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Growth of the yellowtail flounder, *Limanda ferruginea* (STORER), fished around the St Pierre and Miquelon Islands

by

J.P. Berthome
ISTPM
St. Pierre and Miquelon

Introduction.

The yellowtail flounder, Limanda ferruginea, is found from Labrador to Cap Cod. Its distribution is discontinuous, probably related to its preference for shallow water (10-110 m) and small sediments.

By the way, populations may be distinguished from metric and meristic investigations (BERTHOME, 1974 a and b).

The present paper provides information on growth of the yellowtail flounder from the St Pierre and Miquelon area.

Material and methods.

Material was collected in september 1973 near the archipelago (fig. 1).

A bottom trawl with 8.70 m headrope and 11.50 m footrope was used.

Detailed analysis was performed on a random sample of 294 individuals. Fish were measured (mm), weighed (g) and sexed. Otoliths were taken and immersed in glycerin for being thinned. Otolith reading was done through a X10 magnification binocular, using direct light, by counting number of hyaline rings on the whole otolith.

For calculation of growth in length with age, we used the von Bertalanfly equation :

$$l_t = L_\infty \quad (1 - e^{-k\,(t - t_o)}) \quad \text{where}$$

l_t is the length at age t (in years)

L_∞ is the theorical maximum length

k is a constant

t_o is the theorical age at zero length.

The parameters of growth equation were determined after Walford's method (1946).

The length-weight curve was obtained by the equation :

$$W_t = qL_t^n \quad \text{in which}$$

W_t = weight

L_t = length

n and q are constants.

The least squares regression of the logarithmic transformation was used.

The weight-age regression is given by the expression

$$W_t = W_\infty (1 - e^{-k(t - t_o)})^n \quad \text{where}$$

$$W_\infty = qL_\infty^n$$

<u>Results</u>.

Length and year-class distributions, in relation to sex, are shown (fig. 2). It must be noticed that the year-class 3 is not represented in our data, and we suppose that reproduction rate was weak in 1970.

Moreover the greater longevity of females is marked by the presence of year-class 9, a class that does not exist in males from our sample.

a) <u>Growth in length</u> (fig. 3).

The parameters L_∞ and k are determined from the Walford method :

for males : $L_{t+1} = 6{,}70 + 0{,}86\ L_t$

and $L_\infty = 48{,}38$ cm , $k = 0{,}15$

for females : $L_{t+1} = 6{,}79 + 0{,}88\ L_t$

and $L_\infty = 56{,}44$ cm , $k = 0{,}13$

The t_o value is deduced from the straight line equation (GULLAND,1969) ?

$$\text{Log}\ \frac{L_\infty - L_t}{L_\infty} = k\ (t_o - t)$$

for males, $t_o = 0{,}496$

for females, $t_o = 0{,}500$

Hence the Bertalanfly growth curves are :

for males $L_t = 48{,}38\ (1 - e^{-0.15\ (t - 0{,}50)})$

for females $L_t = 56{,}44\ (1 - e^{-0.13\ (t - 0{,}50)})$

The results suggest that growth of females is somewhat faster than that of males.

The difference in growth is reflected in the difference L_∞ values, and also in the rate of change in length with age k.

Thus males reach commercial size at an age of about six years while females reach this size about a year earlier.

b) Length-weight relationship (fig. 4).

The calculated equation for length versus weight derived from the logarithmic transformation is

for males : $W = 5451.10^{-6}\ L^{3.131}$

for females : $W = 4463.10^{-6}\ L^{3.190}$

Up to about 30 cm in length, the rate of increase in weight for males is greater than that for females. But above this size, which corresponds to their age at first maturition, females grow faster than males.

c) Growth in weight (fig. 5).

Curves of growth in weight were determined, using the parameters from the age-length and length-weight relationships, as follows :

for males : $W = 1026\ (1 - e^{-0.15\ (t\ -\ 0,50)})^{3.131}$

for females : $W = 1727\ (1 - e^{-0.13\ (t\ -\ 0,50)})^{3.190}$

At given ages, the heavier weight of females is the result of their faster growth in length and higher rate of weight increase.

Conclusion.

In their studies, SCOTT (1954) and LUX and NICHY (1969) have shown that the growth of males and females is essentially the same up to about a size of 30 cm, thus at 3-4 years of age for the Cap Cod population and 5-6 years of age for that of Western bank.

The present study, based on individuals fished around St Pierre and Miquelon islands, shows that growth in length is faster in females than in males whatever their age.

On the other hand, females have slower growth in weight until their first sexual maturation at a size of 30 cm ; after that their weight increments are superior to those of males.

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References

BERTHOME (J.P.), 1974 a.- Comparative study of the stock distribution of yellowtail (*Limanda ferruginea*, STORER 1839) on Nova Scotia and Georges bank.- Int. Comm. Northw. Atlant. Fish., Res.Doc. 74/56, ser. n° 3269.

BERTHOME (J.P.), 1974 b.- La limande ferrugineuse, *Limanda ferruginea* (STORER, 1839), étude de population.- D.E.S. Fac. Sci. Univ. Nantes, 79 p.

GULLAND (J.A.), 1969.- Manuel des méthodes d'évaluation des stocks d'animaux aquatiques. Première partie : analyse de populations.- Manuels F.A.O. Science halieutique n° 4, FRS/M4, 160 p.

LUX (F.E.) and NICHY (F.E.), 1969.- Growth of yellowtail flounder, *Limanda ferruginea* (STORER) on three New-England fishing grounds.- Int. Comm. Northw. Atlant. Fish., Res.Bull., **6** : 5-25.

SCOTT (D.M.), 1954.- A comparative study of the yellowtail flounder from three atlantic fishing areas.- J.Fish. Res. Bd. Canada, **11** (3) : 171-197.

WALFORD (L.A.), 1946.- A new graphic method of describing the growth of animals.- Biol. Bull., **90** (2) : 141-147.

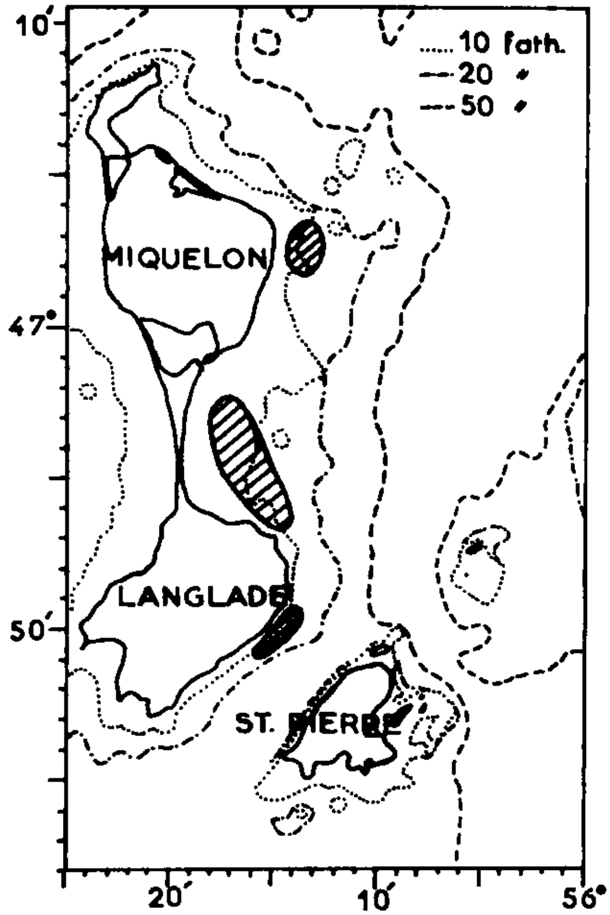

Fig. 1 : Yellowtail sampling areas (Subdivision 3 Ps).

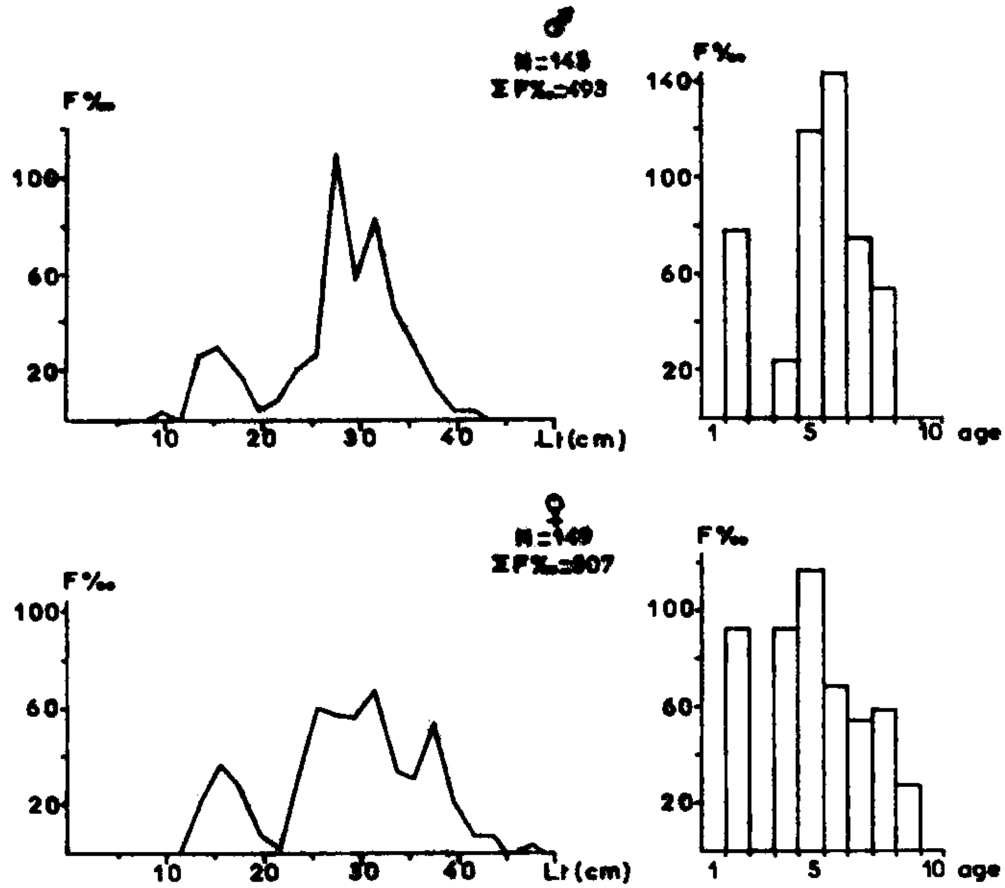

Fig. 2 : Length and age frequencies of yellowtail (by sex) around St Pierre and Miquelon islands (Subdivision 3 Ps).

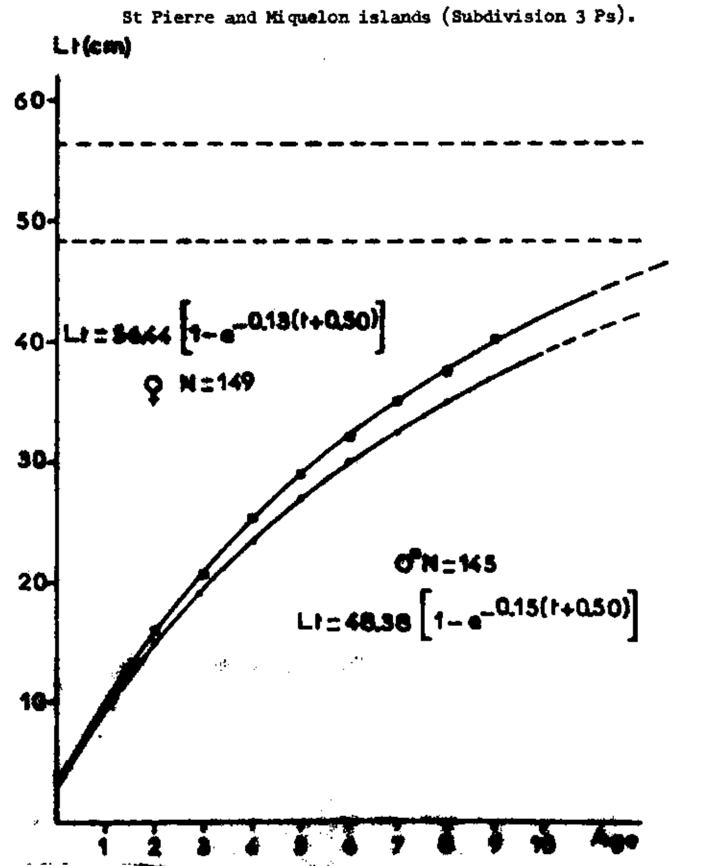

Fig. 3 : Linear growth of yellowtail, by sex (Subdivision 3 Ps).

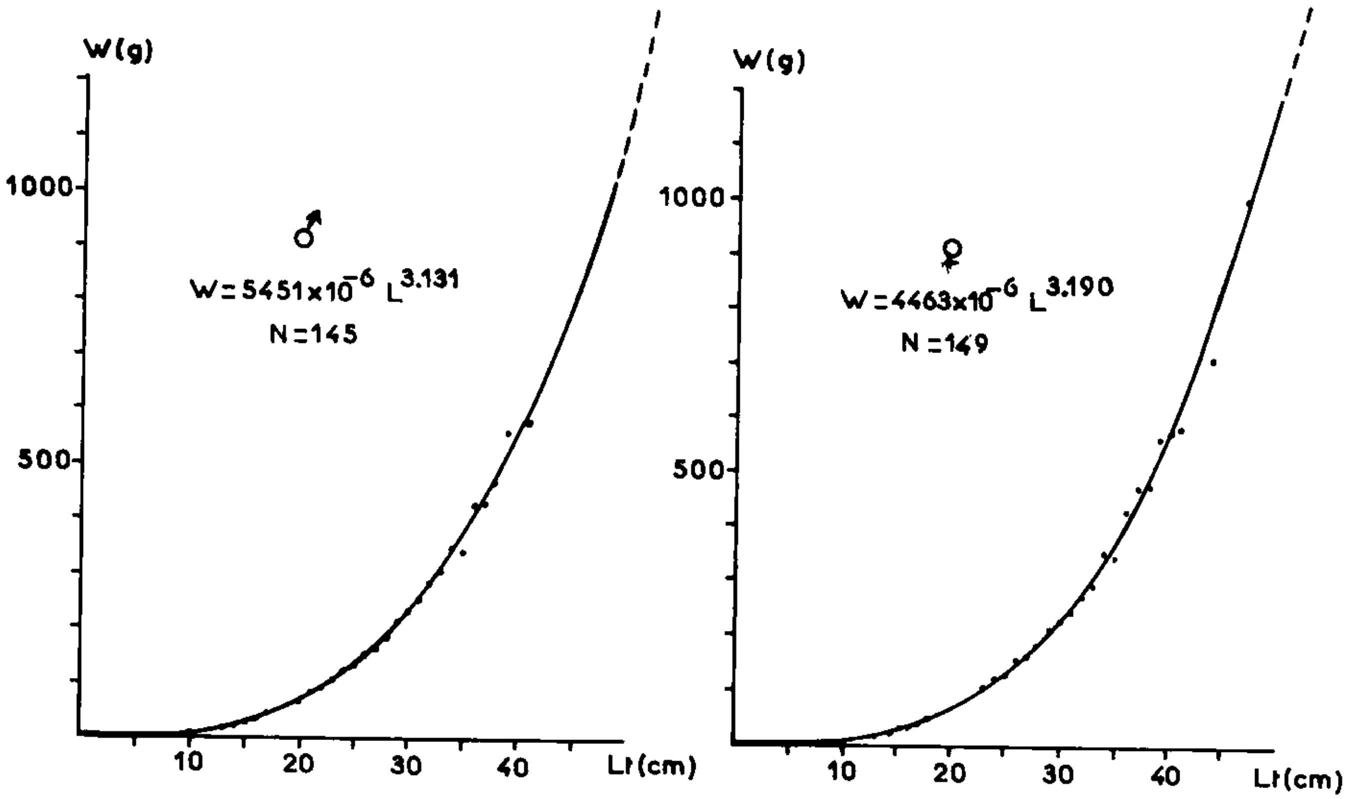

Fig. 4 : Age-length relationships of yellowtail, by sex (Subdivision 3Ps)

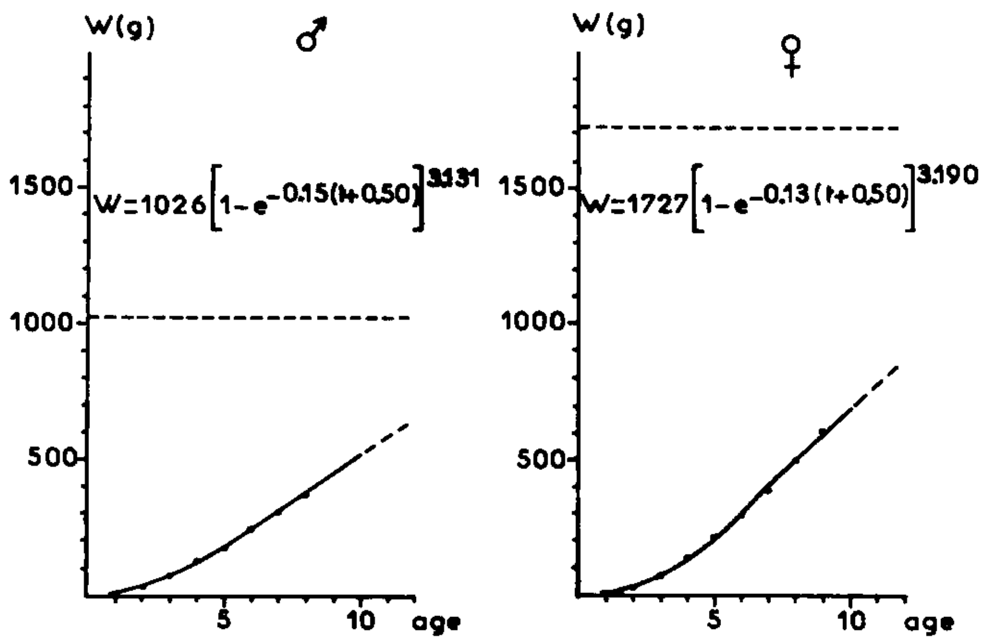

Fig. 5 : Growth in weight of yellowtail, by sex (Subdivision 3 Ps).