



Serial No. 2771
(D.c.9)

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Observations on herring taken in ICNAF Subareas 4 and 5

by

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This study is based on samples of herring collected in 1971 by R/V *Cryos*:

On the Nova Scotia Banks and in the Gulf of St. Lawrence (Chart No. 1):

<u>Date</u>	<u>Area</u>	<u>ICNAF Div.</u>	<u>Number</u>
26 January	St. Ann Bank	4Vn	(100)
7 May	Cape St. Lawrence	4T	(200)
11 May	Cape Smoky	4Vn	(300)
12 May	Cape Gabarus	4Vn	(200)
20 May	Artimon Bank	4Vs	(200)
22 May	Grey Sole Bank	4Vs	(200)
25 July	Sydney Bay	4Vn	(200)

On Georges Bank (Chart No. 2):

28 September	Georges Bank	5Ze	(300)
7 October	Georges Bank	5Ze	(100)

In November and December, no herring were taken by R/V *Cryos* in Subdiv. 4Vn and 4Vs.

Work done

5379 measurements on 1800 specimens included the following: length; age; weight; sex and stage of maturity; gonad weight; gonad-somatic relationship; number of dorsal rays of left pectoral, of vertebrae, of keel scales (K_2), and of branchiostigites.

The method used is found in ICNAF Res.Doc. 71/40.

The separation of spring and autumn populations based on stages of sexual maturity have been determined through the gonad-somatic relationship (RGS). Herring which have not reached first sexual maturity have been treated separately.

Finally, the percentage of fat in the filets and sometimes in the whole fish was determined for 164 specimens.

Results

Gulf of St. Lawrence (Div. 4T)

Cape St. Lawrence

A single station was made after the mid-April concentration observed each year near St. Paul Island. The specimens made up of 69% spring herring, 20% autumn herring and 11% immature, had the following characteristics: 1967 year-class (4 years old) and 1966 year-class (5 years old) made up 69% of the whole stock. Sexual maturity was at stages 4 and 5 and average RGS was 11.03.

Meristic characteristics were those of a spring stock: dorsal rays 17.33, keel scales 13.36 and branchiostigites 45.93. The other characteristics are shown in Table 1, particularly the percentage fat content average of 10.08% of the total weight.

Nova Scotia Banks

St. Ann Bank (Subdiv. 4Vn)

The single sampling of 26 January shows a population distribution similar to that found later at Cape St. Lawrence (Fig. 1); 64% had spring herring characteristics, the RGS was 7.68 and the maturity stage varied from 3 to 5.

Cape Smoky (Subdiv. 4Vn)

Forty-six percent of the fish taken had attained first sexual maturity (average weight 94 g at length 24.14 cm). Meristic characters attained 18.41 for pectoral rays and 13.81 for keeled scale (K_2) counts. Almost the total population was thus autumn stock.

Thirty-nine percent were autumn herring 30.63 cm average length, at an average age of 6.25 years. Stage of maturity was 8 (RGS = 1.64), percent fat 11.96 (Table 1).

Finally, 15% of the specimens, of stage 4 (RGS = 6.93) belong to a spring population defined by the following meristic characters: 17.44 pectoral ray count; 13.35 keeled scale (K_2) count; 46.28 branchiostigite count.

Cape Gabarus (Subdiv. 4Vn)

Ninety-four percent of the fish were at stages 8-3; average length of this autumn stock is 33.34 cm. A very low fat content was found: 6.10 for an RGS of 1.75.

The meristic characters approach those of the populations of "Grey Sole" and Artimon deeps (Table 1).

Artimon and "Grey Sole" Deeps (Subdiv. 4Vs)

In May 1971, good herring catches with a yield of 364 and 450 kg per half hour were made on deeps opening onto the Laurentian Channel, at the 180-m level.

Ninety-seven percent of the fish were 33 to 38 cm long (Fig. 1) with an average weight of 367 g. Eighty percent were 10 years old or more.

Meristic characters of the autumn herring type were: 14.15 keeled scale count; 18.60 pectoral ray count; 49.66 to 49.76 branchiostigite count. Average fat content varied from 11.59 to 13.46 at stage 3 maturity (RGS = 2.81). Finally, the stomachs examined were half full.

Sydney Bay

Herring sampling in Sydney Bay in July was comparable to that from the Artimon and "Grey Sole" deeps: average length 36.40 cm; average weight 420 g (gonads were in stage 4 and the stomach was full).

All other characters were like those of the Artimon and "Grey Sole" area. The low keel scale count (14.03) was due to sexual dimorphism and the sex ratio: 3 males to 1 female.

Georges Bank (Subdiv. 5Ze)

Status of the fishery

On 28 September, after a first sampling at station 401, spawning concentrations were quickly located at stations 404, 405, and 406 (Chart No. 2); 9 days later, station 449, on the northeast part of Georges Bank, showed some herring already spawned and stage of maturity 7 and 8.

Stock composition

On the spawning grounds, 1,546 fish were measured. The age distribution showed a dominant 1966 year-class (5 years old) making up 50% of all the age classes (Fig. 2). The other year-classes 1967, 1965, and 1962 had the same relative importance as in 1970 (Boyar and Perkins, 1971). Fish from two other stations outside the spawning grounds had different year-classes (Fig. 2).

Meristic characters

From 400 specimens, 200 of which were taken on the spawning grounds, they convey, as for all autumn populations, the numbers of keeled scales (K_2) as 14.31, pectoral rays as 18.57 and branchiostigites as 49.31. The other characters are shown in Table 2.

Conclusion

The study made from 7 May-22 May gives some idea of the dispersal of the different spring and autumn populations of herring which are found on the fishing grounds in Div. 4T and Subdiv. 4Vn and 4Vs. On the other hand, the samples collected from the fisheries are interesting due to the fact that they have been taken from concentrations:

1. The sampling from Sydney Bay, in May, had a very high proportion of immature fish.
2. The sampling on Georges Bank was made on a spawning concentration at the end of September. As established by Boyar, the 1966 year-class is predominant.
3. The existence of the same population on the Artimon and so-called "Grey Sole" deeps is noted. Since these deeps open onto the Laurentian Channel, one can think of the populations as coming from the same stock complex as Banquereau.
4. The study of a meristic character, such as the number of keeled scales (K_2) was made on samples collected from Georges Bank and in the Gulf of St. Lawrence. The value of K_2 diminishes with latitude for the autumn population and remains the same for spring populations (Fig.3).
5. Finally, the fat content of filets, using the method of B.B.S., was determined in the laboratory. The method and the results are shown in the general report.

References

- Boyar, H.C. 1968. Age length, and gonadal stages of herring from Georges Bank and the Gulf of Maine. *Res.Bull. int. Comm. Northw. Atlant. Fish.*, No. 5, p. 49-69.
- Boyar, H.C., and F.E. Perkins. 1971. Age length and maturity of adult herring in ICNAF Subareas 4 and 5, 1970. *Annu. Meet. int. Comm. Northw. Atlant. Fish.*, Res.Doc. 71/101.
- Decamps, Ph. 1971. Study of the biological characteristics of spring and autumn herring taken off Cape Breton Island and Burgeo Bank. *Annu. Meet. int. Comm. Northw. Atlant. Fish.*, Res.Doc. 71/40.
- Hodder, V.M., and L.S. Parsons. 1971. Comparison of certain biological characteristics of herring from Magdalen Islands and southwestern Newfoundland. *Res. Bull. int. Comm. Northw. Atlant. Fish.*, No. 8.

Table 1. Results of studies of biological characters of herring from Div. 4T and Subdiv. 4Vn and 4Vs.

Caractères (Biological characters) biologiques (average)	Cap St. Laurent h. print. h.d'aut. juveniles n : 138 n : 39 n : 22	Cap St. Laurent h. print. h.d'aut. juveniles n : 64 n : 28 n : 8	Cap Smoky h. print. h.d'aut. juveniles n : 45 n : 116 n : 139	Cap Gabarus h. print. h.d'aut. n : 12 n : 188	Fosse "Grey Sole" h. print. h.d'aut. n : 200	Fosse "Grey Sole" h. print. h.d'aut. n : 200	Baie de Sydney h. print. h.d'aut. n : 200
Stade de maturité (Stage of maturity)	4 - 5 : 8 : 1 et 2	3 - 4 : 8 : 1 et 2	4 : 8 - 3 : 1 et 2	5 : 8	3	3	4
R.G.S.	11,03 : 1,47 : 0,32	7,63 : 1,16 : 0,39	6,93 : 1,64 : 0,39	11,20 : 1,75	2,85	2,85	10,07
Pourcentage de graisse (Percentage fat content)	10,08		13,75 : 11,96 : 6,20	6,10	13,46	13,46	15,71
taille (cm) (length)	27,47 : 28,43 : 24,54	27,42 : 29,53 : 24,86	28,02 : 30,63 : 24,14	29,83 : 33,34	36,40	36,40	36,40
pois (g) (weight)	156 : 161,4 : 98,1	159,5 : 185,4 : 101,3	165,5 : 216,2 : 94,2	207,2 : 274,7	367,4	367,4	420,5
âge (année) age (year)	5,38 : 5,67 : 3,27	4,77 : 6,14 : 3,14	4,64 : 6,25 : 3,15	6 : 8,80	10,65	10,65	11,12
Nbre de vertèbres (No. of vertebrae)	55,28 : 55,46 : 55,75	55,20 : 55,61 : 55,88	55,44 : 55,52 : 55,60	55,58 : 55,60	55,74	55,74	55,55
Nbre de rayons de la pectorale (No. of pectoral rays)	17,33 : 18,25 : 19,14	17,23 : 18,15 : 18,00	17,44 : 18,42 : 18,41	17,42 : 18,61	18,60	18,60	18,55
Nbre de rayons de la dorsale (No. of dorsal rays)	13,98 : 19,10 : 14,00	19,11 : 19,74 : 19,87	19,20 : 19,45 : 19,53	19,16 : 19,61	19,51	19,51	19,45
Nbre de scalles osseuses K2 (No. of keeled scales)	13,36 : 13,61 : 13,61	13,33 : 13,65 : 14,33	13,35 : 13,83 : 13,81	13,33 : 13,97	14,18	14,18	14,03
Nbre de branchiostigites (No. of branchiostigites)	45,33	48,29	48,47	46,83	49,76	49,76	49,72

Table 2. Results of studies of biological characters of herring from Georges Bank (Subdiv. 5Ze).

Caractères biologiques (moyenne)	Station 401 n = 99	Station 404 n = 196	Station 449 n = 100
Stade de maturité	6	6	7 - 8
R.G.S.	≥ 20	≥ 20	0,52
Pourcentage de graisse	8,39	7,71	10,25
taille (cm)	30,70	28,81	31,64
poids (g)	232,5	199,6	227,5
âge (année)	6,64	5,52	7,19
Nbre de vertèbres	55,34	55,38	55,39
Nbre de rayons de la pectorale	18,47	18,57	18,43
Nbre de rayons de la dorsale	19,40	19,33	19,51
Nbre de scutelles osseuses K ₂	14,15	14,31	14,13
Nbre de branchicténies	49,62	49,31	49,56

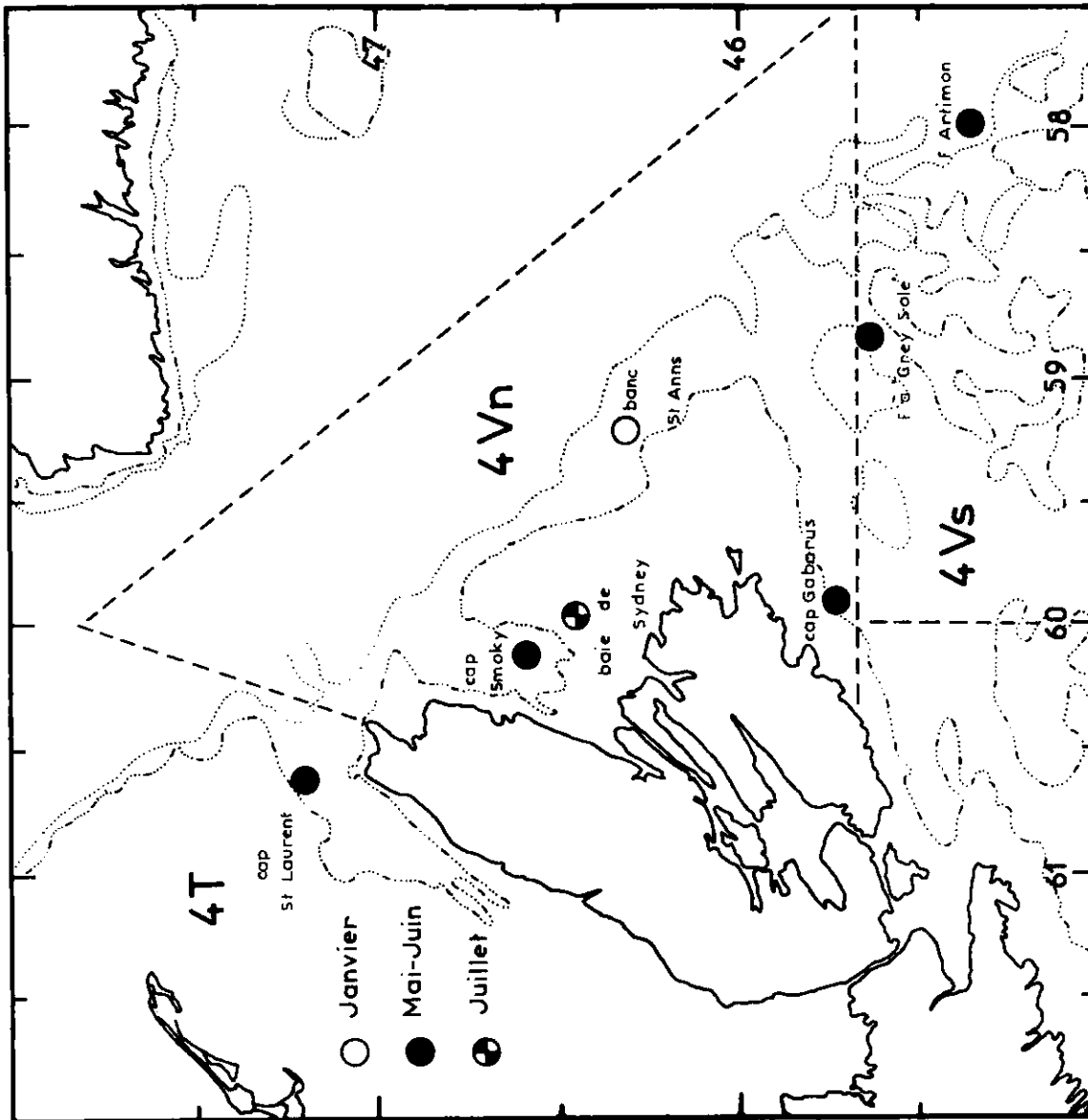


Chart No. 1. Location of sampling areas in Div. 4T and Subdiv. 4Vn and 4Vs.

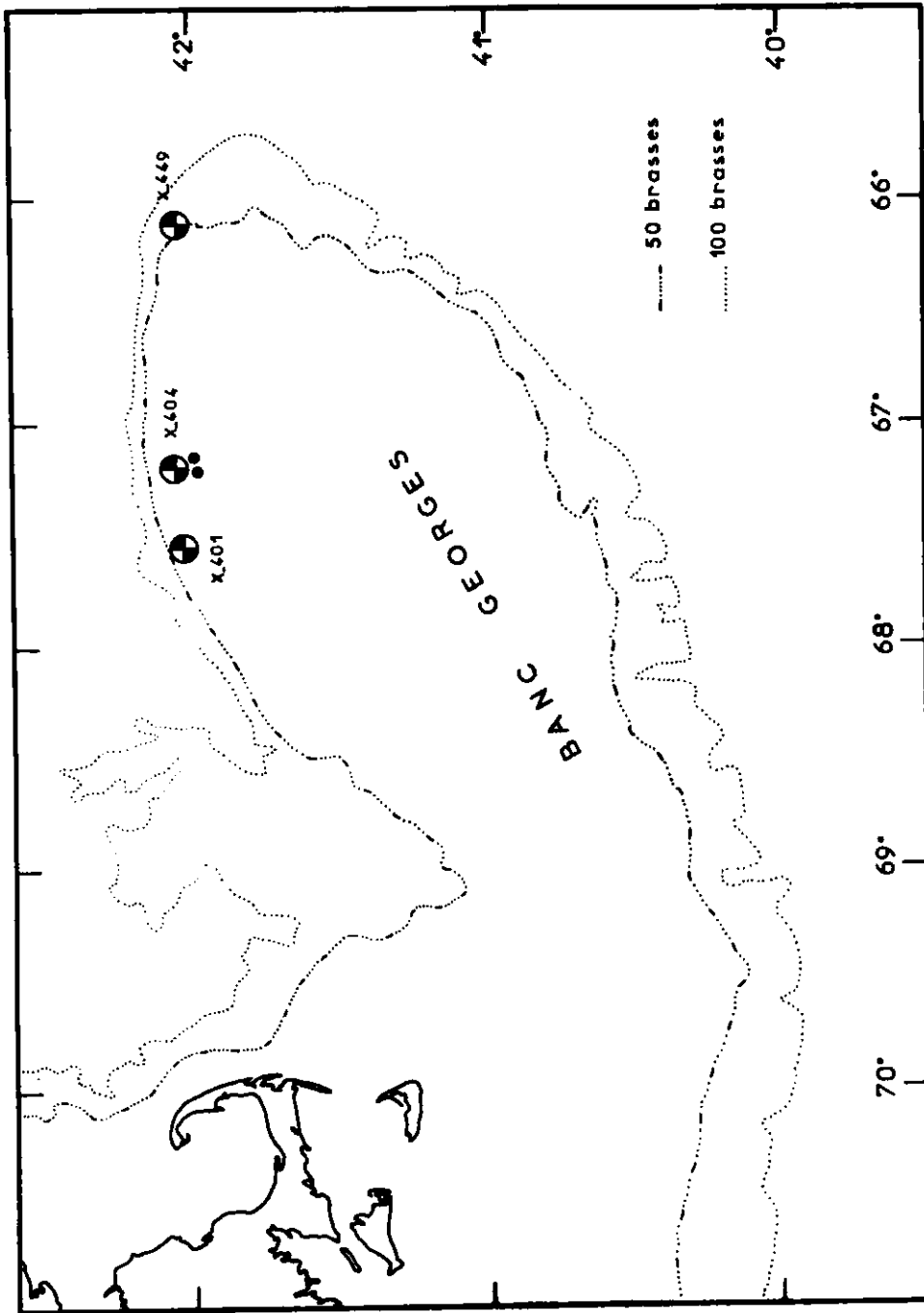


Chart No. 2. Location of sampling areas in Subdiv. 5Ze.

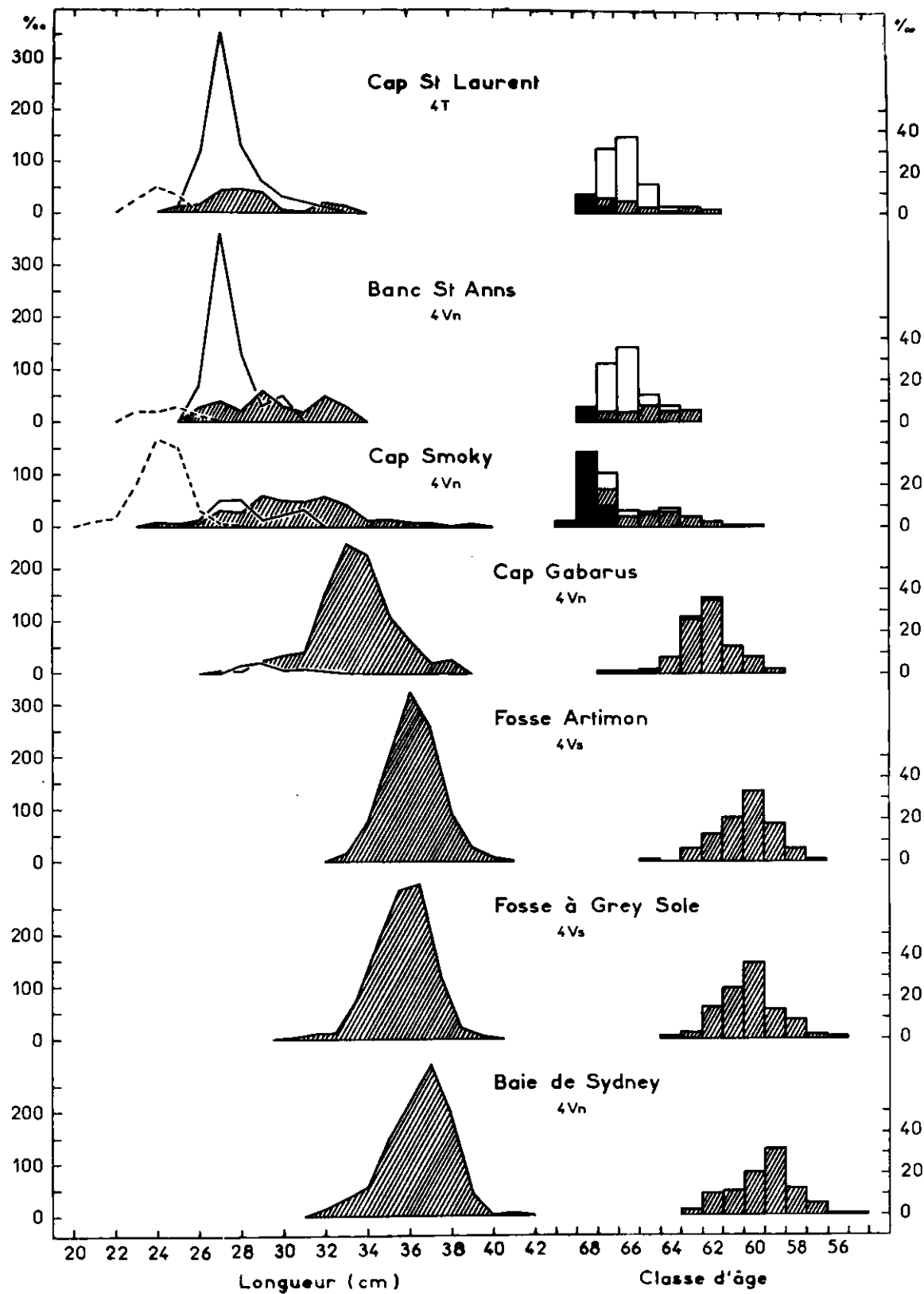


Fig. 1. Length frequencies and age composition of herring from Div. 4T and Subdiv. 4Vn and 4Vs (hatched portion: autumn herring; solid portion and dashed line: immatures).

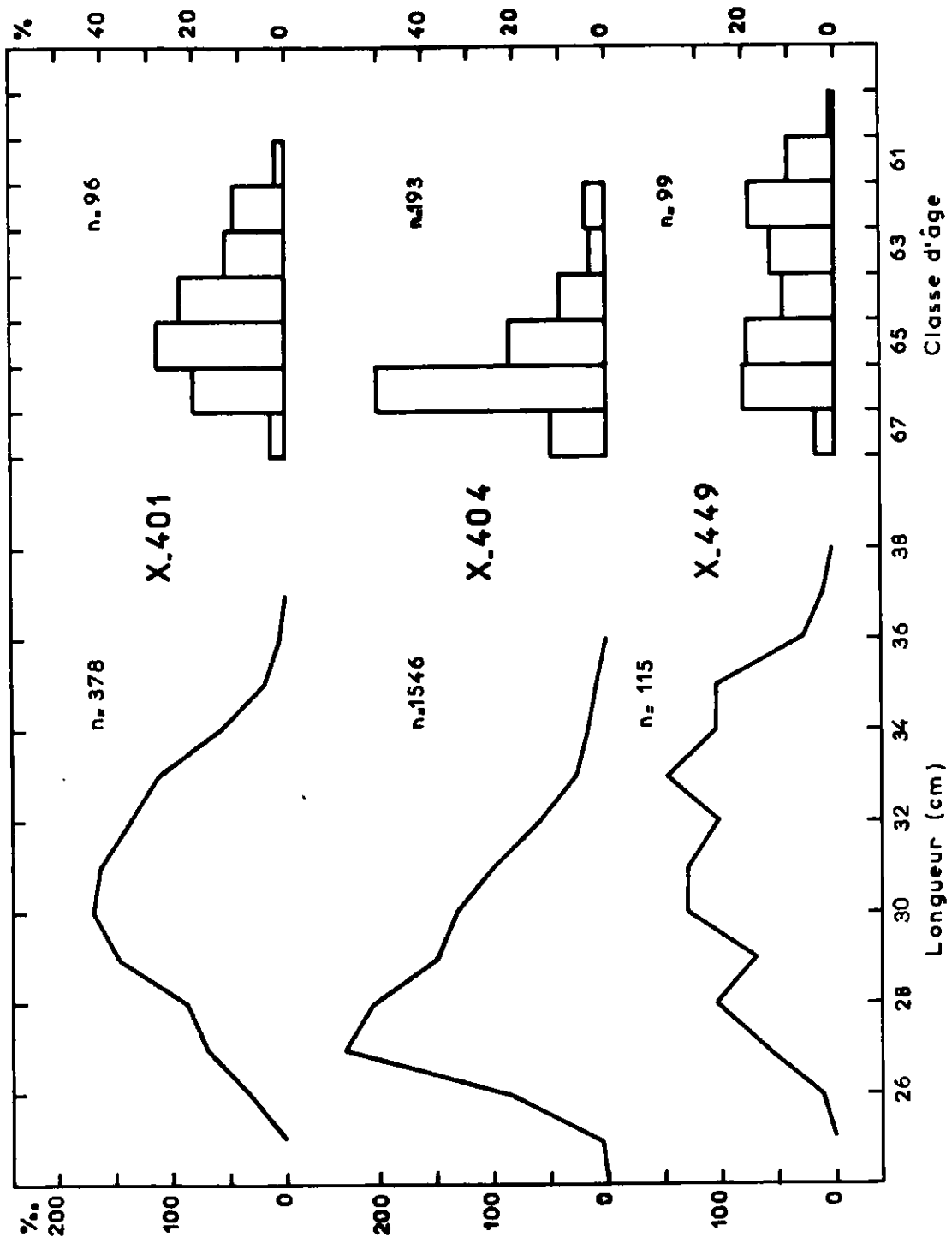


Fig. 2. Length frequencies and age composition of herring from Subdiv. 5Ze.

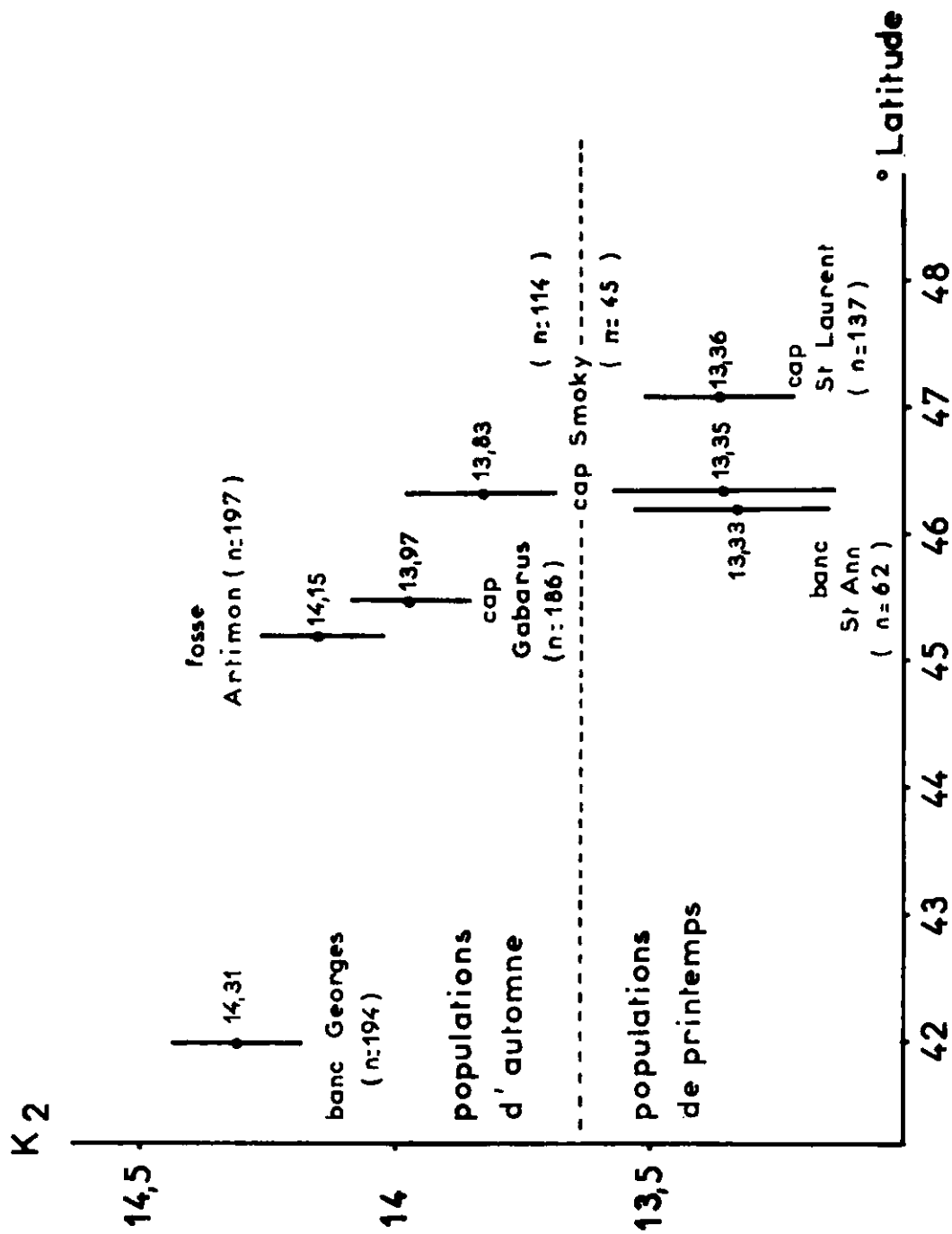


Fig. 3. Distribution of (K₂) with the latitude of the autumn and spring populations.



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1. Under heading "Work done" on page 1, please replace paragraph 1 with the following:
"5379 measurements and 1,800 specimens were examined at the laboratory for the following biological research: length; age; weight; sex and stage of maturity; gonad weight; gonad-somatic relationship; number of dorsal rays of left pectoral, of vertebrae, of keel scales (K_2), and of gill-rakers."
2. Please change the word "branchiostigites" to "gill-rakers" throughout the document (i.e., 2nd line, last para., page 1; last line, para. 4, page 2; 2nd line, para. 9, page 2; 3rd line, para. 1, page 3).
3. Under heading "Sydney Bay" on page 2, please replace the second paragraph with the following:
"All other characters were like those of the Artimon and "Grey Sole" area. The low keel-scale count (14.03) was due to sexual dimorphism and the sex ratio: 3 females to 1 male."

