Morphometric and meristic characteristics of Painted comber, *Serranus scriba* (L. 1758), in the Trogir Bay area (eastern mid-Adriatic)

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Abstract

Background and Purpose: *Painted comber,* Serranus scriba *(Linnaeus, 1758), is a subtropical species which is found in the Eastern Atlantic, Mediterranean and Black Sea. The aim of this study was to report the data on the painted comber morphometric and meristic characteristics in the Adriatic Sea, as until now they have not been systematically studied.*

Material and Methods: *Samples of 253 painted comber individuals were monthly caught as by-catch species of the small coastal trawl between June 2001 and May 2002 in the Trogir Bay area (eastern mid-Adriatic). In order to analyzed biometry of the species, fifteen morphometric and eight meristic characters were measured.*

Results and Conclusions: *Total length of painted comber specimens ranged between 7.1 and 20.0 cm, the mean value was 11.0±1.70 cm. Comparison of the obtained morphometric and meristic characteristics with the same ones that were published earlier did not show differences between painted comber populations inhabiting the Adriatic, different parts of the Mediterranean areas (including the Black Sea) and the eastern Atlantic.*

INTRODUCTION

Painted comber, *Serranus scriba* (Linnaeus, 1758), is a subtropical species which is found in the Eastern Atlantic from the English Channel and Bay of Biscay to the Canary Islands and Western Sahara, around the Azores and Madeira as well as in the Mediterranean and Black Sea. This species is included in the FAO catalogues of species of interest to fisheries in the Eastern Central Atlantic and the Mediterranean and the Black Sea *(1, 2, 3)*. It is a benthic species found on rocky, muddy and algal or seagrass overgrowing substrates, down to the depths of 150 m but usually only down to 30 m *(4, 2)*. This species is known as simultaneous hermaphrodite *(5)*, with the possibility of self-fertilization *(6)*. It tends to spawn from early spring to early summer, and be reproductively active over five months. Its reproductive activity depends on environmental conditions *(7, 8)*. Painted comber is mainly caught in the Adriatic Sea by small coastal trawls as a by-catch species and trammel bottom sets during the whole year, especially during the spring/summer period.

The purpose of this study is to report data on the painted comber morphometric and meristic characteristics in the Adriatic Sea. Morphometric and meristic characteristics have not yet been systematically

studied. Some data on individual meristic characterics of painted comber are available *(9, 10, 11, 12, 13, 1, 14, 15)*. Data on their morphomery *(10–12)* are very scarce.

MATERIAL AND METHODS

A total of 253 painted comber individuals were monthly caught as a by-catch species of the small coastal trawl (12 mm stretched mesh) between June 2001 and May 2002 in the Trogir Bay area (eastern mid-Adriatic) (Figure 1). Trogir Bay (43°30'N, 16³00' E) is a semi-enclosed bay of 29 m average depth and 1.8 km² surface. Sedimentary composition of the sampling area is mostly muddy in its deeper part but, extending to the coastline, muddy bottoms are replaced with sandy/muddy parts that are partially overgrown by *Posidonia oceanica* and *Cymodocea nodosa,* whereas the coastline is mainly rocky. Average annual water surface temperature and salinity is 17.35°C and 35.82 (psu), respectively *(16)*.

All biometric measurements were obtained on fresh specimens immediately after landing. In order to separate muscular tissue from spine to count the number of vertebrae, the analyzed specimens were boiled. Fifteen morphometric characteristics: total length (*LT*), standard length (*LS*), head length (*LC*), preocular head length (*POC*), eye diameter (*O*), postocular head length (*ZOC*), the predorsal (*PD*) and preanal (*PA*) distance, maximum (*H*) and minimum (*h*) body height, length of dorsal fin (*LD*) and anal fin basis (*LA*), length of pectoral fin (*LP*), length of ventral fin (*LV*) and length of caudal fin (*Lcau*), as well as eight meristic characteristics: the number of rays in dorsal fin (*D*), in pectoral fin (*P*), in ventral fin (*V$_v$*), in anal fin (*A*) and in caudal fin (*C*), the number of vertebrae (*Vert.*), the number of gill rakers (*Brsp.*) and the number of scales on linea lateralis (*L.lat*.) were measured according to JARDAS (*15*) (Figure 2).

All lengths were measured to the nearest 0.1 cm. Morphometric characteristics were expressed as % of *LT*, with the exception of preocular head length (*POC*), eye diameter (*O*), and postocular head length (*ZOC*) which were expressed as % of *LC*, and also minimum body height (*h*) which was expressed as a % of maximum body height (H).
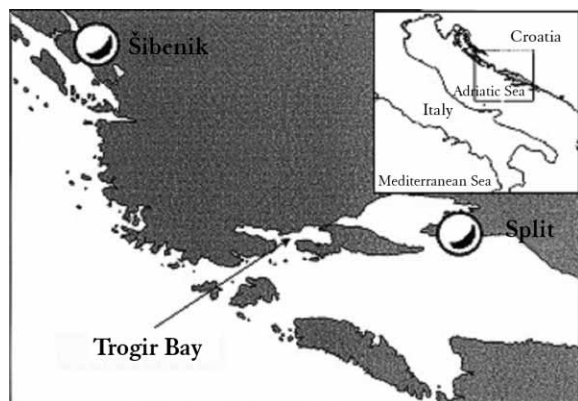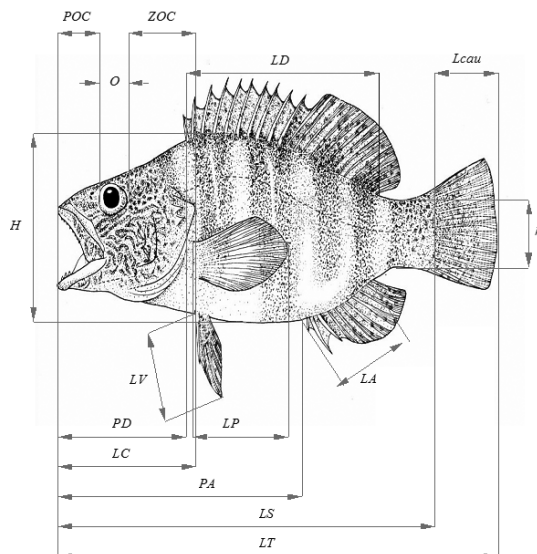

Figure 1. Map of the study area.

Figure 2. *Stylized drawing of body proportions measured on painted comber: LT – total length, LS – standard length, LC – head length, POC – preocular head length, O – eye diameter, ZOC – postocular head length, PD – the predorsal and PA – preanal distance, H – maximum and h –minimum body height, LD – length of dorsal fin and LA – anal fin basis, LP – length of pectoral fin, LV – length of ventral fin and Lcau – length of caudal fin.*

Length-length relationships were determined by the method of least squares to fit a simple linear regression model. Length conversion equations were derived for total length (*LT*), head length (*LC*) and the maximum body height (*H*).

Arithmetic means, standard deviations and variability coefficients were used to process the numerical data.

RESULTS AND DISCUSSION

Total length and body weight of analyzed individuals varied from 7.1 cm to 20.0 cm and from 4.21 g to 108.99 g, respectively. Mean length was 11.0 ± 1.70 cm; mean weight 18.59 ± 10.248 g and modal length was 11.0 cm (19.37 %) (Figure 3). The results of relative morphometric relationships of measured body proportions expressed in percentages are given in Table 1. Ranges of all observed morphometric relationships were within narrow limits and the variability coefficients (*V*) were relatively low for all analyzed morphometric relationships. The modal values of observed relationships are presented in Figure 4. Almost all modal graphs, with the exception of postocular head length (*ZOC*), confirmed that the population of painted comber, which inhabits this part of the Adriatic Sea, is homogeneous.

Length-length relationships are linear. The estimated parameters of the length-length relationship as well as the coefficient of determination (*r²*) are presented in Table 2. The best fit was recorded between total length (*LT*) and standard length (*LS*) (*r²*=0.989), while the lowest value of the coefficient of determination was established between total length (*LT*) and anal length
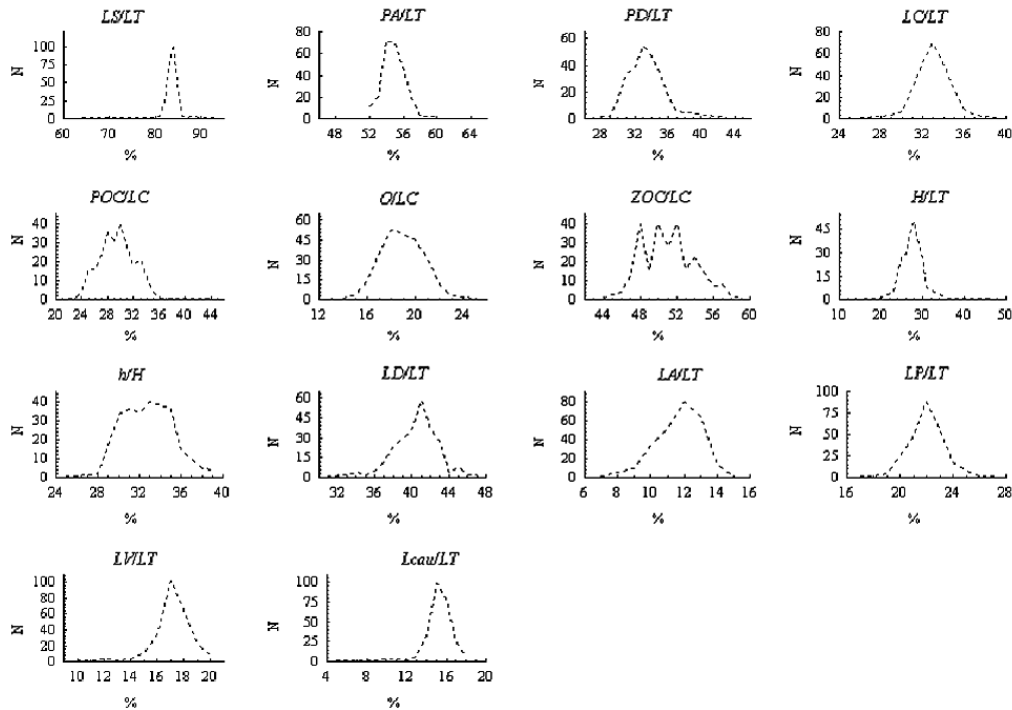
Figure 3. *Length frequency distribution of* S. scriba *caught in the Trogir Bay area from June 2001 to May 2002.*

(*LA*) ($r^2=0.673$). The coefficients of linear regression point to the fact that smaller specimens have a longer standard length (*LS/LT*), preanal distance (*PA/LT*), head length (*LC/LT*) as well as the length of dorsal (*LD/LT*) and caudal fin (*Lcau/LT*). At the same time, they have a smaller amount of maximum body height

(*H/LT*), length of pectoral fin (*LP/LT*), ventral fin (*LV/LT*) and the length of anal fin basis (*LA/LT*) than bigger specimens. Concerning other morphometric relationships, the smaller specimens have smaller preocular head length (*POC/LC*), wider eye diameter (*O/LC*), longer postocular head length (*ZOC/LC*) and higher caudal root basis (*h/H*) than the larger ones.

TABLE 1

Relative relationships of measured body proportions of *Serranus scriba* (*N*=253) caught in the Trogir Bay area from June 2001 to May 2002.

Body proportion	Range (%)	$\bar{x}\pm SD$	*V* (%)
LS/LT	74.74–94.34	84.29±1.767	3.12
PA/LT	48.29–64.76	55.32±1.902	3.62
PD/LT	28.85–43.52	33.59±1.863	3.47
LC/LT	16.83–39.94	33.45±1.648	2.72
POC/LC	22.58–44.44	29.97±2.890	8.35
O/LC	14.72–25.00	19.39±1.732	3.00
ZOC/LC	44.73–59.64	51.48±2.836	8.05
H/LT	16.75–47.06	27.90±2.644	6.99
h/H	25.80–39.71	33.48±2.312	5.34
LD/LT	31.01–47.42	40.88±1.354	1.83
LA/LT	7.5–15.5	12.23±1.305	1.71
LP/LT	17.36–27.84	22.52±1.354	1.83
LV/LT	10.28–20.96	17.64±1.440	2.07
Lcau/LT	5.71–18.42	15.73±1.360	1.85

$\bar{x}$ – mean value; *SD* – standard deviation; *V* – variability coefficient

TABLE 2

Length-length regression parameters (a,b), determination coefficient (r^2) and standard error of coefficient b /SE (b)/of *Serranus scriba* (*N*=253) caught in the Trogir Bay area from June 2001 to May 2002.

Equation	*a*	*b*	SE (b)	r^2
*LS=a+b*LT*	0.115	0.834	0.001	0.989
*PA=a+b*LT*	0.311	0.521	0.002	0.967
*PD=a+b*LT*	0.107	0.328	0.002	0.926
*LC=a+b*LT*	0.371	0.296	0.002	0.932
*POC=a+b*LC*	−0.250	0.363	0.003	0.842
*O=a+b*LC*	0.296	0.112	0.002	0.721
*ZOC=a+b*LC*	0.074	0.500	0.003	0.915
*H=a+b*LT*	0.199	0.247	0.002	0.850
*h=a+b*H*	0.128	0.299	0.002	0.905
*LD=a+b*LT*	1.174	0.290	0.003	0.838
*LA=a+b*LT*	0.257	0.095	0.001	0.673
*LP=a+b*LT*	−0.055	0.228	0.001	0.916
*LV=a+b*LT*	0.055	0.170	0.001	0.888
*Lcau=a+b*LT*	0.183	0.137	0.001	0.848

Meristic characteristics of *Serranus scriba* (N=253) caught in the Trogir Bay area from June 2001 to May 2002.

Peculiarity	Range	$\bar{x} \pm SD$	V (%)
Dorsal fin rays (D)	X/(14–17)	25.01±2.042	8.165
Anal fin rays (A)	III/(7–8)	10.03±0.819	8.166
Pectoral fin rays (P)	12–16	14.10±1.151	8.163
Pelvic fin rays (V_v)	I/(4–6)	5.97±0.488	8.174
Caudal fin rays (C)	15–18	16.59±1.355	8.168
Branchiospines (Brsp)	15–18	17.53±1.432	8.169
Scales in linea lateralis (L.lat.)	60–74	68.78±5.616	8.165
Vertebrae (Vert)	24	24.00 ± 0	–

$\bar{x}$ – mean value; *SD* – standard deviation; *V* – variability coefficient

Results presented in this paper were compared with the data found in the literature. POLJAKOV *et al.* (10) reported some morphometric relationships for painted comber specimens from the eastern South Adriatic Sea and found that their head length (*LC*) makes up 28.6–30.3 % of the total body length, while preocular head length (*POC*) makes up 30.8–33.3 % and eye diameter makes up 18.2–20.0 % of the head length. According to Bănărescu *(12)*, maximal body height (*H*) of painted comber from the Black Sea constitutes 33.0 % and head length (*LC*) makes up 33.3 % of total body length, and eye diameter (*O*) makes up 16.5–20.0 % of head length (*LC*). Svetovidov *(11)* reported that head length (*LC*) makes up 30.3–40.0% of total length, while eye diameter constitutes 16.7–20.0 % of head length (*LC*) in the same area. Results obtained from other geographical areas are generally in agreement with results presented in this paper.
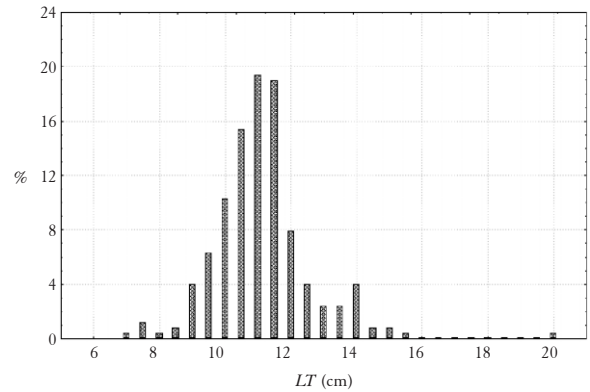

Figure 4. *Relative relationship (in percentage) of measured body proportions expressed in ranged and modal values for samples of* S. scriba *caught in the Trogir Bay area.*

Meristic counts of analyzed painted comber specimens are given in Table 3. Each of the characteristics was compared with data from the literature (Table 4). Meristic characteristics of painted comber population in the Adriatic Sea showed no or very low variability within the data previously reported for this species from various geographical areas. Actually, only the number of branchiospines is somewhat higher than that reported for *S. scriba* from the Mediterranean Sea. The significance of differences among reported data could not be established since only ranges of meristic characteristics are given in the literature (Table 4). It had been assumed earlier that variations in meristic and morphometric characteristics are entirely genetic *(17, 18)*, but recently it has been found that they have environmental and genetic components as well *(19)*.

Morphometric and meristic analyses in this study revealed very similar pattern of biometric characteristics of

TABLE 4

Meristic characteristics of *Serranus scriba* caught in the Adriatic Sea, Mediterranean, Black Sea and NE Atlantic.

Area and data of authors	D	A	P	V_v	C	Brsp.	Llat.	Vert.
Our results	X/ 14–17	III/ 7–8	12–16	I/ 5	15–18	15–18	60–74	24
Tunisian coast Dieuzeide (1953)	X / 14–15	III / 7–8	13	I / 5	17	–	–	–
Eastern South Adriatic Poljakov *et al.* (1958)	X–XI / 14–15	III / 7–8	–	–	–	–	68–80	–
Black Sea Bănărescu (1964)	X–XI / 14–15	III / 7–8	I / 13–14	I / 5	–	–	70–80	–
Black Sea Svetovidov (1964)	X–XI / 14–15	III / 7–8	–	–	–	–	65–75	–
Italian coast Binni (1968)	X / 14–16	III / 7–8	13–14	I / 5	17	–	–	–
Italian coast Tortonese (1975)	X / 14–16	III / 7–8	–	–	–	–	68–73	–
Mediterranean, NE Atlantic and Black Sea Bauchot *et al.* (1986)	X / 14–16	III / 7–8	–	–	–	–	65–75	–
Mediterranean Fisher *et al.* (1987)	–	–	–	–	–	12–14	65–75	–
Middle-eastern Adriatic Jardas (1996)	X / 14–16	III / 7–8	13–14	I / 5	–	–	65–75	–

Explanations: *D* – number of rays in dorsal fin, *A*– number of rays in anal fin, *P* – number of rays in pectoral fin, *V_v* – number of rays in ventral fin, *C* – number of rays in caudal fin, *Brsp.* – number of gill rakers, *L.lat.* – number of scales on linea lateralis and *Vert.* – number of vertebrae

painted comber populations from the Adriatic Sea, Mediterranean (including Black Sea) and the eastern Atlantic. In order to indentify painted comber population more accurately, further studies, especially genetic ones, should be done.

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