

LENGTH-AGE COMPOSITION OF THE TROPICAL ATLANTIC SWORDFISHES (*XIPHIAS GLADIUS*, L.)

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## SUMMARY

The Petersen's curves method combined with the probability paper method gives reliable ageing data. The mean sizes of the tropical Atlantic swordfish are 65, 90, 110, 140, 150, 170, 200 and 210 cm in the first, second, third, fourth, fifth, sixth, seventh and eighth years of life, respectively.

## RESUME

La méthode des courbes de Petersen, combinée avec celle de papier de probite offre des données fiables sur la détermination de l'âge. Les tailles moyennes d'espardon dans l'Atlantique tropical sont respectivement de 65, 90, 110, 140, 150, 170, 200 et 210 cm pour la première, deuxième, troisième, quatrième, cinquième, sixième, septième et huitième année de vie.

## RESUMEN

Las curvas del método de Petersen combinadas con el método del papel probabilístico, da datos fiables de determinación de la edad. Las tallas medias del pez espada del Atlántico Tropical son, 65, 90, 110, 140, 150, 170, 200 y 210 cm en 1<sup>a</sup>, 2<sup>a</sup>, 3<sup>a</sup>, 4<sup>a</sup>, 5<sup>a</sup>, 6<sup>a</sup>, 7<sup>a</sup> y 8<sup>a</sup> año de vida, respectivamente.

The size, growth and age of the fish are the basic parameters in the study of their stocks and abundance dynamics. The age of many tropical fishes including swordfish is far from being studied due to the absence of special ageing techniques. Ageing most tropical fishes from scales, otoliths and bones, in particular, does not give a vivid picture (Iverson, 1955; Ovchinnikov, 1970). The use of the Petersen's curves method in some cases, for instance, for the Atlantic sailfish (Istiophorus albicans Jones) has led to satisfactory results (Sylva, 1957). We applied this method for the swordfish age determination.

This paper is based on the swordfish size composition data (the length of the body from the posterior edge of the eye to the end of the middlerays of the caudal fin) obtained in the Tropical Atlantic in the 1965 to 1976 period. A total of 3266 specimens from the Gulf of Guinea and western Tropical Atlantic was examined. Since the comparative analyses of the swordfish growth from these two areas did not reveal any significant difference, the material was processed for both areas combined.

In addition to determination of the swordfish age composition and growth by variation curves of their length (Petersen's curves) the graphic analyses of polymodal distribution (the probability paper method, Harding, 1949) was used as a control method.

The point of this matter is that the corresponding length distributions plotted on the paper form a straight line. The probability paper is provided with two horizontal scales showing per cent so that the values of the above scale taken on the

vertical line of any point of the below scale supplement the latter to 100%. The points corresponding to the sums of per cents of the values of length frequencies are plotted on the below scale against the <sup>upper</sup> limit of the length frequency. The first point corresponds to the per cent against the beginning of the length frequency, the second point is the sum of per cents for the given and previous intervals, etc. Thus, the sums of per cents corresponding to the fish body lengths plotted on the probability paper reflect the number of expected age groups (according to the number of bend points - S).

From the available data of the fish body lengths the diagrams of the length frequency method (fig. 1) and the curves of polymodal frequency distributions were built on a month basis. The number of age groups on the length-age curve usually corresponded to bend points on the probability paper (fig. 2).

The swordfish size composition in the 1970-1975 period fluctuated insignificantly. The mean size of the fish in the longline catches ranged between 129.6 and 178.8 cm (table 1).

In the 1965 to 1973 period the catches were represented by the fish of 52-285 cm with mean lengths of 145-168 cm in January-December (table 2).

The data of the swordfish length-age composition obtained from the analyses of the Petersen's and polymodal frequency distribution curves are given in table 3.

As is evident from these data, in the longline swordfish catches there occurred specimens of 1-3 years old. The swordfish growth is characterized by relatively steady annual increment of

10 to 20 cm.

Our results are in line with the conclusions (Arata, 1954) according to which swordfishes reach 50-60, 80-90 and 100-120 cm in length in the first, second and third years of life respectively. The growth of the swordfish larvae is also characterized by marked daily increments of 0.6 mm.

The data of swordfish tagging experiment (Beckett, 1974) in the Northwest Atlantic showed that the fish weights are 4, 15, 40, 70 and 110 kg in each of the five years respectively.

In the western Tropical Atlantic the weight of the fish under 1 m in length is about 12.5 kg, the weight at the length of 1-1.5 m ranges between 12.7 and 37.8 kg and at the body lengths of 1.5-2.0 and 2.0-2.5 m the weights are 49.8-104.5 and 122.9-224.5 kg respectively (Dario, 1964).

Our data, therefore, are not at variance with those reported earlier, and confirm the efficiency of application of the Petersen's method combined with the probability paper method for age determination.

#### References

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Table 1

Mean size (M, cm) of the Tropical Atlantic swordfish (1970-1975). Sp. number (n) = 3975.

Year	1970	1971	1972	1973	1974	1975
M	167.9	153.4	129.6	178.8	161.3	160.4
	239	558	201	524	876	1577

Table 2

Variations (V) and mean lengths (M, cm) of the Tropical Atlantic swordfish. n = 2304.

Month	V	M	n
I - III	77 - 238	163	500
IV - VI	52 - 203	145	327
VII- IX	90 - 240	157	258
X - XII	71 - 285	168	1219

Table 3

Length-age composition of the Tropical Atlantic swordfish

Age (years)	1	2	3	4	5	6	7	8
cm	70	70-110	90-130	110-150	130-175	150-195	170-210	195-230
M, cm	65	90	110	140	150	170	200	210

Legends

Fig. 1 Length-age (B) and polymodal-frequency (A) distribution of the Tropical Atlantic swordfish (June, n = 177 sp.). Crosses indicate age groups.

