

NGUYEN-XUAN LOC, Jan WOJCIECHOWSKI

Fish Biology**FOOD AND FEEDING OF FISH OF *DENTEX* GENUS (*SPARIDAE*)
FROM MAURETANIA AND SENEGAL SHELF****POKARM I ODŻYWIANIE SIĘ RYB Z RODZAJU *DENTEX* (*SPARIDAE*)
WYSTĘPUJĄCYCH NA SZELFIE MAURETANII I SENEGALU**

Institute for Exploitation of Sea Resources

The observations were made during fishing voyage to african fishing grounds and with use of materials delivered to country. It ascertained that the fish feeds on the organisms which belong to various systematic groups and composition of food depends from region. It is characteristic for each species and maturity stage of the fish.

INTRODUCTION

Mass appearance of fish of *Dentex* genus (*Sparidae*) in bottom catches at Mauretania and Senegal shelf caused increased interest in its biology. The most frequent species belonging to the genus are: *Dentex macrophthalmus* (Bloch, 1971), *Dentex maroccanus* Valenc. 1830, *Dentex congoensis* Poll, 1954, *Dentex filiosus* Valenc., 1835. Their food and feeding have not been so far well recognized. The authors have not encountered upto now any works which would deal with problem explicitly.

This work is aimed towards thorough recognition of food and feeding of these species of *Dentex* genus which may be most important from economical aspect.

MATERIAL AND METHOD

The present work is based on the investigations carried out during 1968–1970 (Tab.1). The analysed material partly originated from industrial catches. Majority of samples have been collected between 23 XII 1969 and 3 III 1970 during fishing voyage of trawler M.T. „Murena”. The quantity and quality of food was noted directly after extraction from stomach. The content of stomach was weighed on accurate scale after fish separation into particular systematic groups. The organisms, which due to faradvanced decomposition caused by digestive process, could be not determined were listed under separate group and their participation did not exceed generally 5%.

Table 1

Periods, regions and type of examinations

Species	Sample No	Date of sample	Geogr. position	Number of specimens examined	
				Stomach fulfilment	Composition of food
<i>Dentex macrophthalmus</i>	1	14 XII 1968	Rejon Cap Blanc	285	51
	2	13 II 1969	19°56'N–16°38'W	107	40
	3	8 III 1969	24°00'N–16°26'W	128	—
	4	10 IV 1969	20°25'N–17°20'W	272	32
	5	12 V 1969	22°30'N–17°10'W	618	141
	6	18 IX 1969	21°32'N–17°39'W	362	115
	7	23–31 XII 1969	17°40'N–19°07'N	487	95
	8	1–23 I 1970	16°09'N–19°05'N	960	168
	9	1–28 II 1970	15°50'N–18°40'N	325	62
	10	1–9 II 1970	13°30'N–14°50'N	313	49
	11	1–3 III 1970	17°40'N–17°50'N	292	25
<i>Dentex maroccanus</i>	12	23–31 XII 1969	17°40'N–19°07'N	493	45
	13	1–23 I 1970	16°09'N–19°08'N	382	42
	14	1–9 II 1970	13°30'N–14°50'N	278	52
	15	1–28 II 1970	15°50'N–18°41'N	128	33
<i>Dentex filusus</i>	16	23 XII 1969 – 3 III 1970	15°50'N–19°07'N	238	—
<i>Dentex congoensis</i>	17	1–9 II 1970	13°30'N–14°50'W	332	56
Total				6000	1006

The fulfilment of stomachs was determined according to the following 5 grade scales:

0 — empty stomach,

1 — traces of food

- 2 — poor fulfilment
- 3 — medium fulfilment
- 4 — abundant fulfilment

RESULTS

Composition of food

Most differentiated food possessed *Dentex macrophthalmus*. Within the stomachs of these specimens were observed the presence of six animal group, viz.: *Pisces*, *Crustacea*, *Tunicata*, *Mollusca*, *Polychaeta* i *Echinodermata*. The fish belonging to various species formed the basic compound. As it appears from figure 1, their participation amounted in average over 50%. Of the organisms, most frequently noted were *Decapoda* (*Macrura*

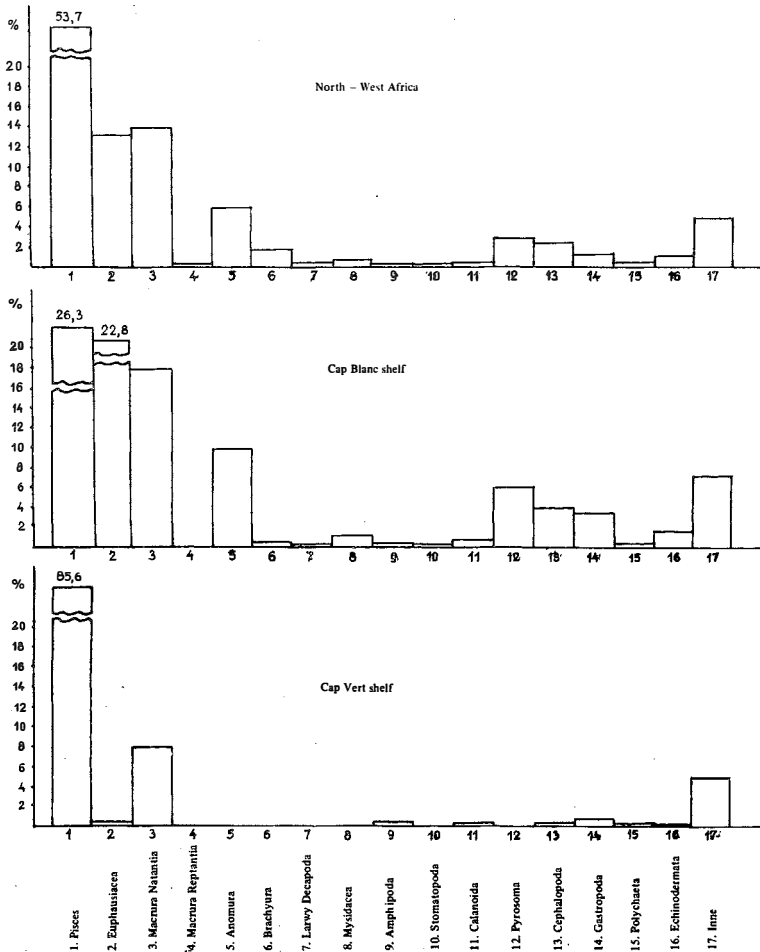


Fig. 1. Food composition of *Dentex macrophthalmus* (% by weight)

Natantia), *Euphausiacea* and *Decapoda* (*Anomura*). Beyond such main compounds within the food of *Dentex macrophthalmus* noted the presence of *Pyrosoma* sp., *Cephalopoda*, *Gastropoda*, *Echinodermata* and *Decapoda* (*Brachyura*). Occasionally were also noted *Mysidacea*, *Polychaeta*, larvae of *Decapoda*, *Amphipoda*, *Calanoida*, *Macrura Reptantia* and *Stomatopoda*. Their participation by weight was however negligent. Similiar composition of food at the same species noted Domanevsky et al. (1970, 1971) and Stepkina (1970).

The stomachs of specimens of *Dentex macrophthalmus* caught at Cap Vert shelf contained more fishes, while other organisms were in majority in specimens of Cap Blanc shelf (Fig.1). This is probably related to the availability of food (Anonymus, 1970, Longhurst, 1959) and to length composition of this species for both regions. Also, the differences were probably influenced by depth of waters. The fishing grounds of Cap Blanc are more shallow (90–170 m) in comparison to fishing grounds of Cap Vert (120–210 m).

The quantity and quality of food is changing progresively with growth of fish (Fig. 2). The specimens in length 9–12 cm (first age group) feed mainly on *Euphausiacea* and to a lesser extend on *Decapoda* larvae. In composition of their food were also encountered *Calanoidae*, *Mysidacea* and *Amphipoda*. Of specimens in length 13–25 cm (II, III, IV, V age groups) the food comprised primarily *Decapoda* (mainly *Macrura Natantia* and *Anomura*) and thenafter the fish and *Euphausiacea*. Encountered also in their stomachs were *Gastropoda*, *Cephalopoda*, *Pyrosoma* sp., *Echinodermata* and others which apparently form the additional food. The specimens in length above 25 cm feed mainly on fish.



Fig. 2. Food composition – length relationship of *Dentex macrophthalmus*

From curves presented on figure 2 on interrelation of length and food composition of *Dentex macrophthalmus* appears that together with growth these specimens were changing gradually from feeding on *Euphausiacea* to feeding on fish. Higher participation of *Decapoda* is noted in food of specimens of medium length (Domanevsky et al., 1970, 1971).

The phenomenon of seasonal changing in feeding of *Dentex macrophthalmus* is quite common and understood as due to seasonal changes of environment conditions. The problems to be noted primarily, are the changes of food compositions and feeding intensity in relation to season of year. The observations indicate that smallest by weight participation of fish within the food of this species prevailed for spring and summer time and the highest one for autumn and winter time. The participation of *Euphausiacea* was higher during spring and summer time and lower during autumn and winter time. Of *Decapoda*, highest participation presented *Anomura* during autumn, while *Macrura* *Natantia* dominated during remaining seasons.

The second species appearing most frequently in catches was *Dentex maroccanus*. In its food was noted the presence of *Crustacea*, *Pisces*, *Polychaeta* and *Mollusca* (Fig.3). The *Crustacea* formed over 60% of its food, with domination of *Paguridae*, *Galatheidæ*, *Brachyura* and *Cirripedia*. The fish presented about 20% of food weight and the remaining part formed *Polychaeta*, *Gastropoda*, *Mysidacea*, *Pyrosoma* and *Amphipoda*.

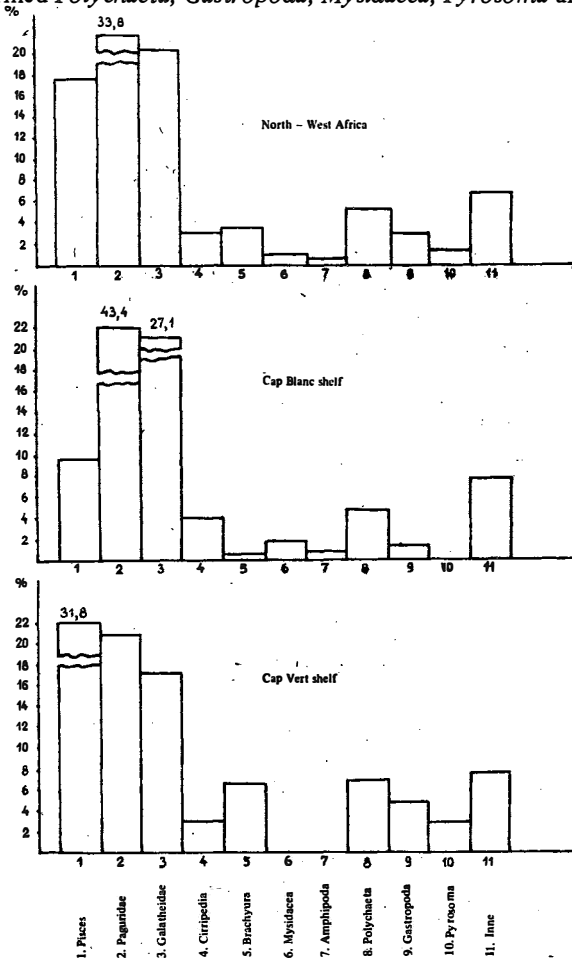


Fig. 3. Food composition of *Dentex maroccanus* (% by weight)

In food of *Dentex maroccanus* from Cap Blanc shelf dominated *Paguridae* and *Galatheididae* in comparison to Cap Vert where dominated the fish, *Brachyura* and *Gastropoda* (Fig.3). This phenomenon was probably due to change of food composition in relation to the length of examined fish (Fig.4). This may also be related to abundance and composition of food of both regions. As it appears from Fig.4, the participation of *Paguridae* was gradually decreasing, while the participation of *Galatheididae* was increasing in food of *Dentex maroccanus*.

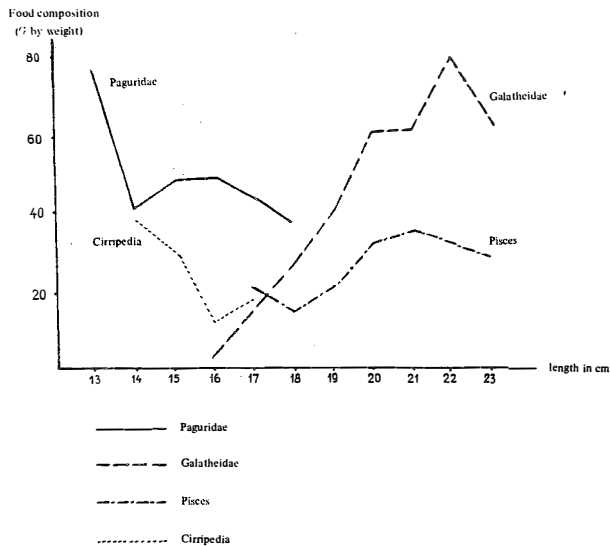


Fig. 4. Food composition-length relationship of *Dentex maroccanus*

Within the food of *Dentex congoensis* noted the presence of *Pisces*, *Crustacea*, *Tunicata* and *Mollusca*. As main food compound for this species, were the fishes 86.3%, than after *Pyrosoma* 3.5%, *Decapoda (Macrura Natantia)* 2.6%, *Cephalopoda* 2.5%, *Copepoda* 0.87%, *Euphausiacea* 0.65% and others.

The intensity of feeding

The observations on feeding intensity were based on evaluations of stomach fulfilment. The results are presented in tab.2. Most of stomachs examined at *Dentex* genus were empty. This probably was caused by low intensity of feeding and may also be assigned to fact that these specimens originated from bottom catches. It is highly probable that during trawling and hauling into higher layers of water, some fishes emptied their stomachs under influence of pressure changes, irritations etc. This is supported by observations that certain amount of fish caught had their stomachs pressed outside.

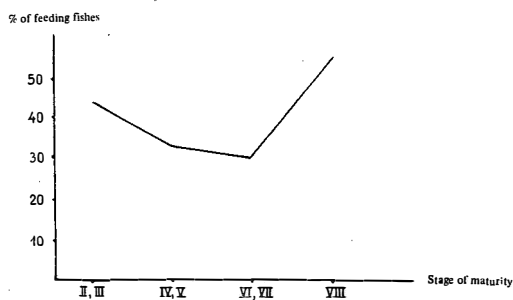
From observations of authors it appears that out of all analysed fishes, above 60% of specimens of *Dentex macrophthalmus* and above 50% of *Dentex maroccanus*, *Dentex congoensis* and *Dentex filusus* had their stomachs empty (Tab. 2).

Table 2

Intensity of feeding of fishes from genus *Dentex* (in %%)

Species	Month	Stomach fulfilment					N (pcs.)
		0	1	2	3	4	
<i>Dentex macrophthalmus</i>	XII – 1968	62.1	15.8	13.6	3.8	4.8	285
	II – 1969	80.5	11.3	4.7	1.8	1.8	107
	III – 1969	75.0	6.3	12.5	3.9	3.5	128
	IV – 1969	75.0	12.8	6.6	4.0	1.8	272
	V – 1969	57.5	25.0	11.7	3.7	2.5	618
	IX – 1969	60.0	26.2	10.5	1.1	2.8	362
	XII – 1969	66.5	17.5	8.4	4.5	2.9	487
	I – 1970	65.0	14.0	9.4	5.0	6.0	960
	II – 1970	81.5	6.9	5.7	1.9	3.8	638
	III – 1970	67.0	16.5	7.5	4.7	4.7	292
<i>Dentex maroccanus</i>	XII – 1969	51.5	19.5	20.8	5.8	2.5	493
	I – 1970	60.0	16.0	12.8	7.2	3.9	382
	II – 1970	51.2	22.4	15.2	6.9	4.2	406
<i>Dentex congoensis</i>	II – 1970	50.7	22.7	13.1	9.7	3.9	332
<i>Dentex filusus</i>	I – 1970	53.7	24.3	14.8	6.3	2.1	95
	II – 1970	50.3	25.5	14.8	7.5	1.0	86

The intensity of feeding of *Dentex macrophthalmus* depends on its physiological conditions. From Fig.5 appears that highest percentage of feeding specimens are of II, III and VII maturity stage (Mayer's scale). Beginning from stage V, the quantity of feeding specimens is decreasing. Highest percentage of fish with empty stomachs was noted in ripening and halfspawned stages. However it can be not ascertained that ripening specimens do not feed at all.

Fig. 5. Feeding intensity-maturity of gonads relationship of *Dentex macrophthalmus*

Feeding intensity of *Dentex* genus fish changes in relation to its length (Fig.6,7,8). The decrease in feeding intensity is noted at larger fish. This may be due to fact that the food of large specimens is mainly composed of fish, which is of higher nutritive value and satisfies energetic demand of organism to a higher extent. It is also probable that large specimens when in cod end empty their stomachs more frequently than the smaller ones under the influence of pressure changes, pressing etc. This is also related to depth of waters at which the catches were made. Smaller fish reside within more shallow places. During the catches, the changes of pressure were not so distinct as in case of deep water catches.

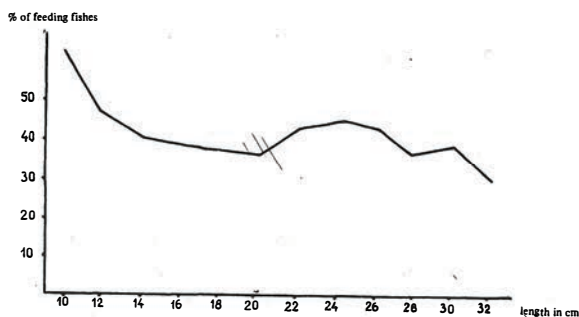


Fig. 6. Feeding intensity-individual length relationship of *Dentex macrophthalmus*

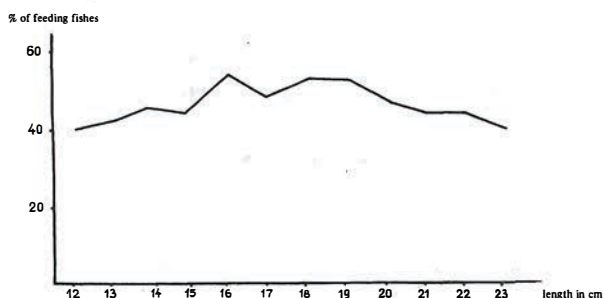


Fig. 7. Feeding intensity-individual length relationship of *Dentex maroccanus*

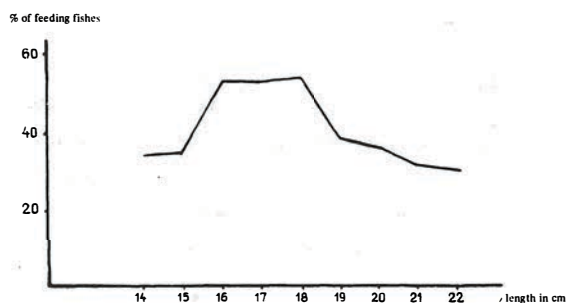


Fig. 8. Feeding intensity-individual length relationship of *Dentex congolensis*

CONCLUSIONS

1. Most varied food possesses *Dentex macrophthalmus*. It is composed of *Pisces*, *Crustacea*, *Tunicata*, *Mollusca*, *Polychaeta* and *Echinodermata*. The food of *Dentex maroccanus* comprises *Crustacea*, *Pisces*, *Polychaeta* and *Mollusca*. Most poore specifically is the food of *Dentex congoensis* and comprises *Pisces*, *Crustacea* and *Cephalopoda*.
2. *Dentex* species residing within the same region feed on various organisms. This is due to their ecological adaptation towards decrease of mutual competition for feeding.
3. The food composition of fish from *Dentex* genus depends on region of their appearance. E.g. the participation of fish in their food was higher for Cap Vert shelf while the participation of *Crustacea* was higher for Cap Blanc shelf.
4. Food composition of this fish is characteristic for each stage of maturity and is related to individual length.
5. The intensity of feeding is not equal for all species of *Dentex*. It depends from individual length and varies in particular seasons of year.

REFERENCES

- Anonymus, 1970: Sprawozdanie z rejestru M/T „Wieczno” na łowiska szelfu Północno-Zachodniej Afryki (24 I–19 III 1970). [Relation from the cruise of M.T. „Wieczno”: on the grounds of N.W. Africa in the period 24 I–19 III 1970]. Morski Instytut Rybacki. Gdynia.
- Domanevsky L.N., Stepkina M.V., Tkachenko V.A., 1970: Nekotoryje osobennosti rosta u *Dentex macrophthalmus* Bloch i *Sardinella aurita* Val. vostočnoj časti Centralnoj Atlantiki. Voprosy Ichtiologii. 10, 5/64: 861–869.
- Domanevsky L.N., Stepkina M.V., 1971: Osobiennosti biologii bolšegłaznogo zubana *Dentex macrophthalmus* Bloch rayona Centralno-Vostočnoj Atlantiki. Voprosy Ichtiologii. 11, 3/68: 438–446.
- Longhurst A.R., 1959: Benthos Densities off Tropical West Africa. ICES. Journal du Conseil. XXV, 1: 21–28.
- Stepkina M.V., 1970: Sparovyje Severo-Zapadnogo pobierežja Afriki. Rybnoje Chozjajstvo. Moscow. 6:8–10.

Translated: Irena Kliche

POKARM I ODŻYWIANIE SIĘ Z RODZAJU *DENTEX* (*SPARIDAE*)
WYSTĘPUJĄCYCH NA SZELFIE MAURETANII I SENEGALU

Streszczenie

W czasie rejsu na łowiska znajdujące się w rejonie Północno-Zachodniej Afryki oraz w oparciu o materiały dostarczone do kraju przez statki przemysłowe dokonano obserwacji nad pokarmem i odżywianiem się ryb z rodzaju *Dentex* (*Sparidae*) w latach 1968–1970. Badano gatunki spotykane najczęściej w polskich połowach.

W składzie pokarmu tych ryb stwierdzono obecność *Pisces*, *Crustacea*, *Tunicata*, *Mollusca*, *Polychaeta* i *Echinodermata*. Najbardziej urozmaicony pokarm miał *Dentex macrophthalmus* i *Dentex congoensis*.

Gatunki zasiedlające ten sam rejon odżywiają się różnymi organizmami, co jest wynikiem ich adaptacji ekologicznej prowadzącej do zmniejszenia wzajemnej konkurencji pokarmowej. Skład pokarmu tych ryb zależy od rejonu ich występowania. Na wysokości Cap Vert w jego składzie dominowały ryby, a w rejonie Cap Blanc skorupiaki.

Intensywność żerowania zależy od długości osobniczej. Zmienia się ona w kolejnych porach roku i nie jest jednakowa u wszystkich gatunków rodzaju *Dentex*.

ПИЩА И ПИТАНИЕ РЫБ РОДА DENTEX, СЕМЕЙСТВА SPARIDAE ШЕЛЬФА МАВРЕТАНИИ И СЕНЕГАЛА

Р е з ю м е

Во время рейса в районы лова у Северо-Западной Африки, а также на основе материалов доставленных промышленными суднами в страну, проведено наблюдения над пищей и питанием рыб рода зубанов (род *Dentex*), семейства спаровых (сем. *Sparidae*) за годы 1968–1970. Исследовано виды чаще встречающиеся в польских уловах.

В составе пищи этих рыб установлено присутствие: *Pisces*, *Crustacea*, *Tunicata*, *Mollusca*, *Polychaeta* и *Echinodermata*. Наиболее разнообразная пища была у *Dentex macrophthalmus* и *Dentex congoensis*.

Виды обитающие в этом самом районе питаются различными организмами, что является результатом их экологической адаптации, ведущей к уменьшению взаимной пищевой конкуренции.

Состав пищи этих рыб зависит от района их обитания. На высоте Cap Vert в её составе преобладали рыбы, а в районе Cap Blanc – ракообразные.

Интенсивность поиска пищи зависит от длины особи. Она меняется на протяжении года, и не одинакова у всех видов рода *Dentex*.

Address:

Received 22 V 1972

Mgr Jan Wojciechowski
Instytut Eksploatacji Zasobów Morza AR

Szczecin ul. Kazimierza Królewicza 4
Polska – Poland