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SOME DATA ON DISTRIBUTION OF YOUNG COD AND HADDOCK OFF LABRADOR AND NEWFOUNDLAND

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Introduction

This contribution is based on the data of 50 research cruises conducted by the Polar Research Institute off Labrador and Newfoundland in the period from March, 1954 to October 1961. We have used the results of 1636 hauls performed by bottom trawls. Young cod and haddock (with the size of 17-20 cm and higher) were caught as a bycatch. That is why it seems impossible to show distribution of the young during the first year of life. In order to reveal the difference in distribution of young fish of various sizes we consider the young under 25 cm and the young from 26 to 36 cm separately in the autumn - winter and spring - summer periods.

C O D

Labrador and North Newfoundland

First investigations carried out by the Polar Research Institute off Labrador took place in October, 1957. That year the scouting vessel "Odessa" has come up to 59°40' N and separate specimens of cod of 25-35 cm occured in the catches taken in northern regions of Labrador. Young cod probably inhabit even more northern regions of the area.

South of Hamilton Inlet Bank on the slopes of the gut at the depths of 200-300 metres the concentration of young cod was noticed during all years of investigations (Figs. I A, B.C.D,). This concentration situated south of the Labrador spawning grounds is relatively constant. Its borders and density vary slightly by seasons. E.g., in the eastern part of the gut at the

depths of 220-300 m there was even distribution of the young amounted from 25 to 100 specimens per one hour trawling in the period of August-September, 1958. In October-December, 1958 the area of the same concentration was smaller one, but at the depths of 270-290 m catches of the young have raised up to 432 specimens per one hour trawling.

Abundance of the young in the gut in question varies by years. At the least quantity the young was caught here in cold 1959. In 1960 and 1961 years which were warmer than 1959, catches of young cod per one hour trawling were equal to 200 specimens at the depths of 200-260 m and when temperature was a little bit higher than $2^{\circ}C$.

In 1961 in the southern part of Hamilton Inlet Bank at the depths of 160-180 m (temperature = $1.6^{\circ}C$) and also on its south-eastern slope at the depths of 200-380 m (temperature = $2.7^{\circ}C$) there were more than 100 specimens of young cod per hour trawling.

During the years of investigations there were no success in discovering of the places of considerable concentration of the young in the region of the North Newfoundland Bank. Only in the north-eastern part of the bank at the depths of 270-340 m when temperature was $3-3.5^{\circ}C$ trawls contained 20-30 specimens (in 1961 - 60 specimens) per one hour trawling.

Flamish Cap

The young is concentrated on the shallow of the bank and on its eastern slope at the depths of 170-250 m. The greatest amount of the young was caught in 1956, 1960 and 1961 (up to 116 specimens per one hour trawling). On the northern slope of the bank at the depth of more than 300 m the young has not occured in the catches. On the southern and western slopes at the same depth only solitary specimens of the young were caught.

Great Newfoundland Bank

On the north-eastern slope of the Great Newfoundland Bank the place where the Labrador current divides into two branches at the depths of 200-300 m when temperature is less than $2^{\circ}C$ catches of young cod were from 10 to 153 specimens in a trawl. At the depth more than 300 m on slope, the young has not been found despite numerous hauls.

On the eastern slope of the Great Newfoundland Bank, according to the 1960 and 1961 data, the young was distributed at the depths of 200-300 m (up to 117 specimens per one hour

trawling) during the winter period. In the summer period the young was distributed on the shallow of the bank where, as a rule, temperature of water was rising due to the summer heating.

Concentration of the young in the 'tail' region of the Great Newfoundland Bank is appreciably distinguished. At this place at the depths of 100-200 m from 40 to 278 specimens were caught by a trawl.

St. Pierre Bank. Green Banks.

According to data of several years, the young was distributed in the warmer southern parts of St.Pierre and Green Banks. Especially great amount of young cod (up to 2000 specimens per one hour trawling) was caught at the depths of 45-70 m in November, 1958. In 1961 the young was found on the south-western slope of St.Pierre Bank at the depths of 100-180 m and catches per one hour trawling varied from 27 to 107 specimens.

Peculiarity of the young cod distribution is that almost in all regions it was concentrated near spawning grounds. Location of these grounds is presented in papers of the meeting of the "Environmental Working Group" of the International Commission for the North-West Atlantic fisheries.

Investigations have shown that at the depth more than 400 m the young was not found, with rear exception. The young of small sizes more often occures in less deep waters. E.g., in subdivision 2J the young of 25 cm was in trawls at the depth less than 300 m, the young of 26-35 cm - at the depth less than 400 m, on St.Pierre Bank the above-mentioned size groups were distributed at the depths up to 200 m and 300 m accordingly.

Data of several years testify that in the summer period young cod leaves slopes for shallow waters. No changes in the young cod distribution by depths in different seasons were observed on Flemish Cap probably in connection with relatively constant temperature regime.

Distribution of the young by depths varies from year to year. So, in subdivision 3O in December of anomalously warm 1958 young cod was in catches taken at the depths of 250-275 m; even in August, 1959 the young was distributed rather deeply at the depths of 125-200 m.

Size of Young Cod

Size composition of the young by regions in 1954-1961

is shown on Fig. 2. So for as data are bazed on collections made in different periods of time, size groups of the young are summarized (for better comparison) by three months periods.

Taking into account size composition of the young and comparing it with not numerous data on age determinations we can judge (approximately) of the dominating year- classes. For subdivisions 2J and 3K the 1954, 1955 and 1957 year-classes are predominant. Domination of these year-classes specimens in commercial catches is also marked in the paper by A.I.Postolaky (1).

On Flamish Cap the 1958 year-class can well be observed.

For St.Pierre Bank it is possible to characterize the 1955 and 1958 year-classes as good ones, using average sizes for cod of different age-groups which are given in the papersby Fleming (2) and Postolaky (I).

Haddock

Distribution of haddock under 35 cm is shown on Fig.3. In the autumn-winter and spring-summer periods young haddock was located in the southern part of Great Bank and on its south-western slope, and also in the southern part of St.Pierre and Green Banks. Young haddock was distributed in shallow waters wider in the summer period than in the winter one. More often young haddock was in the catches taken at the depth from 50-150 m and up to 200 m. In the southern part of Newfoundland Bank at the depth of 70 m sometimes in catches there were up to 7000 specimens of the young per one hour trawling. Investigations showed that young haddock inhabits this region constantly and in great amount.

On the southern slope of St.Pierre Bank at the depths of 160-200 m up to 183 specimens were taken per one hour trawling. In 1961 the young was found on the south-western slope of St. Pierre Bank (from 20 up to 374 specimens per one hour trawling.).

Size of Young Haddock

Resemblance of curves designating sizes of the young by the same years in subdivisions 3N, 3O and 3P may testify comparatively similar composition of haddock in these subdivisions (Fig. 4).

Taking into account size composition and data of age definitions we can suppose that the young of 25-28 cm (in 1957) and of 30-32 cm (in 1958) which was dominating considerably in the above mentioned regions belonged to the 1955 year - class.

Conclusions

I. Thus, we can distinguish five regions of the young cod concentrations in the investigated part of Labrador and Newfoundland:

a) Region of the gut south of Hamilton Inlet Bank;
b) Northern part of the north-eastern slope of Great Bank;
c) Shallow of Flamish Cap Bank and its eastern slope;
d) Southern part of Great Bank;
e) Southern and south-western slopes of St.Pierre Bank.

2.Young haddock was found only in the southern part of Great Newfoundland and St.Pierre Banks and on their south-western slopes.

3. Young cod and haddock of up to 25 cm inhabited less deep waters than young fish of 26-35 cm.

4. In the summer period the young of both species was caught in great amount in shallow water of the Banks and in the winter period - closer to the slopes.

5. Taking into account size composition of young cod we can say that for subdivisions 2J and 3K the 1954 and 1957 year-classes and for St.Pierre Bank - the 1955 and 1958 year-classes are abundant.

6. The 1955 year - class was abundant for haddock.

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References

1. Postolaky A.I. - Some data on biology of Labrador and Newfoundland cod. Collection to the XII meeting of ICNAF.

2. Fleming A.M. - Age, Grouth and Sexual Maturity of Cod in the Newfoundland Area, 1947-1950. Journ. Fish. Research Board of Canada, vol. 17, No.6, 1960.

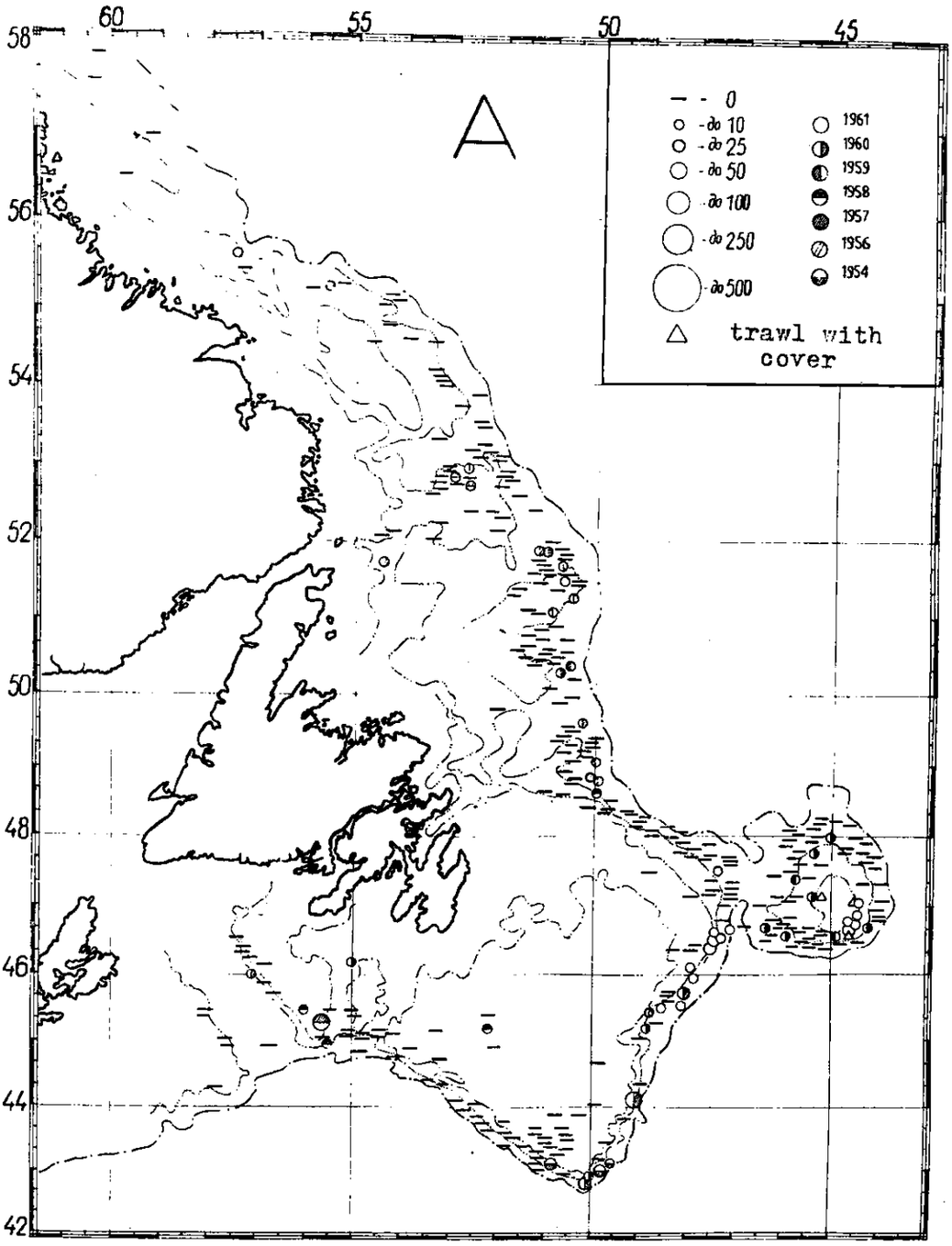

Fig. I A. Distribution of young cod of less than 25 cm in the period from October to March, 1954-1961.

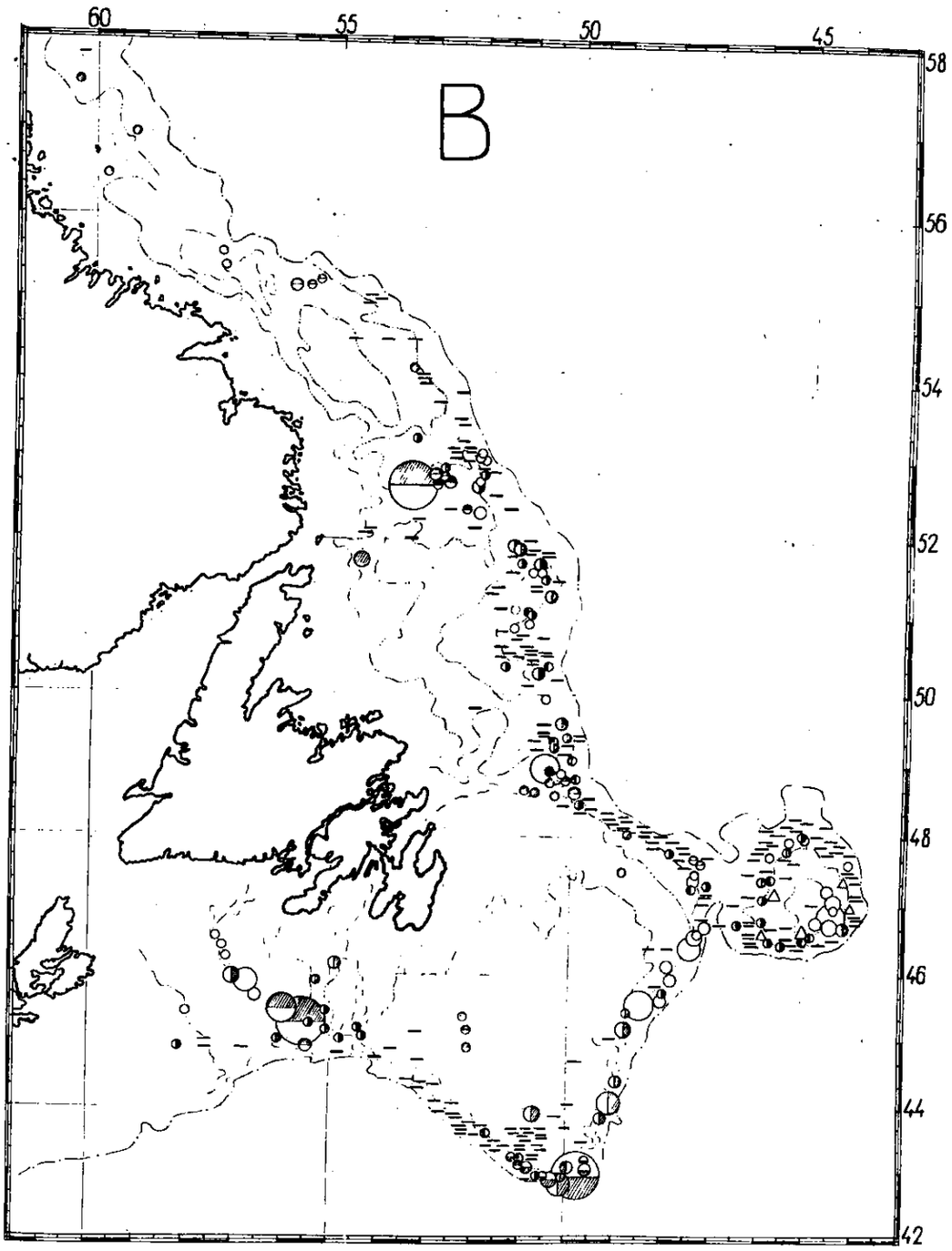

Fig. I B. Distribution of young cod of 26-35 cm in the period from October to March, 1954-1961.

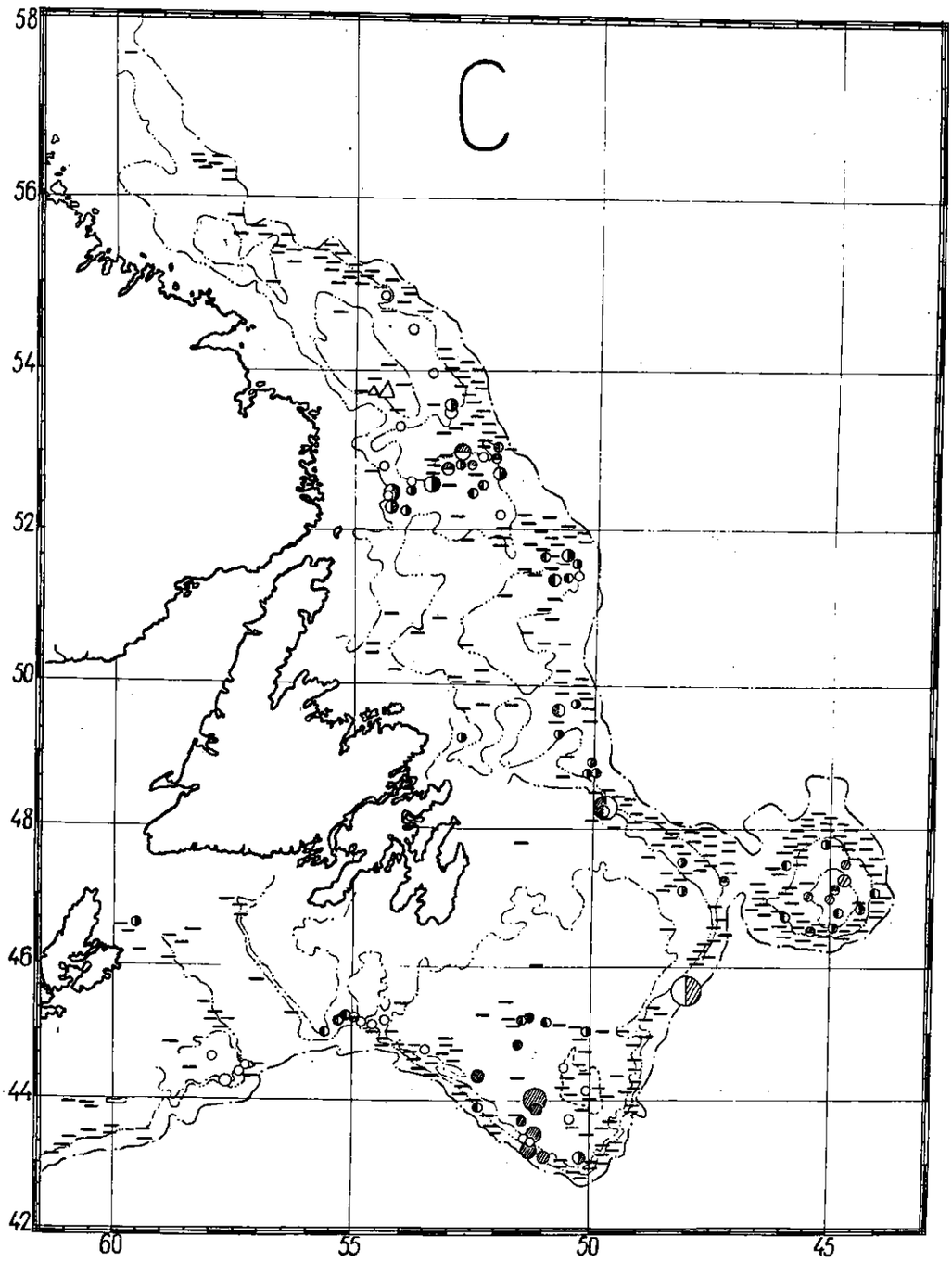

Fig. I C. Distribution of young cod of less than 25 cm in the period from April to September, 1954–1961.

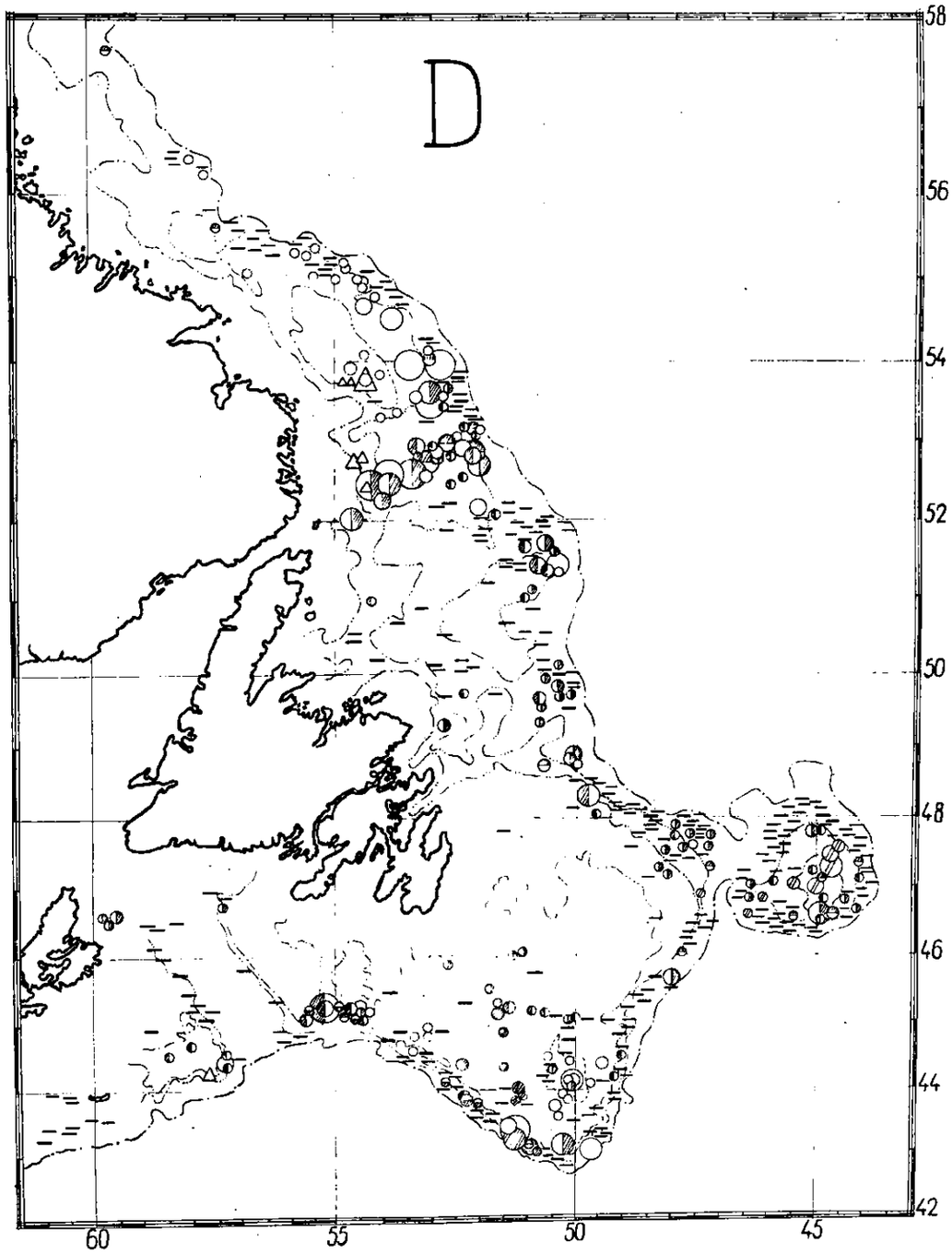

Fig. I D . Distribution of young cod of 26-35 cm in the period from April to September, 1954- 1961.

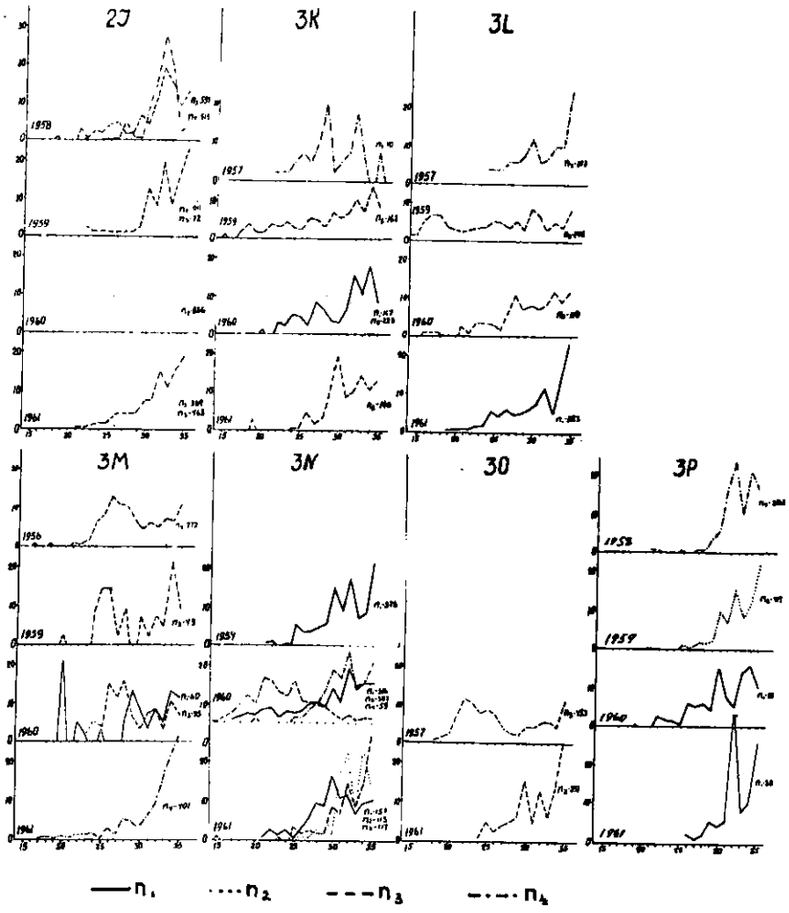

Fig. 2. Sizes of young cod by regions in different years, n_I - January - March; n_2 - April-June; n_3 - July- September; n_4 -October-December.

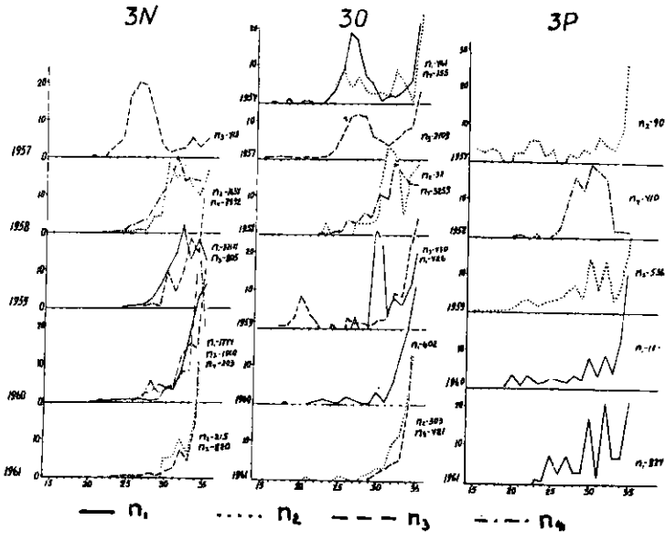

Fig. 4. Sizes of young haddock by regions in 1954-1961.
n_I - January- March; n_2 - April-June;
n_3 - July- September; n_4 -October-December

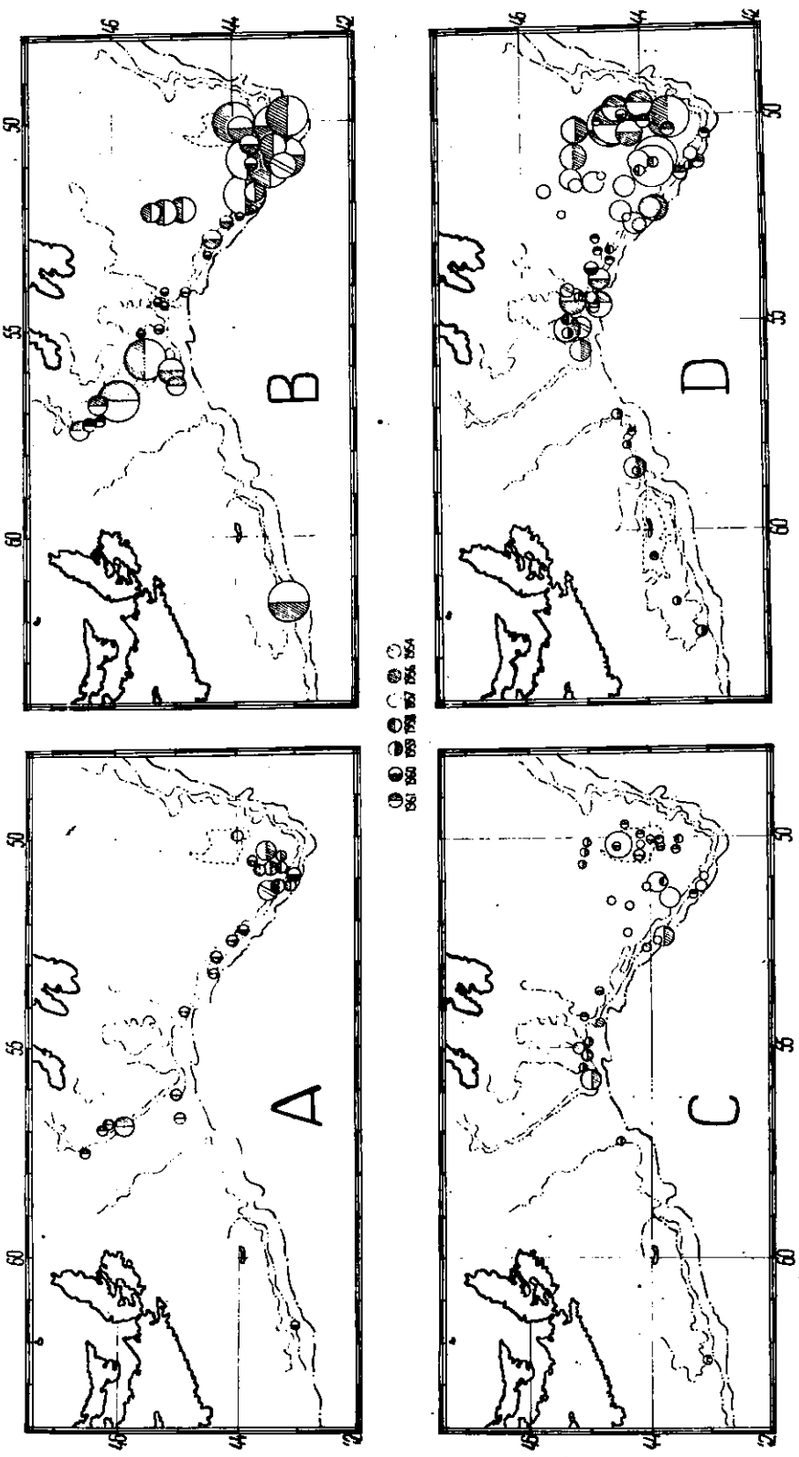

Fig. 3. Distribution of young haddock of less than 25 cm (A and C) and of 26–35 cm (B and D) in 1954– 1961