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MORPHOLOGICAL CHARACTERISTICS OF *DENTEX MACROPHTHALMUS* (BLOCH, 1791) (*SPARIDAE*) FROM THE NAMIBIAN SHELF

CHARAKTERYSTYKA MORFOLOGICZNA *DENTEX MACROPHTHALMUS* (BLOCH, 1791) (FAM: *SPARIDAE*) SZELFU NAMIBII

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Morphological features of *Dentex macrophthalmus* (Bloch, 1791) caught in the SW African fishing grounds (17–19°S) are described. The characters analysed show no sign of sexual dimorphism other than that of the females attaining larger size than the males.

INTRODUCTION

Dentex macrophthalmus (Bloch, 1791) is one of the most abundant sparid fishes off the west coast of Africa. Most papers on the species (Woźniak, 1967; Trunov, 1969 b, 1972; Domanevskij and Stepkina, 1971; Tjunina and Perova, 1976) deal mainly with its distribution, age composition, food, and reproduction. Information on morphology is scarce and can be found, i.a., in Fowler (1936), Joubin (1938), and Grubišič (1967); more recent data are reported by Nowak (1968) and Trunov (1969a).

An important aspect in morphological studies on sparids is to analyse various features separately for males and females, which is particularly useful when considering problems related to hermaphroditism of species belonging to the family (Alekseev, 1983).

The present paper is aimed at describing in detail the morphology of *D. macrophthalmus* caught off Namibia (SW African fishing grounds).

MATERIALS AND METHODS

The materials examined were obtained from catches of the „Albacora", a B-23 freezer trawler, from the SW African fishing grounds between 17 and 19°S. Fish specimens were collected throughout the cruise, from 22 May until 3 July 1981. A total of 1337 individuals were collected, on 1112 of them mass measurements of body length (*longitudo corporis*, l.c.) were taken. The remaining individuals (255) were sexed; their total and body lengths were also measured (Table 1).

Table 1

Percentages of females, males, and fish of non-determined sex in the sample analysed (n = 255) and their total lengths (l.t.)

Number and percentage	Sex	Total length (cm)		Total
		range	mean	
161 63%	♀♀	15.9 – 39.0	24.88	255 100%
68 27%	♂♂	16.3 – 32.0	21.98	
26 10%	non-determined	12.7 – 19.8	16.62	

The species morphology was analysed on 100 individuals by way of studying 21 plastic and 6 meristic characters. The measurements were taken with a caliper to 0.5 mm; body and total lengths were measured to 1 mm on the measuring board. The filtrating processes (gill rakers) were counted on the first right-hand side gill arch. Fig. 1 shows the pattern of measurements. The statistical treatment of the data involved calculations of arithmetic means (M), standard error of the mean (m), standard deviation (δ), and coefficient of variation (V). The extent of diversification (d) used in the sexual dimorphism analysis and in comparisons with literature data was calculated from the formula:

$$d = \frac{M_1 - M_2}{\sqrt{m_1^2 + m_2^2}}$$

where: M_1, M_2 = means of the data sets compared
m_1, m_2 = respective standard errors of the mean.

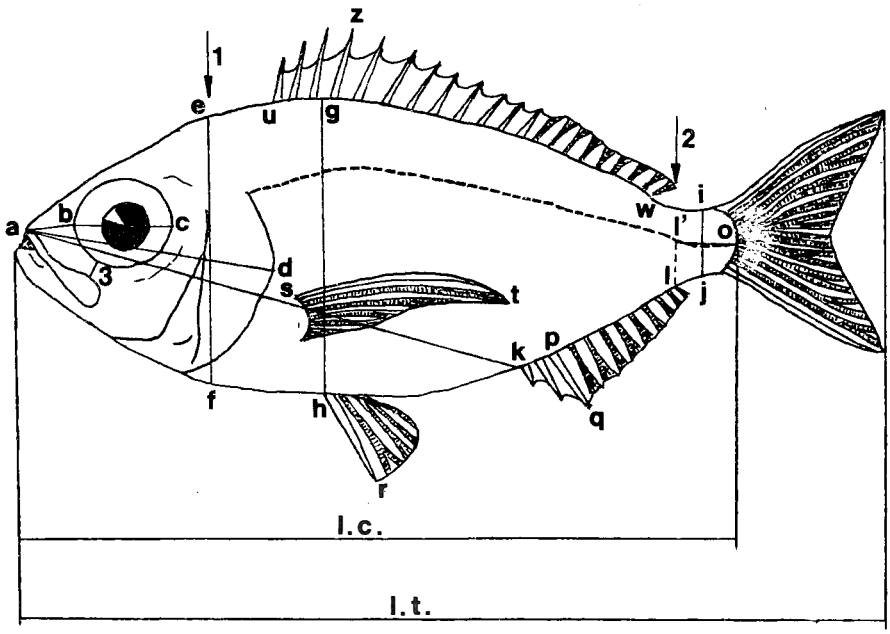

Fig. 1. Measurement of plastic characters in *Dentex macrophthalmus*. l.c. = body lenght (*longitudo corporis*), l.t. = total length (*longitudo totalis*) ab = preocular distance (*distantia praeocularis*) ad = lateral head length (*longitudo capitis lateralis*) ak = preanal distance (*distantia praeanalis*), au = predorsal distance (*distantia praedorsalis*), bc = eye diameter (*diameter oculi*), ef = head height (*alitudo capitis*), gh = maximum body height (*summa altitudo corporis*), gz = maximum height of dorsal fin, D (*summa altitudo D*), hr = maximum length of ventral fin, v (*summa longitudo V*), hk = ventral-anal fin distance (*spatium* V-A), ij = minimum body height (*minima altitudo corporis*), kl = length of anal fin base (*longitudo basis A*), l'o = length of caudal peduncles (*longitudo pedunculi caudae*), pq = maximum height of anal fin (*summa altitudo A*), st = maximum length of pectoral fin (*summa longitudo P*), uw = length of dorsal fin base (*longitudo basis D*), 1 = maximum head width (*summa latitudo capitis*), 2 = width of caudal peduncle base (*latitudo basis pedunculi caude*) (arrows denote spots from which measurements were taken), 3 = buccal height (*altitudo buccae*),

RESULTS

1. Shape and colour of the body

The *D. macrophthalmus* body is laterally compressed and relatively high; the largest height is from 38.4 to 43.0% of the body length. The head is large, its height and length reaching 35 and 37% of the body length. In the frontal part of the jaw there usually are 4–6 strong and sharp teeth. A single row of smaller and sharp teeth is placed on each side of the jaw. Just behind the frontal large teeth there are few rows of fine teeth. The simple dorsal fin consists of hard and soft rays. The caudal fin shows a well-marked incision. The

pectoral fins are long, reaching to the anal fin base. The lateral line is well-marked and runs high, parallel to the dorsal margin.

The back is pink-red; the sides are golden and the ventral side has a silver-gray coloration. The fins are reddish. The jaws are intensively red. The iris is pale golden. The whole body is covered by ctenoid scales. The special process is located at the base of the ventral fins.

2. Mass measurements

The fish belonging to length classes of 14, 15, and 16 cm are most numerous in the materials studied. Results of the mass measurements are presented in Fig. 2; a single, well-marked peak is evident. Additionally, in 255 fish individuals the total length-body length (l.t.-l.c.) relationship was followed (Fig. 3). The relationship is linear as described by

$$l.t. = 1.18897\ l.c. + 1.29199$$

3. Morphological characteristics

The meristic features were worked out from 100 individuals; the following characteristics are given: fins; scale count along, below, and above the lateral line; and gill rakers count. (Table 2)

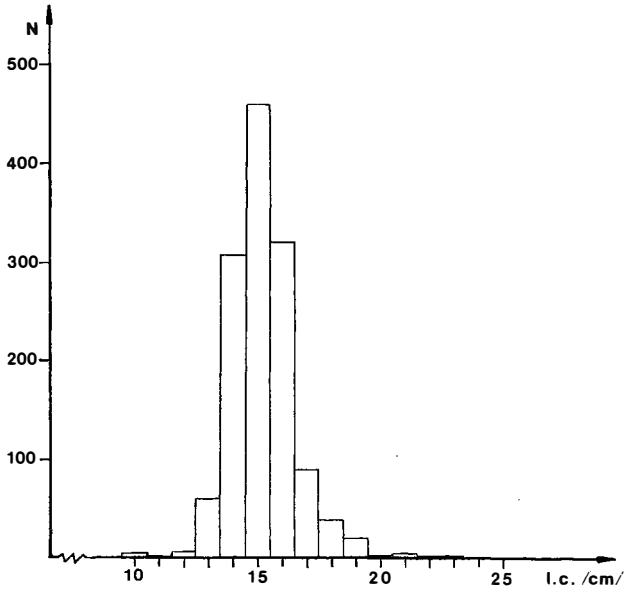

Fig. 2. Body length (l.c.) distribution; mass measurments, n = 1112.

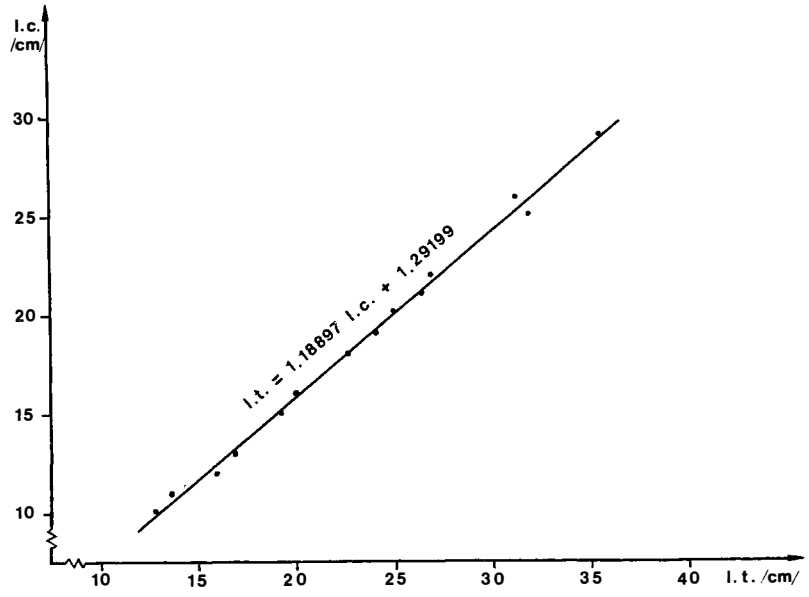

Fig. 3. Total length (l.t.) – body length (l.c.) relationship.

Generally, the morphology can be summarised in the following way: D (XI) XII (9) 10 (11); A III (7) 8 (9); V I 5; P I (14) 15 (16);

1.1. $51-58\ \frac{6-7}{11-13}$; gill rakers count 26–31.

The plastic features are described in Table 3. The male and female plastic characters were analysed separately on individuals similar in their length and meristics (Table 4). The differences between mean values of various characters in males and females are slight and the extent of diversification (d) never exceeds 3.

Changes in body proportions with length (Table 5) involve mainly the head becoming shorter, the eye diameter decreasing, the height of the dorsal and anal fins becoming smaller, and the pectoral and ventral fins becoming shorter. On the other hand, the distance between the pectoral and anal fins increases with fish size.

DISCUSSION

The materials under study (n = 255) clearly show a numerical domination of females (Table 1), the mean female: male ratio being 2.3:1 (not counting juveniles and those individuals of uncertain sex). It is relatively difficult to sex *D. macrophthalmus*, particularly the 12–13 cm long individuals. This is presumably related to her-

Table 2

Meristic characters of *D. macrophthalmus* (n = 100)

Character			Range	M ± m	δ	V (%)
Fins	D	hard rays	11 – 12	11.95 ± 0.02	0.22	1.8
		soft rays	9 – 11	9.97 ± 0.03	0.30	3.0
	A	hard rays	3	3	–	–
		soft rays	7 – 9	7.99 ± 0.02	0.17	2.2
	V	hard rays	1	1	–	–
		soft rays	5	5	–	–
	P	hard rays	1	1	–	–
		soft rays	14 – 16	15.03 ± 0.02	0.22	1.5
Scale count along lateral line			51 – 58	53.53 ± 0.18	1.75	3.3
Scale count above lateral line			6 – 7	6.22 ± 0.05	0.41	6.7
Scale count below lateral line			11 – 13	12.45 ± 0.06	0.52	4.2
Gill rakers count			26 – 31	28.35 ± 0.10	1.03	3.6

maphroditism of juveniles which, according to Alekseev (1975), when mature, further develop one type of gonads only, male or female.

In spite of having collected otoliths and scales, no growth rate analysis could be made. Serious difficulties in age reading and in assigning a fish to a proper age group were encountered when examining the otoliths and scales. The difficulties have two major causes: firstly, the first spawning of *D. macrophthalmus* in the Namibian shelf proceeds for almost the whole year (Trunov, 1972; the author's own observations); and secondly, as stated by Trunov (1972), otoliths and scales grow two rings each during a year. Moreover, many otoliths and scales exhibited numerous additional rings, impossible to distinguish from the proper rings established in spring and autumn (Trunov, 1972).

The results of mass measurements (Fig. 2) do not permit to distinguish age groups among the individuals measured, in spite of *D. macrophthalmus* being a short-lived species (life span of 6–7 years) and one attaining relatively high increments during the first three

Table 3

Plastic characters in *D. macrophthalmus* (n = 100)

Character	Range	M±m	δ	V (%)
longitudo totalis in cm	12.8–27.2	19.26±0.26	2.62	13.6
longitudo corporis in cm	9.8–21.4	15.13±0.21	2.14	14.2
longitudo corporis = 100				
longitudo capitis lateralis	33.4–41.0	36.95±0.35	3.51	9.5
distantia praeocularis	8.6–11.5	9.64±0.05	0.49	5.1
altitudo buccae	3.1– 4.5	3.88±0.03	0.31	8.0
diameter oculi	11.7–14.7	13.13±0.06	0.61	4.6
longitudo pedunculi caudae	17.7–22.5	20.56±0.10	1.01	4.9
distantia praedorsalis	38.5–43.5	41.50±0.14	1.36	3.3
distantia praeanalis	63.0–70.2	67.40±0.16	1.58	2.3
spatium V–A	25.7–31.9	28.22±0.30	2.97	10.5
summa longitudo P	31.3–36.9	34.47±0.12	1.20	3.5
summa longitudo V	21.9–26.3	23.88±0.09	0.85	3.6
summa altitudo D	13.1–18.4	15.82±0.09	0.92	5.8
longitudo basis D	47.0–54.3	51.10±0.13	1.34	2.6
summa altitudo A	10.8–15.0	12.80±0.08	0.77	6.1
longitudo basis A	17.7–20.6	19.14±0.07	0.72	3.8
altitudo capitis	30.7–37.7	34.73±0.13	1.34	3.9
summa altitudo corporis	38.4–43.0	40.51±0.11	1.08	2.7
minima altitudo corporis	8.8–10.7	9.89±0.04	0.39	4.0
summa latitudo capitis	15.3–18.9	16.82±0.07	0.67	4.0
latitudo basis pedunculi caudae	7.3– 9.5	8.20±0.05	0.45	5.5
longitudo capitis lateralis = 100				
distantia praeocularis	23.2–29.4	25.89±0.13	1.27	4.9
altitudo buccae	8.2–12.4	10.40±0.08	0.80	7.6
diameter oculi	30.9–38.3	35.20±0.18	1.29	3.7
altitudo capitis	81.7–101,0	92.81±0.43	4.29	4.6
summa latitudo capitis	41.8–48.7	45.21±0.20	1.98	4.4

Table 4

Plastic characters in *D. macrophthalmus* females and males and their extent of diversification, d

Character	♂♂ (n=30)	♀♀ (n=30)	d
	M ± m		
longitudo corporis in cm	15.08 ± 0.29	15.18 ± 0.31	–
longitudo corporis = 100			
longitudo capitis lateralis	37.24 ± 0.25	37.38 ± 0.16	0.47
distantia praeocularis	9.66 ± 0.12	9.68 ± 0.10	0.12
altitudo buccae	3.91 ± 0.06	3.82 ± 0.05	1.15
diameter oculi	13.07 ± 0.13	13.23 ± 0.12	0.90
longitudo pedunculi caudae	20.62 ± 0.22	20.47 ± 0.18	0.53
distantia praedorsalis	41.36 ± 0.32	41.54 ± 0.19	0.48
distantia praeanalis	67.11 ± 0.31	67.05 ± 0.34	0.13
spatium V – A	28.04 ± 0.21	28.27 ± 0.29	0.64
summa longitudo P	34.60 ± 0.22	34.54 ± 0.25	0.18
summa longitudo V	23.84 ± 0.17	23.84 ± 0.16	0.00
summa altitudo D	15.87 ± 0.20	15.97 ± 0.15	0.40
longitudo basis D	50.86 ± 0.31	51.20 ± 0.20	0.92
summa altitudo A	12.94 ± 0.14	12.77 ± 0.13	0.89
longitudo basis A	19.23 ± 0.15	19.10 ± 0.12	0.68
altitudo capitis	34.89 ± 0.24	34.61 ± 0.33	0.69
summa altitudo corporis	40.50 ± 0.24	40.67 ± 0.21	0.53
minima altitudo corporis	9.84 ± 0.08	9.91 ± 0.08	0.11
summa latitudo capitis	16.79 ± 0.14	16.94 ± 0.11	0.84
latitudo basis pedunculi caudae	8.23 ± 0.09	8.20 ± 0.07	0.26
longitudo capitis lateralis = 100			
distantia praeocularis	25.93 ± 0.27	25.91 ± 0.25	0.05
altitudo buccae	10.49 ± 0.14	10.24 ± 0.15	1.22
diameter oculi	35.05 ± 0.28	35.42 ± 0.25	0.99
altitudo capitis	93.57 ± 0.52	91.74 ± 1.25	1.35
summa latitudo capitis	45.23 ± 0.44	45.34 ± 0.35	0.20

Table 5

Body length (l.c.) – related changes in *D. macrophthalmus* body proportions

Character	Mean			
longitudo corporis in cm	Length class			
	11	14	17	20
longitudo corporis = 100				
longitudo capitis lateralis	38.77	37.56	36.76	36.31
diameter oculi	13.93	13.37	12.61	12.39
spatium V – A	27.19	28.21	29.16	30.73
summa longitudo P	34.95	34.54	33.99	33.95
summa longitudo V	24.65	24.28	23.37	23.13
summa altitudo D	17.13	16.02	14.99	14.83
summa altitudo A	13.89	12.95	12.10	11.95
longitudo capitis lateralis = 100				
diameter oculi	35.91	35.59	34.31	34.08

Table 6

Meristic characters of *D. macrophthalmus* caught in different areas

Area	Fins				l. l.	Gill rakers count	Verte-brae count	n	Author
	D	A	P	V					
Cap Mirik Bank	XII 9–10	III 8–9	15–16	I 5	$54–60\frac{6}{13}$	27–31	24	150	Nowak (1968)
Namibia 18°30'–23°30' S	(XI) XII (XIII) (9) 10 (11)	III (7) 8 (9)	–	–	$47–55\ \frac{5–7}{13–16}$	26–31	24	419	Trunov (1969 a)
Namibia 17°–19° S	(XI) XII (9) 10 (11)	III (7) 8 (9)	I (14) 15 (16)	I 5	$51–58\ \frac{6–7}{11–13}$	26–31	–	100	present study

years of life (Domanevskij and Stepkina, 1971; Trunov, 1972). Presumably the recruitment to the stock proceeds throughout the year, the recruits being derived from spawning at different times of the year.

Oven and Salechova (1970) as well as Trunov (1972) found no betweensexes differences in growth rate. On the other hand, the individuals examined do show a certain difference in this respect as shown by the body length distributions (Fig. 4) for the two sexes (the female peak is shifted by 1 cm), and by the females being, on the average, by almost 3 cm larger than the males and attaining a larger maximum body length.

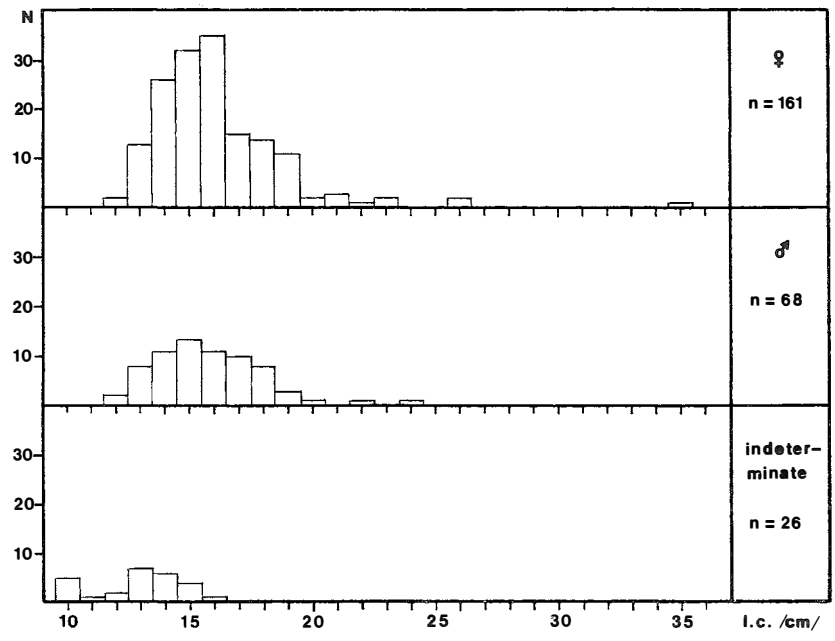

Fig. 4. Body length (l.c.) distribution in females, males, and fish of non-determined sex (n = 255).

Presumably, the sex ratio varies over the year and is depth dependent, as pointed out by Domanevskij and Stepkina (1971) who studied the species from off NW Africa. They, however, state the number of males to be usually higher than that of females.

On the other hand, Trunov (1969b) reported by percentages of females and males (62 and 38%, respectively) off SW Africa to be similar to those found in the present study (63% of females and 27% males; 10% of uncertain sex).

No clear-cut differences in the meristic features are found when the results obtained in the present study are compared with the literature data (Table 6) for *D. macrophthalmus* from other areas. A detailed comparison is, however, difficult owing to a non-uniform treatment of the subject in the literature.

Table 7

Selected meristic and plastic characters of *D. macrophthalmus* caught off Namibia within 17–19° S and within 18°30′–23°30′ S (Trunov, 1969a) and their extent of diversification, d

Character	Namibia 17°–19° S (n= 100)		Namibia 18°30′–23°30′ S (n=419)		d
	Range	M ± m	Range	M ± m	
Scale count along lateral line	51–58	53.53 ± 0.18	47–55	52.40 ± 0.08	5.74
Scale count above lateral line	6–7	6.22 ± 0.05	5 –7	6.00 ± 0.02	4.09
Scale count below lateral line	11–13	12.45 ± 0.06	13–16	14.82 ± 0.03	35.33
Gill rakers count	26–31	28.35 ± 0.10	26–31	27.86 ± 0.06	4.20
longitudo capitis lateralis = 100					
altitudo capitis	81.7–101.0	92.81 ± 0.43	90.0–110.0	101.21 ± 0.23	17.23
diameter oculi	30.9–38.3	35.20 ± 0.18	27.6–37.5	32.13 ± 0.11	14.55
distantia praeocularis	23.2–29.4	25.89 ± 0.13	25.8–32.1	29.19 ± 0.08	21.62

Table 7 compares the present author's results with those obtained by Trunov (1969a) for a few characters which could be compared, and the degree of diversification (d) is calculated. It is not possible to compare all the plastic characters studied by Trunov (1969a), as he reported their relation to the caudal length (*longitudo caudalis*). The means compared in Table 7 show a fairly large extent of diversification. The characters compared in Table 7 show in general the fish caught within 17–19°S to differ from those caught within 18°30′–23°30′ S in having a smaller head, larger eye diameter, shorter preocular distance, higher number of scales along the lateral line, higher number of scales above the lateral line, lower number of scales below the lateral line, and a higher gill ray count.

Basically, however, no general conclusion on the differences between the fish groups compared can be drawn before more individuals from the two areas are examined by means of an identical technique.

The results on the plastic characters for the males and females separately (Table 4) fail to demonstrate any between-sexes differences. Similarly, Trunov (1969a) failed to detect sexual dimorphism in *D.macrophthalmus*. Nowak (1968) in his paper on the species caught off Cap Mirik Bay points out to several characters evidencing the presence of sexual dimorphism which appears basically in older fish. He also states that the male head height is larger than that of the females. Moreover, the males have longer jaws and a larger preocular distance than the females. Additionally, the author mentioned lists some other characters differing the males from the females. However, the lack of any statistical treatment of the problem makes it impossible to interpret the information given.

The analysis of changes in body proportions with length shows the smaller fish to have a longer, relatively, head and a larger eye diameter; their fins are proportionally larger than those of the larger fish. The remaining plastic characters, not listed in the table, show a slight body length-related variability without any clear-cut trend.

CONCLUSIONS

1. The materials analysed are clearly dominated by the fish belonging to three body length classes: 14, 15 and 16 cm.
2. The total length-body length relationship is linear and described by the equation

$$l.t. = 1.18897\ l.c. + 1.29199$$

3. The *D.macrophthalmus* females grow, on the average, larger than the males, the respective mean total lengths being 24.88 cm and 21.98 cm.
4. No plastic character analysed indicates the presence of sexual dimorphism in *D.macrophthalmus*.

REFERENCES

Alekseev F. Je., 1975: Mechanizm formirovanija polovoj struktury populacji u promyslovych vidov kostnych ryb Sparidae na šelfe Zapadnoj Afriki. In: Biologija šelfa, Vladyvostok: 7–8. (in Russian)

Alekseev F.Je., 1983: Germafroditizm u sparovych (Perciformes, Sparidae). –Vopr. Ichtiol.23, vyp. 2:244–256. (in Russian)

Domanevskij L.N., Stepkina M.V., 1971: Osobiennosti biologii bolšeglazogo zubana Dentex macrophthalmus BLOCH rajona centralnovostočnoj Atlantiki.-Vopr. Ichtiol., 11, vyp. 3:438–446. (in Russian)

Grubišič F., 1967: Ribe, rakovi i školjke Jadrana. Split. (in Jugoslavian)

Fowler H.W., 1936: The marine fishes of West Africa.-Bull. of American Museum of Natural History. LXX, New York.

Joubin M., 1938: Faune ichthyologique de l'Atlantique Nord. Copenhague.

Nowak H., 1968: Charakterystyka Dentex macrophthalmus (Bloch, 1791) z łowiska Cap Mirik Bank u wybrzeży Północno-Zachodniej Afryki. Praca magisterska, Katedra Ichtiologii, AR Szczecin. [Characteristics of Dentex macrophthalmus (Bloch, 1791) caught off Cap Mirik Bay, NW Africa. M.Sc. Thesis, Academy of Agriculture, Szczecin].

Oven L.S., Salechova L.P., 1970: Rost i rozmnoženije nekotorych morskich tropičeskich ryb. In: Biologija moria, vyp. 21, Kijev: 245–267. (in Russian)

Tjunina V.N., Perova L.I., 1976: Razmernovesovoj i chimičeskij sostav sparovych (sem. Sparidae). Trudy Atlant. NIRO. vyp. 66:3–6.

Trunov I.A., 1969a: K morfologičeskoj charakteristike zubana bolšeglazogo – Dentex macrophthalmus BLOCH jugo-zapadnogo pobierižja Afriki. Trudy Atlant. NIRO, vyp, 22:206–214. (in Russian)

Trunov T.A., 1969b: Polovoj sostav zubana bolšieglazogo – Dentex macrophthalmus (BLOCH) jugo-vostočnoj Atlantiki.-Trudy Atlant. NIRO, vyp. 22: 215–220. (in Russian)

Trunov I.A., 1972: Opredelenje vozrasta bolšeglazogo zubana Dentex macrophthalmus (BLOCH) (sem. Sparidae) jugo-vostočnoj Atlantiki.-Vopr. Ichtiol. 12, vyp. 1:94–100.

Woźniak S., 1967: Rozmieszczenie ryb prażmowatych (Sparidae) na szelfie Afryki Północno-Zachodniej (w okresie maj-sierpień 1963 r.). [Distribution of the Sparidae on the NW African shelf (May-August 1963)]. – Prace MIR, Gdynia, 14/A: 7–26.

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CHARAKTERYSTYKA MORFOLOGICZNA *DENTEX MACROPHTHALMUS* (BLOCH, 1791) FAM.: *SPARIDAE* SZELFU NAMIBII

STRESZCZENIE

Badany materiał pochodził z połowów prowadzonych przez statek trawler-zamrażalnia typu B-23, na łowiskach południowo-zachodniej Afryki pomiędzy 17° a 19° S. Ogółem pobrano 1337 okazów ryb, z których 1112 posłużyło do wykonania pomiaru masowego długości ciała (l.c.). W pozostałej części materiału (255 sztuk) oznaczono płeć i zmierzono długość całkowitą i długość ciała (Tabela 1). Analizę morfologiczną przeprowadzono na 100 okazach ryb, opracowując 21 cech plastycznych (Rys. 1) i 6 cech merystycznych (Tabela 2 i 3).

W badanym materiale najliczniej reprezentowane są ryby z trzech klas długości ciała: 14, 15, 16 cm (Rys. 2). Analiza składu płciowego wykazała iż na jednego samca przypada średnio 2,3 samicy (nie wliczając w to ryb młodocianych i o nieokreślonej płci). Charakterystykę cech merystycznych przedstawia następująca formuła:

D (XI) XII (9) 10 (11), A III (7) 8 (9), V I 5, P I (14) 15 (16),

1.1. 51–58 $\frac{6-7}{11-13}$ wyrostki filtracyjne 26–31. Dymorfizmu płciowego u *D.macrophthalmus* nie stwierdzono (Tabela 4), jednak zaznaczyła się pewna różnica pomiędzy samicami a samcami, na co wskazuje rozkład długości ciała (Rys. 4) dla obu płci (szczyt jest przesunięty o 1 cm), jak również to, iż samice były średnio większe o prawie 3 cm od samców i osiągały większą maksymalną długość (Tabela 1).

Томаш Хесе

МОРФОЛОГИЧЕСКАЯ ХАРАКТЕРИСТИКА DENTEX MACROPHTHALMUS (BLOCH 1791) (FAM: SPARIDAE) ШЕЛЬФА НАМИБИИ

Р е з ю м е

Исследуемый материал брали из уловов, взятых морозильным траулером типа „B-23", в промысловой зоне юго-западной Африки, между 17° и 19° ю.ш. Всего взято 1337 особей рыб, из которых на 1112 особях был проведён массовой обмер длины тела(l.c.). На остальной части материала (225 штук) определён пол и промерены общая длина и длина тела(табл.1). Морфологический анализ проведён на 100 образцах рыб, при этом выделено 21 пластических признаков (рис.1) и 6 меристических признаков (табл.2 и 3).

В исследуемом материале наибольшее количество рыб принадлежит трём размерным группам: 14,15 и 16 см (рис.2). Анализ полового состава показал, что на одного самца приходится в среднем 2,3 сам-

ки (не считая неполовозрелых рыб и рыб с неопределённым полом).

Следующая формула представляет характеристики меристических признаков: (XI) XII(9) 10 (11), A III (7) 8 (9), V I 5, P I(14) 15(16), l.l.51--58 $\frac{6-7}{11-13}$, фильтрационные отростки 26-31. Половой диморфизм у D. macrophthalmus не установлен, но наблюдается некоторая разница между самками и самцами, на что указывает график длины тела (рис.4) для обоих полов (верхний предел отодвинут на 1 см), как также и то, что самки всреднем были больше самцов почти на 3 см и достигали наибольшей максимальной длины (табл.1).

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