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Study of the Biological Characteristics of Spring and Autumn Herring Taken off Cape Breton Island and Burgeo Bank

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Samples studied (400 fish) came from seasonal fishing areas normally visited by Canadian seiners or German trawlers.

In the spring, 17 April, only one sampling was effected off Cap St. Laurent by R/V *Thalassa*.

In the fall, the samplings come from two different areas, Cap Smoky and Burgeo, and at an interval month (November and December), see Fig. 1.

All samples are the results of catches made with a Lofoten trawl and deal with samples of 100 herring each. Various biological observations were made on the following features:

1. Length

Samples were measured according to "total length" to the nearest mm. Then, to establish size curves, in frequency °/₀₀, data were converted to lower cm as stated in the recommendation "review of length measurements used for herring", ICNAF *Redbook* 1968, (Part I, p. 15).

2. Age

Herring age is determined by examination of otoliths.

3. Stages of Sexual Maturity

Samples were separated by sex and stage according to the 8-stage scale for sexual maturity as adopted by ICNAF (1964) and described by H.C. Boyar (1968).

The use of the relationship between the sexual maturity scale and the somatical gonad report outlined by G.P. Farran and A. Bowman allowed a better separation of the stages.

In the sampling made in April, herring of sexual stages 4, 5, 6, and 7, are "spring" herring which will spawn from April to June; the herring of stages 8 and 3 of the same sampling can be called "autumn" herring. On the other hand, herring caught in November and December, showing stages 7 and 8, can be called "autumn" herring (spawning has just occurred) and in the same samplings, fish of stages 3, 4, and 5, are "spring" herring.

4. Dorsal and Left Pectoral Ray Count

The counting was made by a binocular scope.

5. Vertebral Count

The cleaning of the axial skeleton was made in warm water and the count of vertebras was made without the urostyle.

6. Keel Scale K_2 and Gill Raker Counts

Count of bony scutes K_2 is made between the insertion of the ventral fins and the anus, and that of the gill rakers on the lower limb of the first left branchial arch.

RESULTS

Results are given in Table 1, as well as in Figs. 2, 3, and 4.

The distinction between "spring herring" and "autumn herring" based on sexual maturity stages gives the following results:

Cap St. Laurent - 86% "spring" herring

Cap Smoky - 98% "autumn" herring

Burgeo - 87% "autumn" herring

Spring catches are made of individuals varying in length from 26 to 34 cm (mean 29 cm) and average 30.06 cm, for an average weight of 185.49 g. Sixty-nine percent of the population is 5-6 years old. Autumn samplings collected herring varying in length from 28 to 39 cm; mean being 36 cm and average of 35.19 cm. Average weight is 291.88 g. Sixty percent of the population is over 9 years old. Proportions of both sexes are more or less equal:

Cap St. Laurent - 48% female; 52% male

Cap Smoky - 54% female; 46% male

Burgeo - 52% female; 48% male

Examination of meristic features allows one to establish that the results (average vertebral count and average number of pectoral rays) are comparable to those of V.M. Hodder and L.S. Parsons (1970).

Taking into account a mixture of both populations in the samplings, it is the Cap Smoky sampling with 98% autumn herring which gives the best results. The most significant result is the average number of rays of the left pectoral (17.61 spring herring versus 18.54 autumn herring).

The average of 49.39 for gill rakers from Cape Smoky is near that of 49.57 given by K. Schubert (1969) on biological studies of herring taken on Misaine Bank in the same season.

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.

HODDER, V.M. and L.S. PARSONS. 1970. A comparative study of herring taken at Magda Islands and along southwestern Newfoundland during the 1969 autumn fishery. *ICNAF Res.Doc. 70/77.*

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TABLE 1. Summary of the study of biological characteristics.

Biological Characteristics (average)	17 April Cap St. Laurent n = 100 86% spring herring	4 November Cap Smoky n = 194 98% autumn herring	9 December Burgeo n = 100 87% autumn herring
Size (cm)	30.066	35.190	35.156
Weight (g)	185.49	294.57	286.67
Age (year)	6.17	9.79	10.02
No. of vertebras	55.68	55.60	55.50
No. of pectoral rays	17.61	18.54	18.25
No. of dorsal rays	19.45	19.26	19.00
No. of bony skeletons K_2	13.46	13.92	13.79
No. of gill rakers	46.97	49.39	48.84

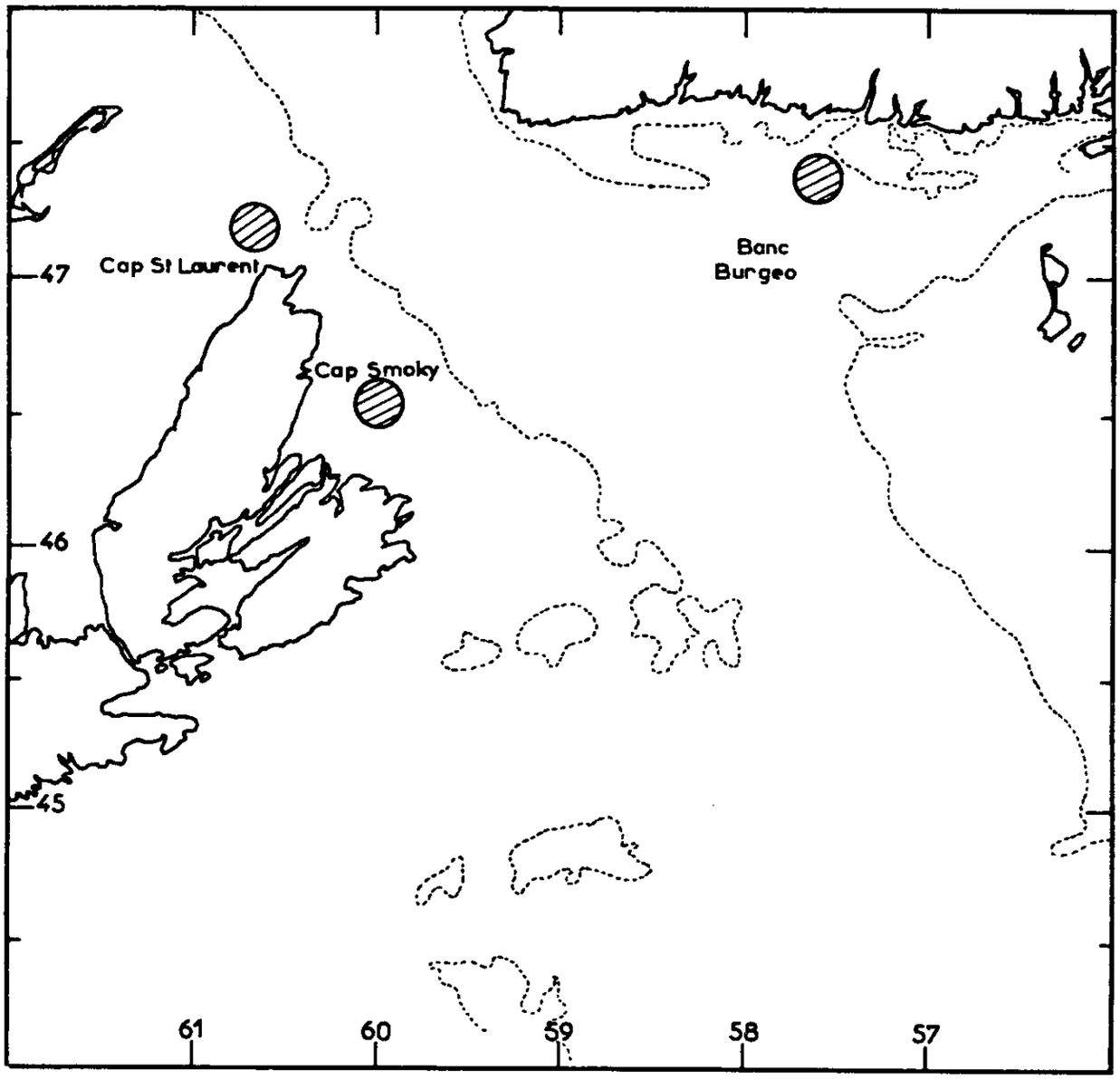

Fig. 1. Chart showing sampling areas.

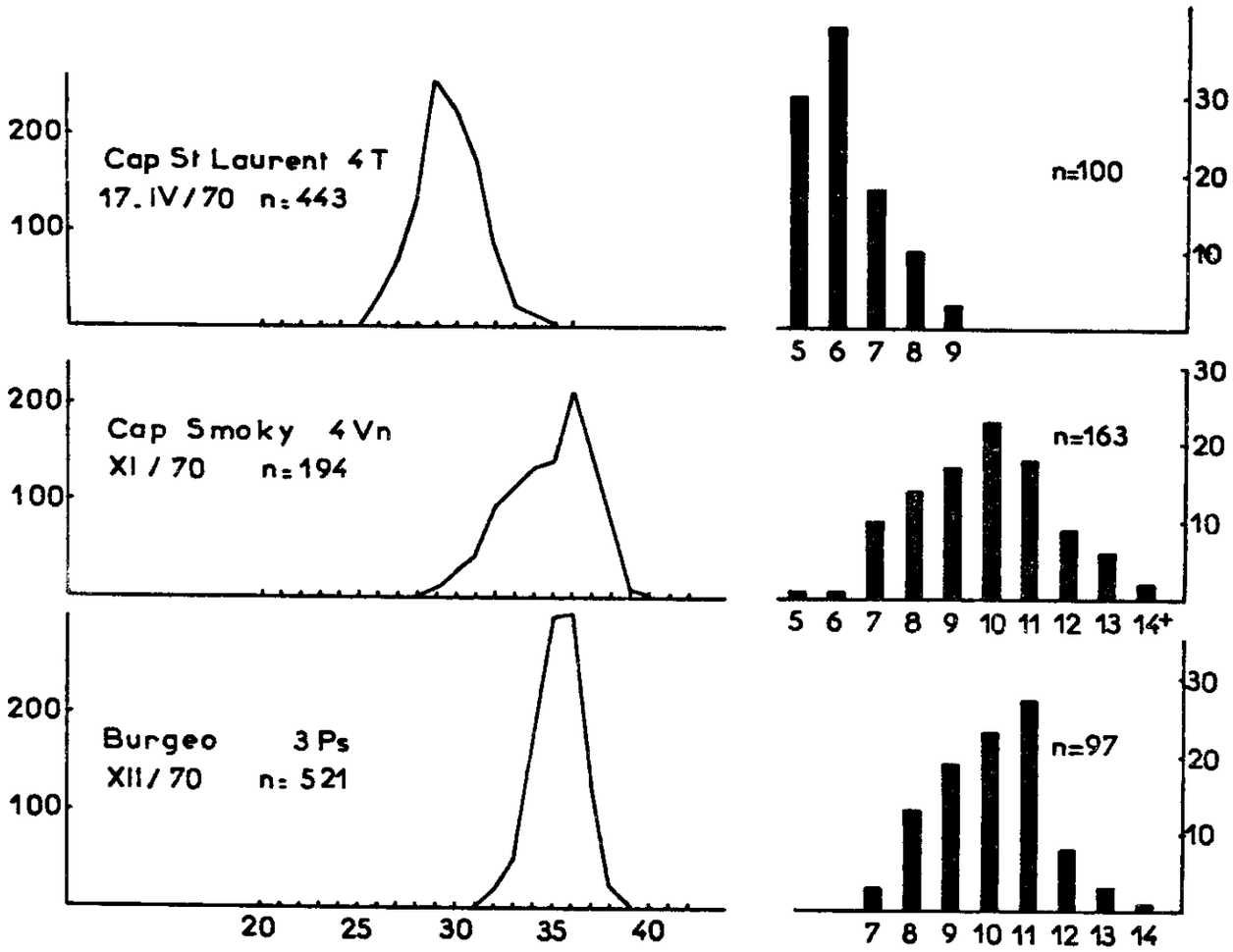

Fig. 2. Herring: Length frequency and age composition.

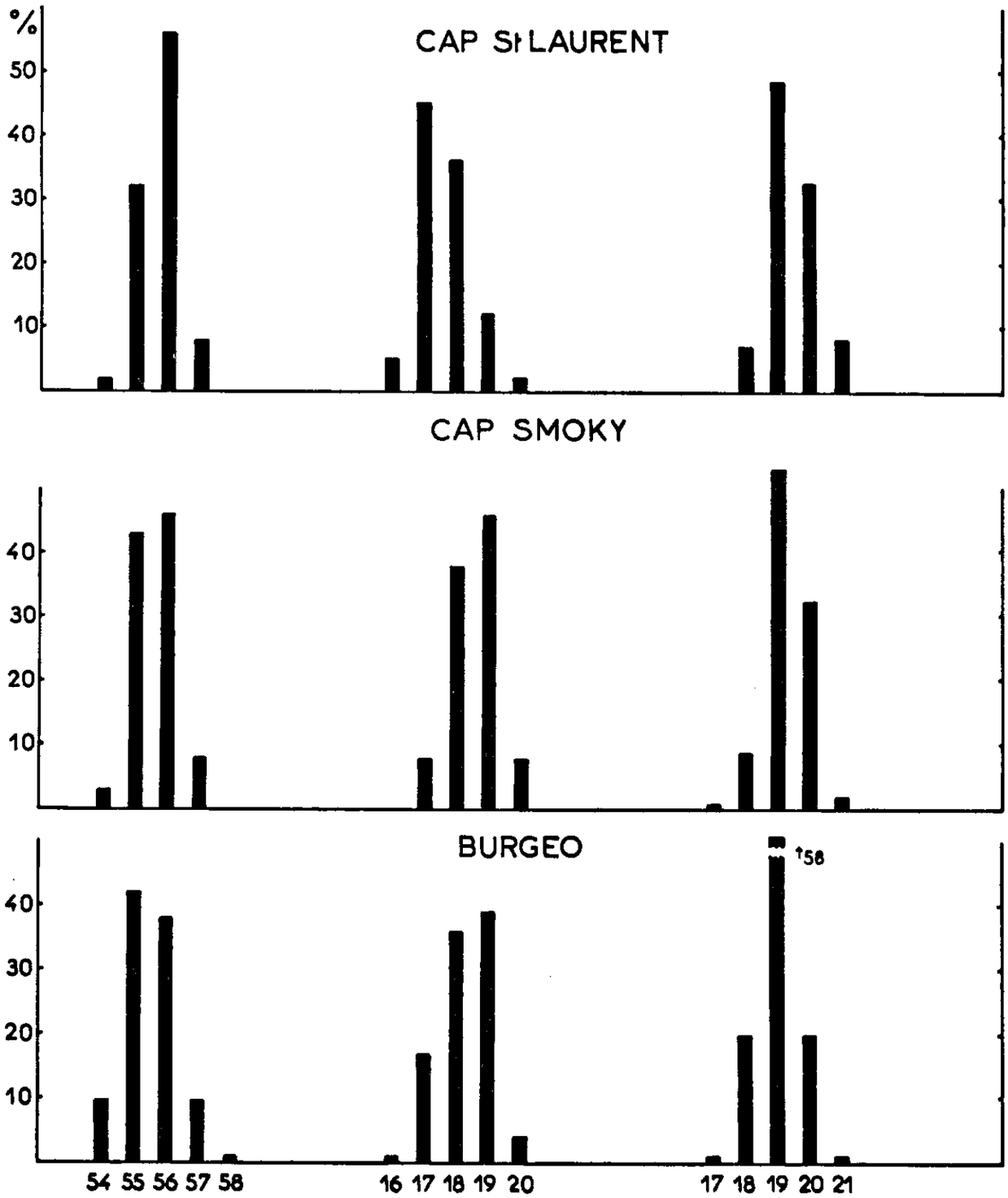

Fig. 3. No. of vertebras | No. of pectoral rays | No. of dorsal rays

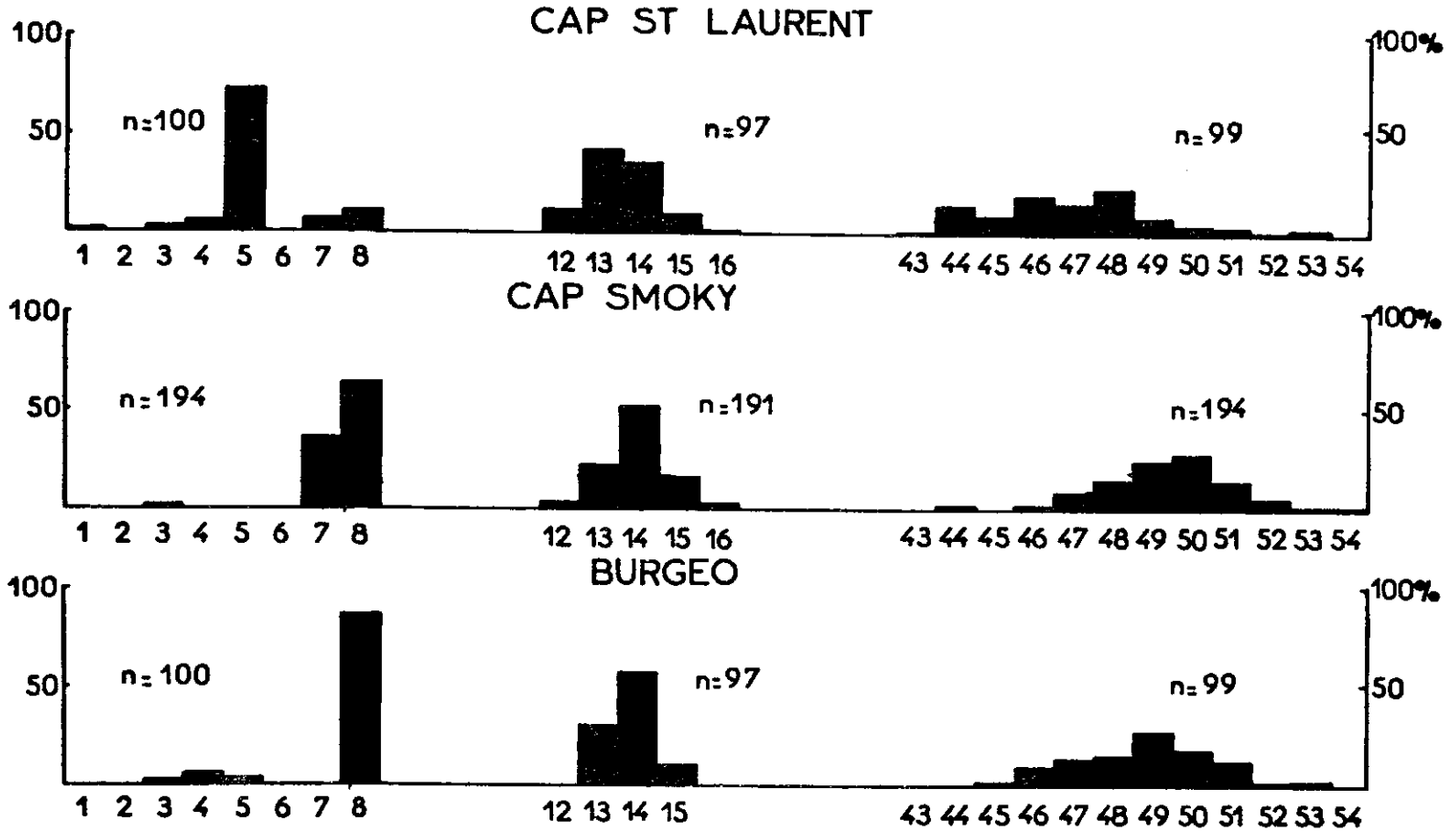

Fig. 4. Stages of maturity K_2 No. of gill rakers