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Investigations on Macroramphosus scolopax (Linnaeus, 1758) (Pisces, Syngnathiformes) from the subtropical N.E.Atlantic

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1. Introduction

On the shelf off the coast of Northwestafrica the stocks of the snipefish are becoming interesting for commercial utilisation (fishmeal). As little is known about this fish, an investigation on its taxonomy, ecology and population-dynamics was necessary.

2. Material and Method

The extensive material was gathered preponderantly by myself; it comes from the Great Meteor Seamount(30°00'N/28°30'W;February 1970), the Josephine Seamount(36°40'N/14°20W;March 1970), the Gettysburg Seamount(36°29,9'N/11°33'W/June 1967) and from the shelf off Morocco(June 1967 and July 1972).

338 individuals between 43 and 168,1 mm standard length have been measured. The exact position of the measuring points and the abbreviations will be explained in fig.1 and in the legend.

In the length-distribution-diagrams the total length has been taken as a basis and has been rounded off to the centimeter below.

3. Results

3.1. Taxonomy

In the 'Checklist of the fishes of the north-eastern Atlantic and of the Mediterranean'(Clofnam; WHEELER, 1973) the genus Macroramphosus is represented by the two species M. gracilis (Lowe, 1939) and M. scolopax (Linnaeus, 1758).

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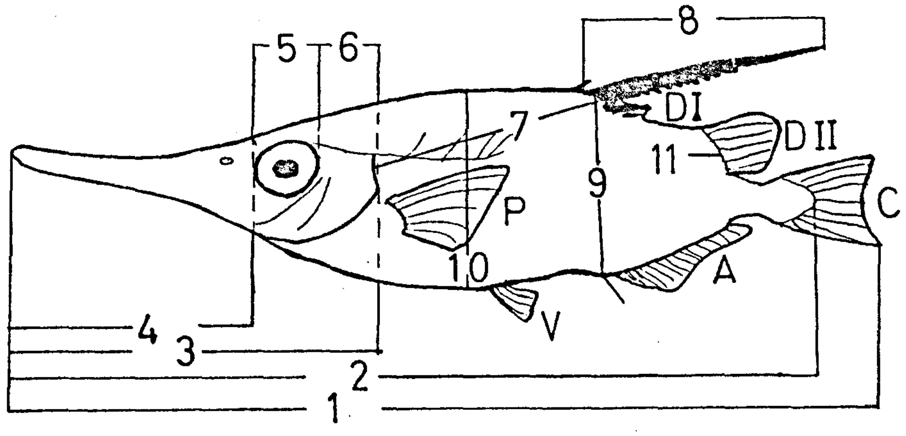

Fig.:1 Macroramphosus scolopax

1.total length (TL), 2.standard length (SL), 3.head length(KL), 4.length of snout (PrOr), 5.diameter of bony orbit (ØOr), 6.postorbital part of head PK), 7.distance from the edge of the operculum to the base of the dorsal spine (ODS), 8.length of dorsal spine (LDS), 9.distance from the anus to the base of the dorsal spine (ADS), 10.greatest body height (H), 11. inclination of the base of the second dorsal fin (ND), D=dorsal fin, A=anal fin, P=pectoral fin, V=ventral fin, C=caudal fin, KRF=number of gill rakers, VertS= number of vertebrae (urostyl not included).

Working according to the criteria of the species from former authors (GÜNTHER 1861, WEBER 1910, REGAN 1914, BARNARD 1925-27, FOWLER 1936, MOHR 1937) the two species were found to be present in the material.

However, a separation was impossible because all kinds of intermediate forms were represented.

The fishes were divided up into three types according to following criteria:

gracilis-type: The base of the second dorsal ray of the first dorsal fin (the dorsal spine) is situated in front of the anus. The end of this spine extends at the most to the end of the second dorsal fin. Its length amounts at the most to 15,6% of the standard length.

scolopax-type: The base of this spine is situated behind the anus. Its end extends beyond the beginning of the caudal fin. Its length is at the least 22,2% of standard length.

intermediate-type: The base of this spine is situated directly above the anus. Its end extends from the end of the second dorsal fin to the beginning of the caudal fin. Its length amounts to 15,7 - 22,1% of the standard length.

A specimen has only been included in either the gracilis- or scolopax-type, if all three characteristics matched.

The result of the investigation is that the gracilis-type is only the pelagic stage of development of the species M. scolopax, and that the change of form from the slender gracilis-type to the high-backed scolopax-type begins only, when the fish lives near the bottom.

It will be shown with the samples from the Great Meteor Seamount that the development of the two characteristics, which have been used by authors in the past for the separation of the two species, is dependent on the length of the fish.

The length of the dorsal spine (LDS) and the body height (H) do not increase linearly with the standard length (SL). After the fish begins living near the bottom after reaching a length of about 90 - 100 mm SL, the body heigth and the length of the spine increase more rapidly than the body length in the following growth phase up to about 120 - 130 mm SL. In the next phase the increase in growth of the characteristics is negatively allometric (see fig.2 and 3). From fig.4 can be seen that the relation of the body height to the length of the spine is almost linear.

It is possible to confirm the hypothesis that the gracilis-type is the pelagic transitional form between the larval stage and the bottom-living adult stage by the following observations:

1. All transitional stages from the slender gracilis-type to the high-backed scolopax-type are present.
2. Small individuals of the scolopax-type below 90 mm SL are very rare (one individual in the material).
3. Specimen of the gracilis-type are generally smaller than those of the scolopax-type.

4. The development of characteristics of the scolopax-type is dependent on the length of the fish (see above).
5. In comparison to the fish of the scolopax-type, which are reddish in colour, those of the gracilis-type show the typical silver-blue colouring of pelagic fish on their back.
6. The intensity of the transformation is positively correlated to the percentage of bottom animals in the food (see chapter 3.2.).
These results should be sufficient to include M. gracilis as a synonym of M. scolopax.

Table 1 shows the breadth of variation of some characteristics.

Characteristics	Variability n=338;43-168,1mm SL
TL (1)	108,1-123,3
KL (3)	46,0-54,8
PrOr (4)	28,6-40,0
øOr (5)	6,7-11,4
PK (6)	7,0-10,8
ODS (7)	20,8-40,0
LDS (8)	8,6-38,9
ADS (9)	14,7-32,2
H (10)	16,7-36,0
ND (11)	25-70°
D	IV-VIII+10-14
A	18-21
P	15-17
V	I/4
KRF	18-25
VertS	23

Tab.:1 Variability of some characteristics of M. scolopax. The morphometric values (TL - H) are expressed in percent of the standard length. The abbreviations are declared in the legend of fig.1.

3.2. Food

Food investigations on fishes from the Josephine Seamount and from the shelf off Morocco support the results from the Great Meteor Seamount (EHRICH & JOHN, 1973) that the gracilis-type is only a pelagic feeder (Copepoda, Ostracoda, Foraminifera, larvae of molluscs), while bottom-living animals (Polychaeta, Echinodermata) provide almost one third of the food for the scolopax-type.

In addition the samples from the moroccan shelf (tab.2) show that the proportion of benthic food animals increases with the development of the gracilis-type via the intermediate-type to the scolopax-type.

3.3. Growth

Since no measurements of length over a longer period of time are available for a single stock the data from the various stocks were used as refering to one stock.
It was assumed that the 1st of February was the date of birth for all stocks. As it was not possible to determine the age by means of the otoliths, the age was estimated with reference to the mean length, date of catch and knowledge of larval growth (EHRICH & JOHN, 1973).
The growth parameters of the general length-growth-formula of VAN BERTALANFFY have been determined with the help of the non-linear regression. The following values were calculated:
L_∞=164,9 mm; K=0,745; t_0=-0,244 and the course of the growth curve is demonstrated graphically (see fig.6).
In order to test the validity of the data the mean lengths, with the exception of the values from April 1971 and May 1966, were given an age increased by one year. However, the resulting values calculated for the parameters were useless.

3.4. Sex ratio

The sex ratio on the Great Meteor Seamount (47,7% males) and on the Josephine Seamount (54,9% males) is approximately balanced, while on the moroccan shelf the proportion of males is only 38,7%.

3.5. Distribution of M. scolopax

The area of distribution includes the Mediterranean, the Atlantic, the Indian Ocean and the Pacific. It lives there mainly in temperate latitudes between 20° and 40° N and S. It also penetrates singly into the higher and lower latitudes, especially of the eastern Atlantic.

This species is probably most stongly represented in the subtropical north-eastern Atlantic as there is no reference to be found in literature that this species is caught elsewhere in such great numbers.

3.6. Conclusion

It remains to be said that the stocks of the snipefish are interesting for commercial use because of its relatively short juvenile stage and especially because of its change of biotop. As the fishes generally only penetrate into the shallow waters in large schools after reaching maturity, as for example on the moroccan shelf, they do not suffer from heavy exploitation in the time before.

3.7. References

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Number of investigated intestines with food: gracilis-type:82, intermediate-type:118, scolopax-type:5

groups of nutrient animals	grac.-type %	interm.-type %	scol.-type %
CRUSTACEA	88	97	80
Copepoda	71	35	-
Amphipoda	7	12	-
Caprellidae	-	2	-
Mysidacea	5	30	60
Decapoda, Natantia	6	32	-
Isopoda	1	-	-
Larvae	2	1	-
indef. rests	13	31	20
MOLLUSCA	62	20	-
Bivalvia-larvae	54	17	-
Gastropoda-larvae	26	8	-
FORAMINIFERA	29	16	40
POLYCHAETA	4	20	-
Sedentaria	1	20	-
Larvae	1	-	-
indef. rests	1	-	-
Eggs	13	2	-
Scales of fish	6	4	-
Sand with biog. components	1	9	60
indef. rests	2	3	20

Tab.: 2 Food of M. scolopax; shelf of Morocco
The numbers express the presence of a group of nutrient animals, related to the number of the investigated intestines.

date of catch	number measured	length (TL;mm)	mean length	estimated age
April 71	146	19-48	37	0,25
May 66	22	33-85	60	0,30
July 67	2	86-88	87	0,50
January 68	117	78-119	90	0,90
February 70	480	90-135	107	1,00
March 70	62	75-127	97	1,10
April 71	5	102-111	106	1.25
July 72	172	95-142	115	1,50
February 70	266	100-195	140	2,00

Tab.: 3 Length-data used for the calculation

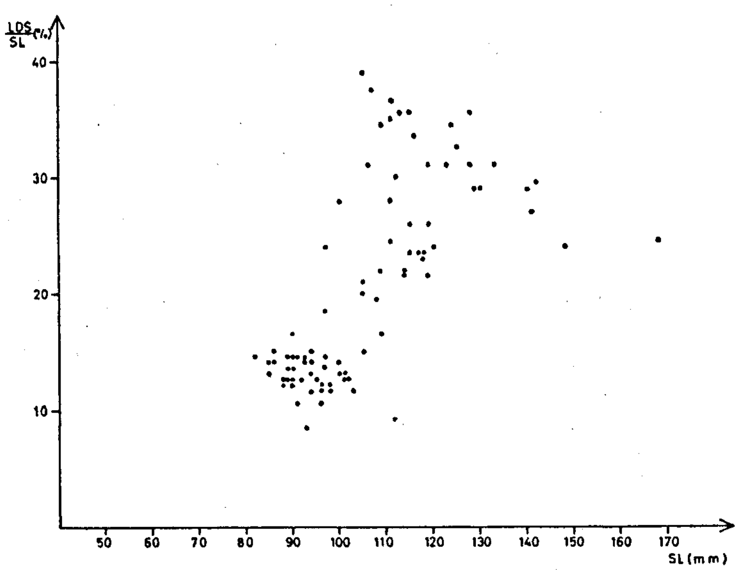

Fig.: 2 Quotient LDS/H in relation to standard length (SL); Great Meteor Seamount

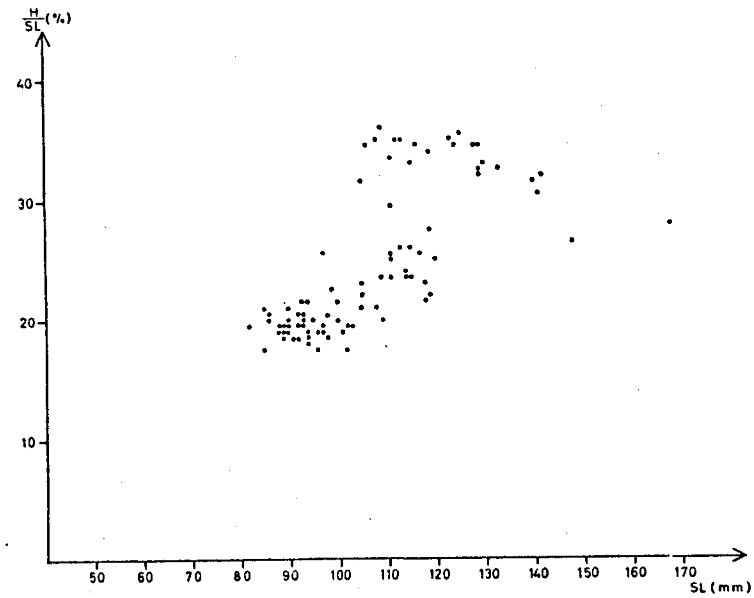

Fig.: 3 Quotient H/SL in relation to standard length (SL); Great Meteor Seamount

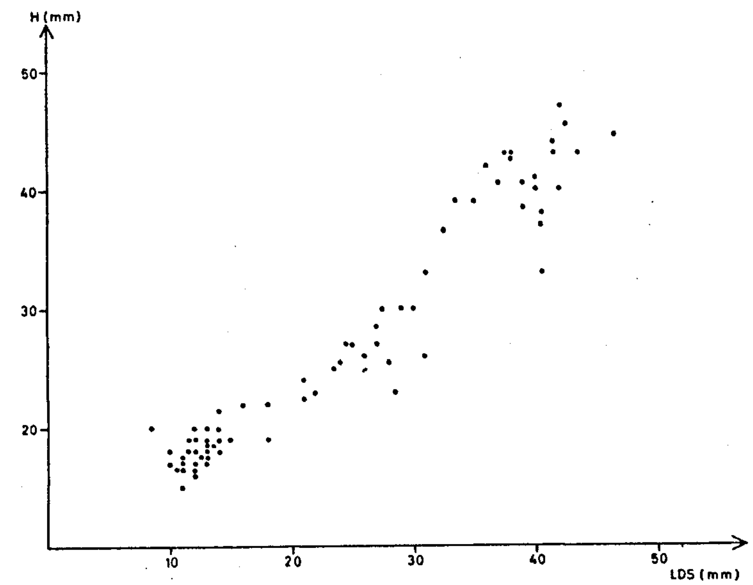

Fig.: 4 H in relation to LDS; Great Meteor Seamount

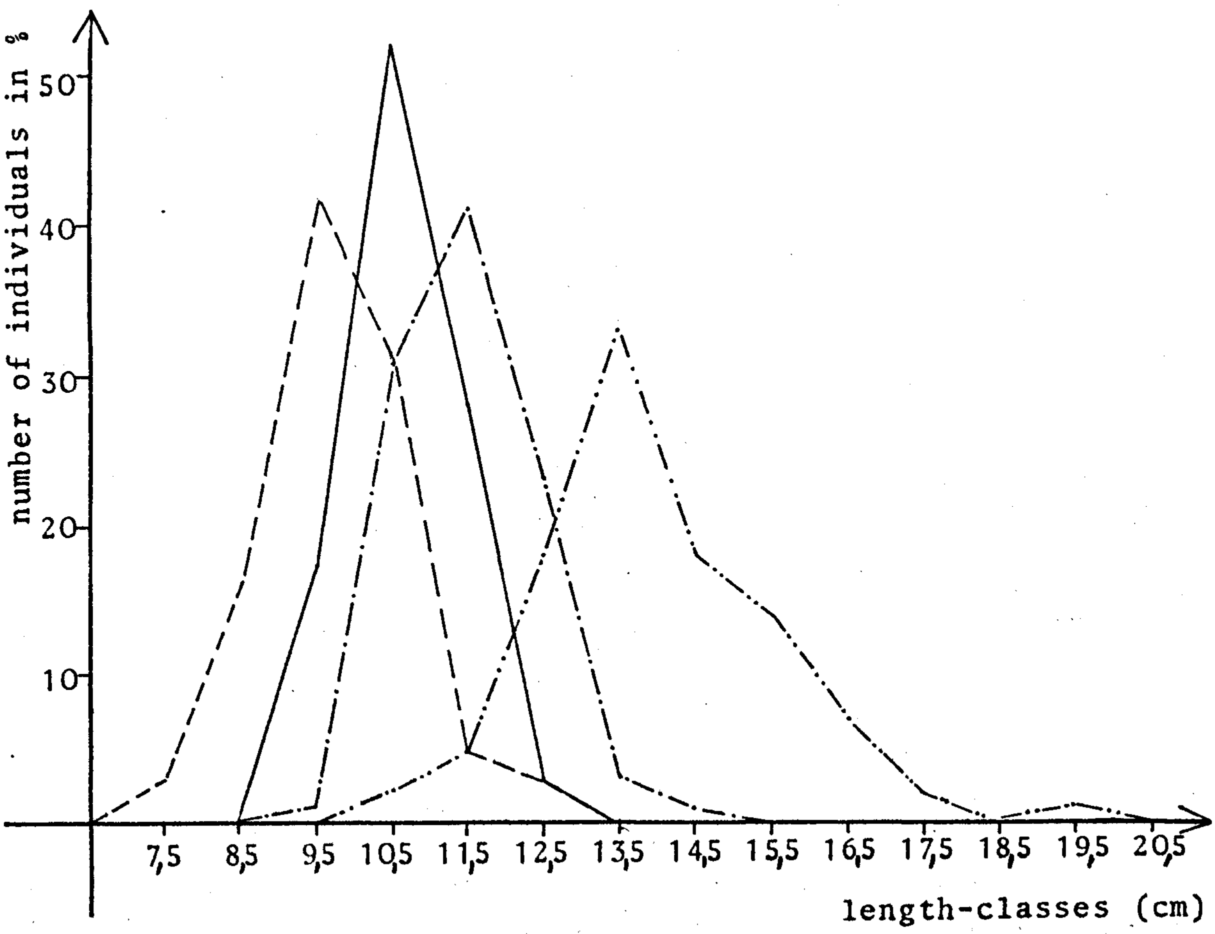

Fig.: 5 Length-distributions of M. scolopax

------ Josephine Seamount, March 1970, TL,n=62
——— Great Meteor Seamount, gracilis-type, February 1970, TL, n=418
-..-.. Great Meteor Seamount, scolopax-type, February 1970, TL, n=271
-.-.-. Shelf of Morocco, July 1972, TL, n=172

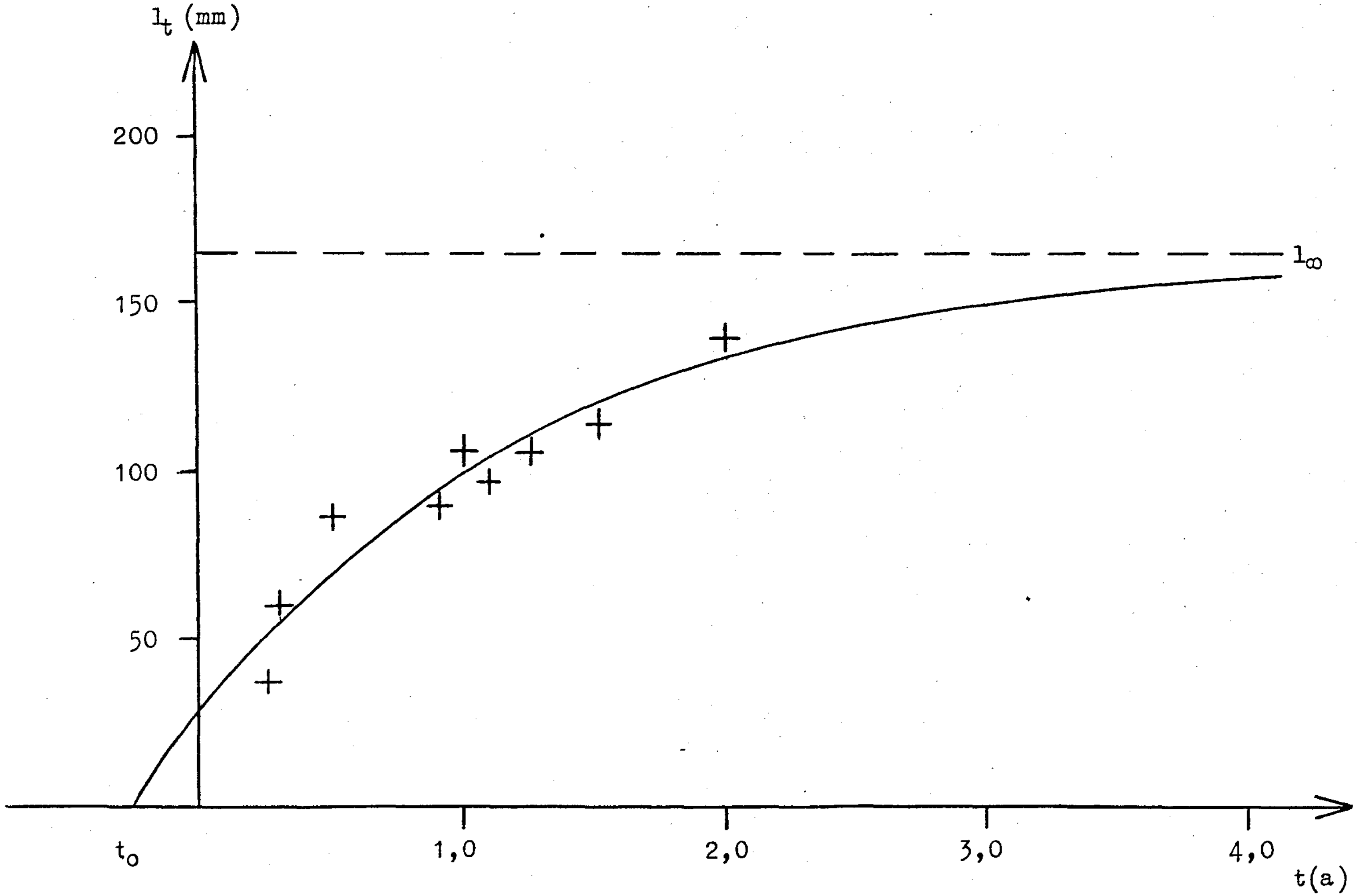

Fig.: 6 Calculated growth-curve of *M. scolopax*
The original values are marked with a cross