORWESTLANT II
DANA
Calanus
finmarchicus V-VI
See Key at Left
45
50
55
65
60

Figure 1

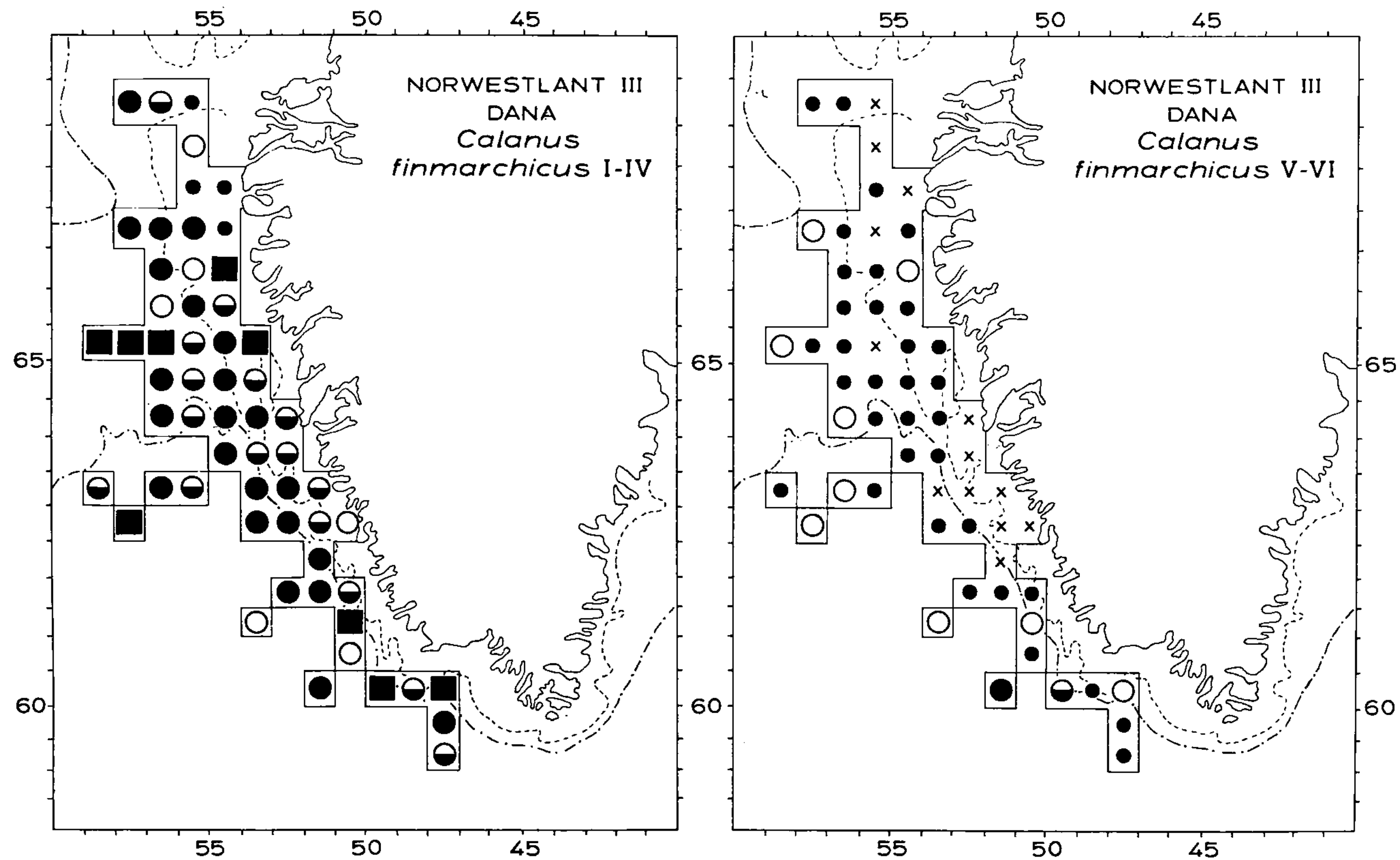

Figure 2 (for key see Fig.1)

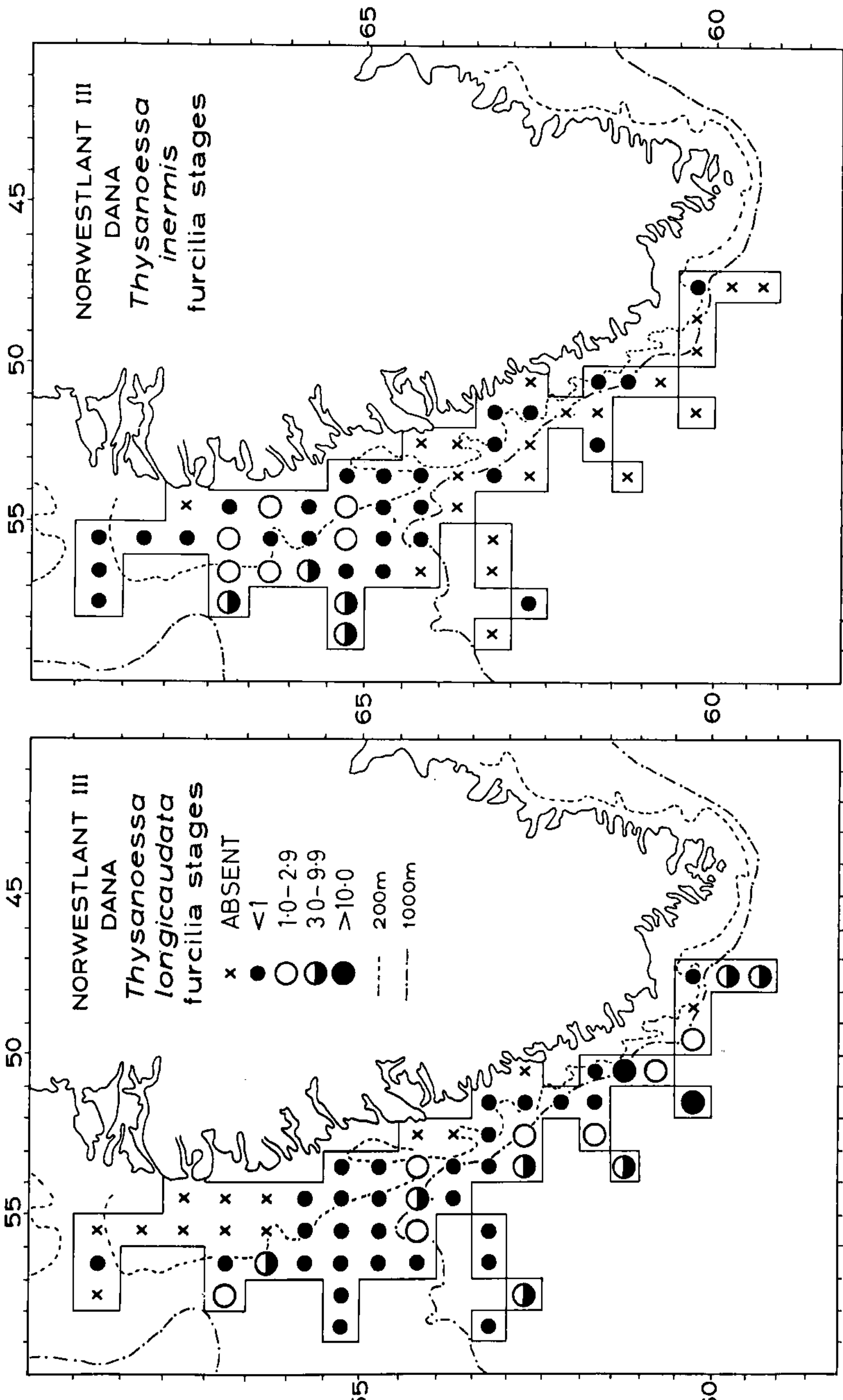
NORWESTLANT III
DANA
Thysanoessa
inermis
furcilia stages
NORWESTLANT III
DANA
Thysanoessa
longicaudata
furcilia stages
ABSENT
<1
1·0–2·9
3·0–9·9
>10·0
200m
1000m
45
50
55
60
65

Figure 3

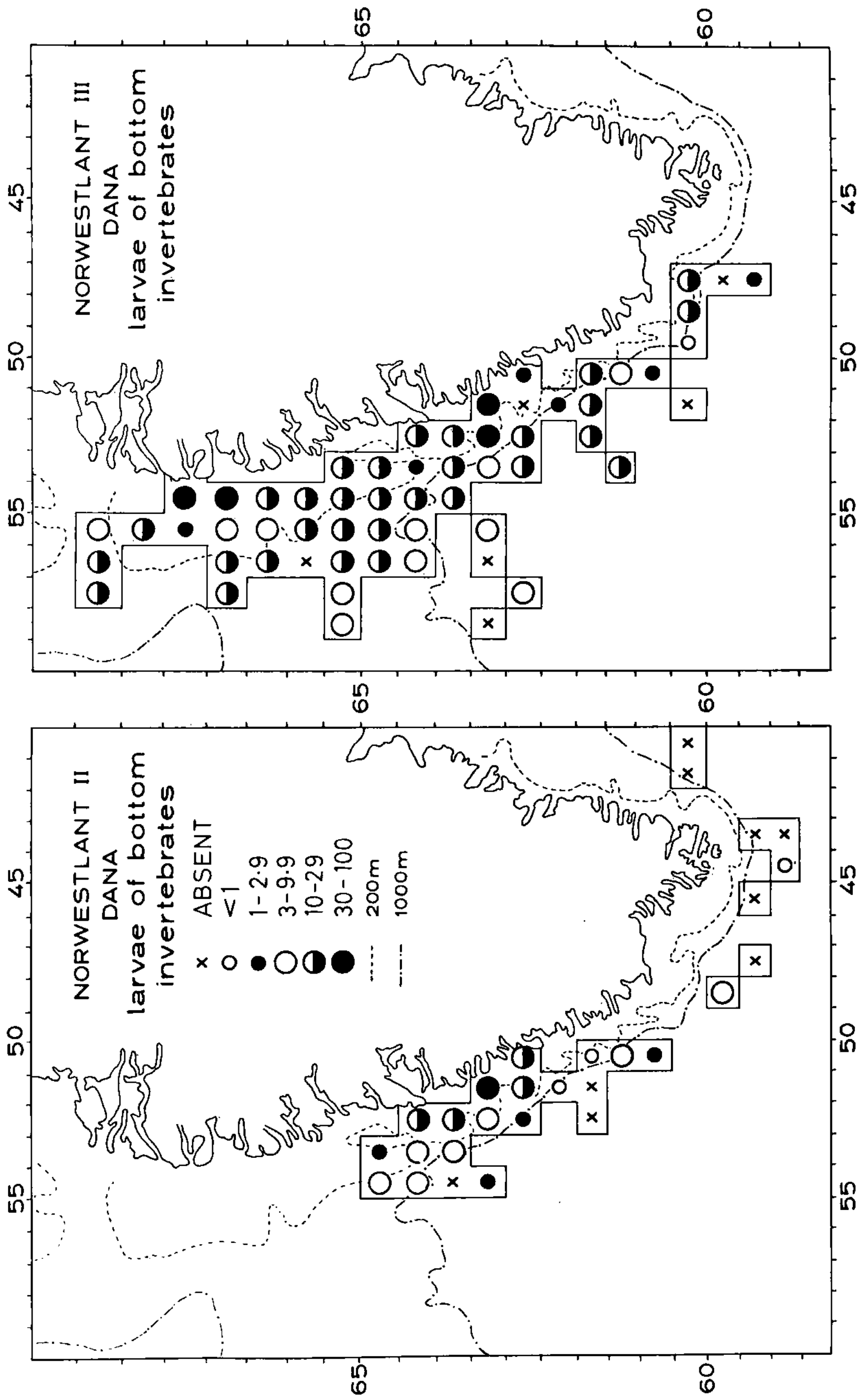
NORWESTLANT III
DANA
larvae of bottom
invertebrates
NORWESTLANT II
DANA
larvae of bottom
invertebrates
ABSENT
<1
1-2·9
3-9·9
10-29
30-100
200m
1000m
45
50
55
65
60

Figure 4