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Fish Biology

OBSERVATIONS ON BIOLOGY OF CUTLASSFISH  
*TRICHIURUS LEPTURUS* L. (*TRICHIURIDAE*) OF MAURITANIA SHELF  
OBSERWACJE NAD BIOLOGIĄ PALASZA, *TRICHIURUS LEPTURUS* L.  
(*TRICHIURIDAE*) REJONU MAURETANII

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The observations were made on participation in catches and on biology of cutlassfish *Trichiurus lepturus* L. of Mauritania shelf during fishing voyage of factory trawler. The length, age, weight, maturing and feeding of cutlassfish had been investigated.

INTRODUCTION

A cutlassfish *Trichiurus lepturus* L. (Trichiuridae) is of considerable importance for Polish industrial fishing in coast of North-West Africa. Highest quantities of it are caught in Mauretania shelf. Acc. to observations, it represents about 5% of Polish bottom catches and 15% of pelagic catches for this region. Indicated annual Polish catches amount to several hundred tons of this species. Actually, the catches are higher because when the catches are designed for export, this species is accounted to group "various". In Polish fishing at Mauretania shelf, the participation of cutlassfish has recently increased. This is due to gradual learning by our fishery on pelagic fishing. Such increase is also due to fact that Polish fishing ships operate recently more and more on deeper places of the shelf, where this species forms highest concentration. This, in fact, results from the tendency of coastal African countries to widen their coasting waters.

This work is related to biology of cutlassfish *Trichiurus lepturus* of North-West African region. In spite of great industrial importance, this species has not been investigated yet under this aspect. Knowledge of its biology will permit the predictions on its catches in future.

## MATERIAL AND METHOD

The material for this investigation had been collected during industrial voyage of fishing ship M/T "Murena" in January - May 1970.

In all, the length (l.t.) was measured at 11.000 specimens, with accuracy up to 1 cm. Intermediate values were approximated within the range of first decimal sign. For better understanding, on Fig.1 is presented the length composition of cutlassfish in application of 5 cm length classes.

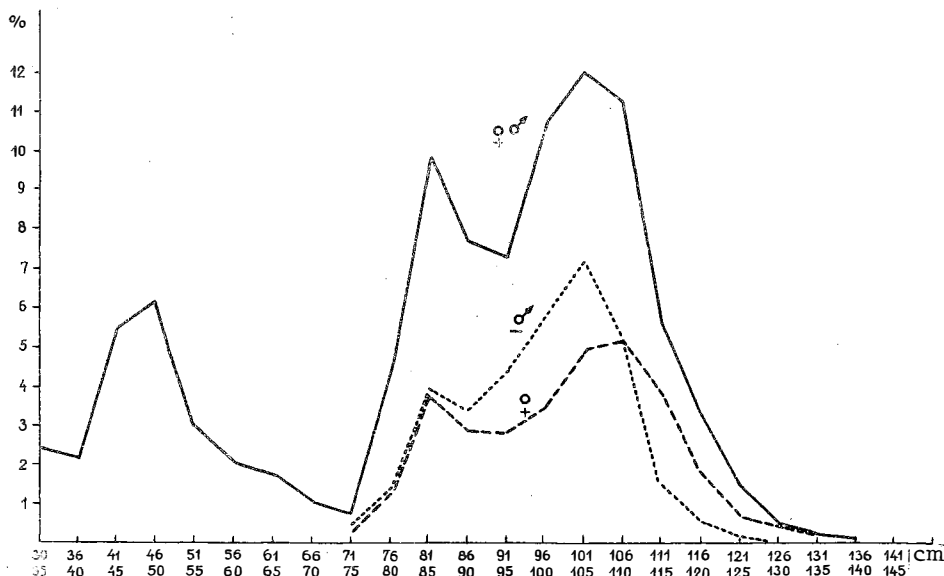


Fig.1. Length composition of cutlassfish *Trichiurus lepturus* L. caught in Mauretania shelf during 1970

2,600 of specimens were subjected to detailed analysis and their age, gonads maturity and composition of food were examined.

The age was determined from otoliths as this species is scaleless. Readings were taken through binocular with application of xylene as clearing agent.

The otoliths of cutlassfish are elliptically shaped and sharpened in front part. Their inner side is concave and the outer one - convex. At concave side of otolith, parallel to its longitudinal axis runs small groove. Translucent and opaque zones of growth are best seen at convex side of otolith. Generally, the otoliths of cutlassfish are not the best to read. Certain difficulties were encountered in interpretation of growth zones, as only part of them maintained the continuation along total edge. These zones are best seen in front part of otolith.

Maturity of gonads were determined according to Meier's scale and the composition of food - by analysis of stomach content of 140 fishes.

The weight was determined with accuracy of 5 g at 1090 specimens belonging to various length classes.

Percent participation of cutlassfish was determined by analysing all haulings made during the voyage.

## RESULT

The length of caught cutlassfish amounted to 30-145 cm. Dominating in catches were the specimen in length classes of 95-105 and 40-50 cm (Fig.1). Comparing length composition for subsequent months of analysis performed, slight offset towards right of the peaks denoting the quantity for particular length classes was noted. This had probably been caused by quick growth of these fishes.

The weight of caught cutlassfish amounted to 30-4500 g (Tab.1). By quantities, dominated the specimens of 500-700 g in weight.

Table 1

Average length of cutlassfish *Trichiurus lepturus* L.  
from various geographic regions (in cm)

Region	Age groups							
	1	2	3	4	5	6	7	8
North-West Africa (author's investig.)	47	84	95	105	115	120	130	140
Yellow Sea (acc. to Tsukahara 1961)	24	56.8	82.4	97.9	110.9	121.6	130.0	-

Maximum length observed for cutlassfish of North-West Africa coast amounted to 135 cm.

Certain conclusions relating to cutlassfish age composition derive from the Petersen's curve (Fig.1). Its first two peaks correspond to first and second age groups, while the third peak - for remaining age groups. The curve is characteristic for pelagic tropical fish in its part relating to older age groups. Further investigations are required to explain the cause of rapid quantitative decrease of older fish. Age-classes 1-4 year (Fig.3) dominated in catches.

Sex of analysed cutlassfish could be distinguished with bare eye gonad analysing at the specimens of length above 70 cm. Males dominated in length classes up to 110 cm and the females - above 110 cm (Fig.1).

Both, males and females of cutlassfish have more developed in length the right ovary. No differences, however, are noted in respect to physiological condition of both ovaries. During all periods of fishing, the fish encountered possessed the ovaries at various maturity stage. This relates particularly to ripening of fish. The fishes post spawning (VI stage) were very rare and amounted to about 2% of all analysed fishes.

The stomachs of most cutlassfishes caught were empty. Content of food in stomach was noted in about 5% of all examined fishes only. This could be due to weak intensity of cutlassfish feeding during that period and to influence

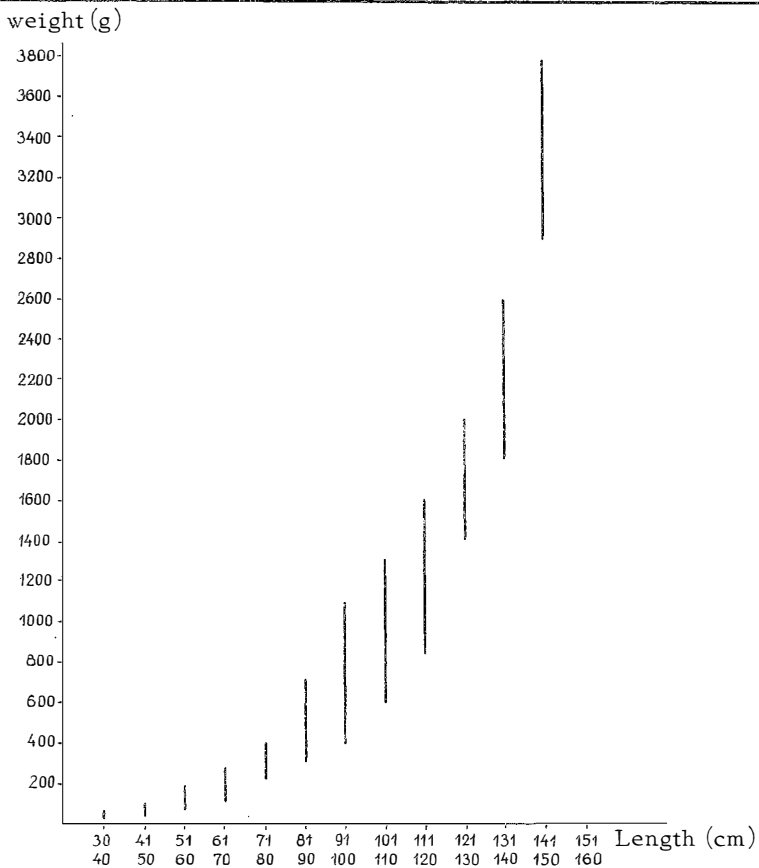


Fig. 2. Length-weight relationship of *Trichiurus lepturus* L. caught in Mauretania shelf during 1970

of fishing gear. It is probably that in trawling, when lifted in net, some specimens may emptied their stomachs under the influence of pressure changes, irritations etc, by vomiting the food into sea.

According to analysis of stomachs, it ascertained that the food of cutlassfish comprised the following organisms:

Crustacean (Euphausiacea and shrimps)

Cephalopods (Loligo sp., Ilex sp., Sepia sp.)

Fishes (Trachurus sp., Sardinella sp., Sardinops sp.,  
Conger sp. and others).

In certain cases, determination of specific food composition was impossible as it was partly digested. It was observed that food composition of cutlassfish changes together with its length growth. The specimens of length 40-70 cm feed mainly on Euphausiacea, of length 70-90 cm - Euphausiacea, shrimps, small fishes and Cephalopods. Specimens of the length more then 90 cm feed mainly on fishes and Cephalopods.

It appears from analysis of cutlassfish food composition that young specimens show certain tendency to keep in the nearbotton zone. Their food from this period of life comprises Euphausiacea, and with growth they change to

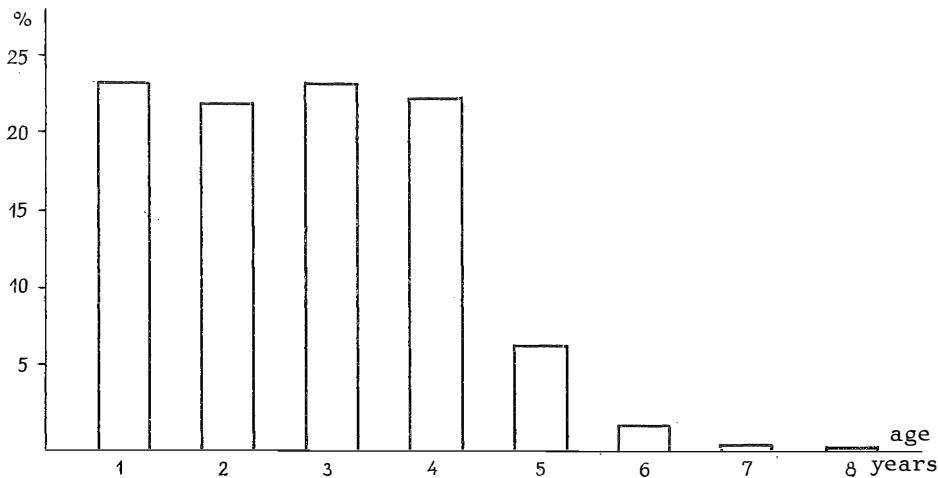


Fig.3. Age composition of cutlassfish *Trichiurus lepturus* L. caught in Mauretania shelf during 1970

feed on pelagic organisms. This is confirmed by the presence of small specimens solely in fishing with bottom trawl-net, while larger specimens were present in bottom and pelagic catches.

#### DISCUSSION

The fishes belonging to family of *Trichiuridae* are of considerable industrial importance for fishery in Indian Ocean (Jacob, 1949; Gupta, 1967) and in region of South-Eastern Asia (Tsukahara, 1961, 1962; Vuong Di Khang, 1963; Thanh-Khanh Thai, 1962). The family comprises several species. Majority of them live in Northern part of Indian Ocean and in region of South-Eastern Asia. In Atlantic, only one species may be encountered - *Trichiurus lepturus* L. (Lozano Cabo, 1970; Maurin et al, 1970; Tucker, 1956).

In this work are presented the results of observations made on the biology of cutlassfish *Trichiurus lepturus* L. from North-West African coast during January/May 1970. This species had not been examined in detail within this region. To supplement full characteristics of its biology, it was necessary to relate to investigations which had been made on this species in other regions of world.

The species discussed possesses partial spawning taking place in such layers of water where the temperature and salinity are best for this species (Klimaj, 1971; Tsukahara, 1961). In North-West African coast this species spawns in period May to October (Klimaj, 1971).

From investigations of Tsukahara (1961, 1962) and from our observations is apparent, that cutlassfish is a species of relatively short life

cycle. Oldest specimen encountered in Mauretania shelf were of 8 years (Wojciechowski, 1971a). According to Tsukahara (1962) for Yellow Sea - of 7 years.

A cutlassfish residing in Mauretania shelf attains during first years of life higher increases of length and weight in comparison to cutlassfish of Yellow Sea (Tab.2, Fig.2,4). This results from more favourable conditions for development of this species in North-West African coast. This may also be conditioned by influence of fishery. While in Yellow Sea industrial fishing of this species had been carried out for many years, in Middle-Atlantic this species is fished on larger scale only recently.

Table 2

Average weights of cutlassfish Trichiurus lepturus L. caught in 1970 at Mauretania shelf

Length (cm)	31-40	41-50	51-60	61-70	71-80	81-90
Average weight (g)	34	65	99	193	324	418
Length (cm)	91-100	101-110	111-120	121-130	131-140	
Average weight (g)	660	914	1197	1727	2182	

Maximum weight noted of 1 specimen amounted to 4,500 g.

Certain conclusions relating to age composition of fished cutlassfish may be deduced from Petersen's curve, because, as appears also from investigations of Tsukahara (1962), otoliths of this species are difficult to read.

It seems that during investigations, the participation of 1 and 2 years specimens within industrial concentrations of this species was higher than it appears from Fig.3. It was caused by the influence selectivity of net - on the size and age composition of the catches (Mesh size in the cod-end was 5 cm).

The fishes belong to genus Trichiurus are predators and feed on pelagic species of Crustacean, Cephalopods and fish (Gupta, 1967, Wojciechowski, 1971a, Venkataraman, 1944). Composition of food of cutlassfish from Mauretania shelf changes together with its growth. It passes gradually from feeding on small Crustacean to feeding on Cephalopods and fish (Wojciechowski, 1971a).

The observations made on specific composition of Polish catches from North-West African coast (Wojciechowski, 1971b), indicate that the cutlassfish is caught during whole year. Its highest catches had place during May-June; this probably is due to concentration for spawning of this species during that period. Acc. to Wojciechowski (1971b), this

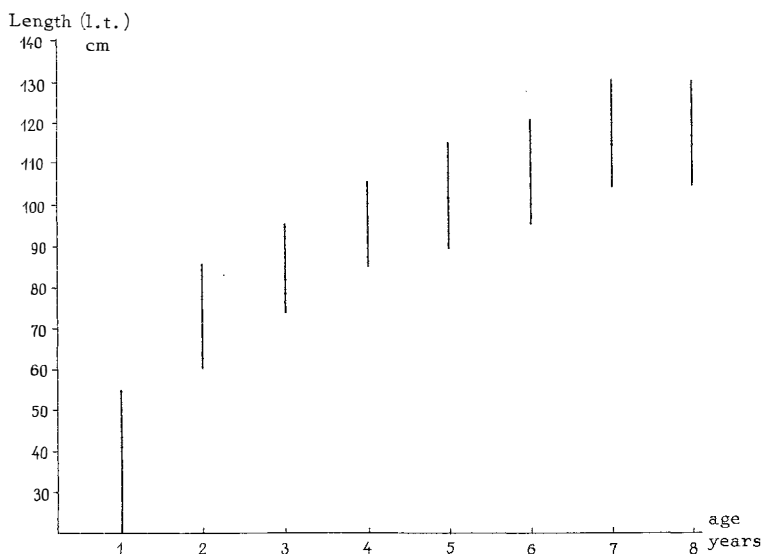


Fig.4. Length-age relationship of cutlassfish *Trichiurus lepturus* L. from Mauretania shelf

species performs distinct vertical migrations within day cycle (24hrs cycle). During the day, it remains within bottom layers (depth 80-140 m) while in the night time - in upper layers of water, what probably is connected with its feeding.

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#### OBSERWACJE NAD BIOLOGIĄ PAŁASZA TRICHIURUS LEPTURUS L. REJONU MAURETANII

##### S t r e s z c z e n i e

W czasie rejsu na przemysłowym trawlerze rybackim w okresie styczeń-maj 1970 r. dokonano obserwacji nad biologią pałasza, *Trichiurus lepturus* L. rejonu Mauretanii. Ogółem zmierzono długość (L.t.) 11 000 osobników. Analizie szczegółowej poddano 2600 osobników badając ich wiek, stan dojrzałości gonad i skład pokarmu. Badane pałasze miały długość 30-145 cm, wiek 1-8 lat, ciężar 30-4 500 g. W połowach dominowały osobniki w wieku 3-4 lat. Ich ciężar wynosił 500-700 g.

Otolity pałasza nie są zbyt dobrym materiałem do określania jego wieku z powodu trudności przy interpretowaniu stref wzrostowych.

Płeć analizowanych ryb można było określić gołym okiem dopiero począwszy od długości 70 cm. Samce dominowały w klasach długości do 110 cm, natomiast samice od długości 110 cm. U pałasza zarówno samce jak i samice mają bardziej wydłużone gonady znajdujące się po prawej stronie ciała.

Spośród wszystkich analizowanych ryb jedynie około 5% miało żołądki wypełnione pokarmem. Skład jego w wyraźny sposób zależał od długości ryb. Osobniki o długości 40-70 cm odżywiały się głównie *Euphausiacea*, o długości 70-90 cm - *Euphausiacea*, krewetkami, małymi rybami i głowonogami. Pałasze o długości ponad 90 cm odżywiały się różnymi gatunkami ryb i głowonogów.

Pionowy dobowy cykl wędrówek tego gatunku ma prawdopodobnie charakter zerowiskowy.



НАБЛЮДЕНИЯ НАД БИОЛОГИЕЙ РЫБЫ-САБЛИ *TRICHIURUS LEPTURUS* L.  
РАЙОНА МАВРЕТАНИИ

## Р е з ю м е

Во время рейса на промышленном рыболовческом траулере (январь - май 1970 г.) проведено наблюдения над биологией рыбы сабли *Trichiurus lepturus* L. района Мавретании. Измерено общую длину у 11000 представителей. Обстоятельно проанализировано 2600 экземпляров, исследуя их возраст, степень зрелости гонад и состав пищи. Изучаемые рыбы-сабли имели длину 30-145 см, возраст 1-8 лет, вес 30-4500 г. В уловах преобладали особи 3-4 летнего возраста, весом 500-700 г.

Отолиты рыбы - сабли не являются хорошим материалом для определения её возраста по причине трудностей при интерпретации возрастных зон.

Невооруженным глазом возможным было определение пола у рыб длиной свыше 70 см. Самцы преобладали в классах длины до 110 см, в то время как самки в классах свыше 110 см. Как у самцов так и у самок рыбы-сабли гонады расположены с правой стороны - были более удлинненные.

Среды обследованных рыб только у 5% желудка были наполнены пищей. Её состав заметным образом зависел от длины рыбы. Особи длиной 40-70 см питались главным образом *Euphausiacea*, длиной 70-90 см *Euphausiacea*, креветками, мелкими рыбами и *Cephalopoda*. Рыбы - сабли длиной свыше 90 см питались различными видами рыб и головоногих моллюсков. Вертикальный, суточный цикл миграции у этого вида рыб имеет вероятно характер поиска пищи.

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