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**Fish systematics**

# ANALYSIS OF THE VERTEBRAL NUMBER OF DAMSELFISH *CHROMIS CHROMIS* (L.) IN THE CENTRAL ADRIATIC

# ANALIZA LICZBY KRĘGÓW CHROMISA KASZTANOWEGO (*CHROMIS CHROMIS* L.) W ŚRODKOWYM ADRIATYKU

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Six samples of damselfish catches with a total of 833 individuals from the channel area (Hvar channel) and open waters (the region of Vis and Biševo Islands) of the central Adriatic were analysed with respect to their number of vertebrae. The vertebral number of damselfish ranged from 24 to 27. The mode of 26 vertebrae was observed in all the examined samples. Total mean value of damselfish vertebral number from both regions was 25.74.

## INTRODUCTION

The differences between the length distribution of damselfish taken from the channel area (Hvar channel) and the open waters (the region of Vis and Biševo Islands) of the central Adriatic pointed to the possibility of heterogeneous damselfish population existence.

The number of vertebrae is a meristic character previously used at population identification (Piccinetti 1971; Krajnović-Ozretić and Žikić 1978; Sinovčić, 1982). The same meristic character was applied in this work.

It was found by experiments that the vertebral number is genetically fixed with narrow limits, and that minor aberrations are due to the influence of different environmental factors, especially temperature in the so called sensitive time (Gabriel 1944; Lindsay 1954; Blaxter 1957) which is different for each species. However, it is apparent that statistic different number of vertebrae represents and independent population (Larrańeta 1958).

The purpose of the present study is to analyse the number of vertebrae in damselfish from channel area (Hvar channel) and open waters (the region of Vis and Biševo Islands) of the central Adriatic since thereare no data on the vertebral number of damselfish from the eastern Adriatic.

## MATERIALS AND METHODS


Fig. 1. Distribution of sampling stations of damselfish in central Adriatic
A - Hvar channel; B - Vis and Biševo Islands.

Samples of damselfish catches were taken from the channel area (Hvar channel) and open waters (the region of Vis and Biševo Islands) of the central Adriatic (Fig. 1).

Six representative samples of catches with a total of 833 individuals caught in the period of their intensive spawning during fishing season 1992, were used.

The number of individuals varied from 93 to 176 in some samples of the catches.

Total length of damselfish from the Hvar channel used in the anlysis of the vertebral number varied from 8.6 to 11.8 cm, and their means from 9.3 to 10.4 cm. The damselfisch from the region of Vis and Biševo showed variations in total length from 7.8 to 13.5 cm, and means from 10.2 to 11.9 cm.

Fish were preserved in 4% formaldehyd and after dissection they were air dried one to two days. The vertebrae were counted by lens, from occipital condyle (not counted) to urostyle, included, as recommended by FAO Fisheries Division.

The samples were also analysed statistically. Mean numbers of vertebrae, standard deviation and standard errors of arithmetic means were calculated. Analyses of variance and Fisher's F test were also apllied to determine the significant differences among variances. Obtained F values were compared to those of the limited values F, at a 5% significance level.

## RESULTS AND DISSCUSION

The total vertebral number of damselfish from the channel area and open waters of central Adriatic ranged from 24 to 27 vertebrae (Fig. 2). The vertebral number of damselfish from the Hvar channel ranged from 24 to27 vertebrae (Fig. 3), and that from the region of Vis and Biševo Islands from 25 to 27 vertebrae (Fig. 2).

Modal value of 26 vertebrae was observed in all the samples of damselfish catches. Besides that modal class, the class 26 showed the highest frequency and the class 24 appeared rarely just in the Hvar channel damselfish.

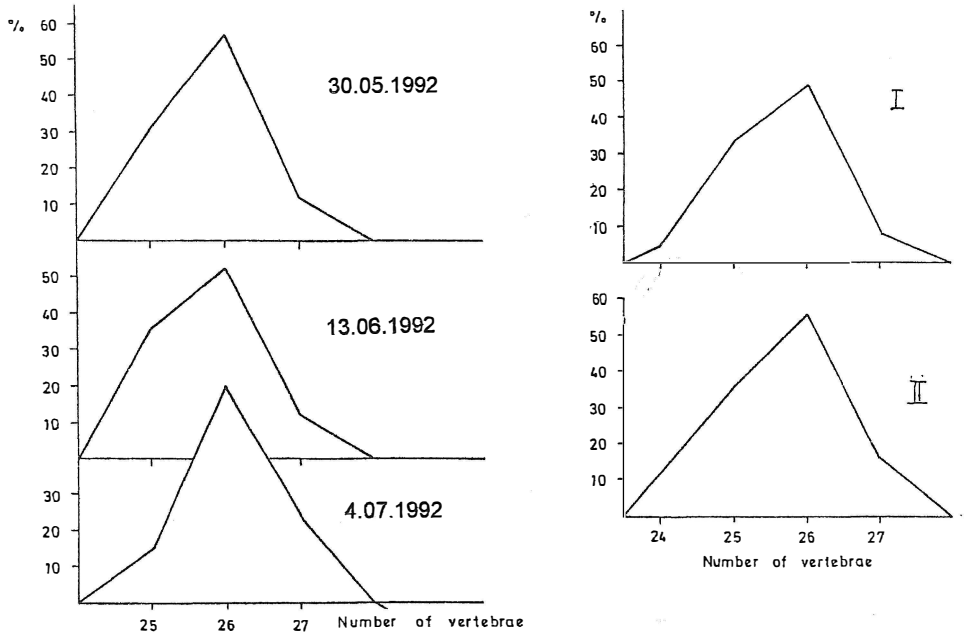


Fig. 2. Vertebrae polygons of the damselfish samples from Hvar channel (I) and Vis and Biševo Islands (II) in 1992, and vertebrae polygons of the damselfish from Vis and Biševo Islands region (separately for samples)

The overall mean of the vertebral number of damselfish from the Hvar channel was 25.64 with the standard deviation of 0.71 and the standard error of 0.04. The overall mean of damselfish vertebral number from the region of of Vis and Biševo Islands was very similar to that of the damselfish from the Hvar channel and amounted to 25.84, with the standard deviation of 0.65 and the standard error of 0.03 while in some of the catches it ranged from 25.54 to 25.96 (Tab. 1).

**Table 1**

Damselfish distribution as to vertebral number in the samples of commercial catches in 1992

| Region and date | Number of vertebrae | | | | n | $\bar{x}$ | sd | se |
|---|---|---|---|---|---|---|---|---|
| | 24 | 25 | 26 | 27 | | | | |
| Hvar channel | | | | | | | | |
| 29.05.92 | 5(3.3) | 65(43.3) | 70(46.7) | 10 (6.7) | 150 | 25.57 | 0.67 | 0.05 |
| 15.06.92 | 12(9.4) | 49(38.3) | 52(40.6) | 15(11.7) | 128 | 25.54 | 0.82 | 0.07 |
| 05.07.92 | 3(3.2) | 21(22.6) | 60(64.5) | 9 (9.7) | 93 | 25.80 | 0.65 | 0.07 |
| Total | 20(5.4) | 135(36.4) | 182(49.1) | 34 (9.2) | 371 | 25.64 | 0.71 | 0.04 |
| Vis and Biševo Islands | | | | | | | | |
| 30.05.92 | | 47(31.3) | 85(56.7) | 18(12.0) | 150 | 25.81 | 0.63 | 0.05 |
| 13.06.92 | | 63(35.8) | 92(52.3 | 21(11.9) | 176 | 25.75 | 0.69 | 0.06 |
| 04.07.92 | | 21(15.4) | 82(60.3) | 33(24.3) | 136 | 25.96 | 0.65 | 0.05 |
| Total | | 131(36.4) | 259(56.1) | 72(15.6) | 462 | 25.84 | 0.65 | 0.03 |

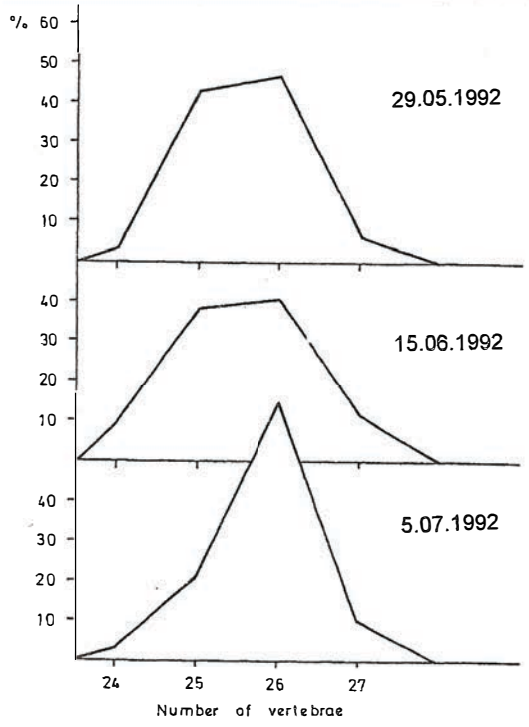


Fig. 3. Vertebrae polygons of the damselfish samples from the Hvar channel in 1992

Similar vertebral number means of damselfish for Black Sea were reported by Banarescu (1964) - 25-27, and Svetovidov (1964) - 26, for some parts of the Mediterranean, Fage (1918) - 26, and Tortonese (1975) - 26, and for whole Mediterranean Sea and from Portugal southwards to Angola Quignard and Pras (1986) - 26.

The critical values F at the 5% significance level at degrees of freedom of 5 and 827 was 2.21 and since the observed value is much lower 0.071 (Tab. 2), it may be concluded that there are no statistically significant differences in the vertebral number of damselfish from Hvar channel in relation to the damselfish from Vis and Biševo Islands. There also were no such differences between the vertebral number of damselfish from the catch samples within the same regions. We can conclude that the tested damselfish samples from both regions belonged to the same population as regards their number of vertebrae.

**Table 2**

The analysis of variance of vertebral number of damselfish in the central Adriatic

| Source of variation | Degree of freedom | SS | MS | $F_S$ | P |
|---|---|---|---|---|---|
| Between groups | 5 | 261 506 | 130 753 | 0.071 | 0.001 |
| Within groups | 827 | 12 822 780 | 1 832 826 | | |

## CONCLUSIONS

The vertebral number of damselfish from channel regions (Hvar channel) and open waters (the region of Vis and Biševo Islands) of the central Adriatic ranged between 24 and 27 vertebrae. Modal class of 26 vertebrae was observed in all the samples. The overall mean of the vertebral number of damselfish from the Hvar channel was 25.64 and from the region of Vis and Biševo Islands 25.84. It was found that there were no statistically significant

differences between the vertebral number of damselfish from Hvar channel and that from Vis and Biševo Islands. There also were no such differences between the vertebral number of damselfish in the same regions what could point to the homogenity of the damselfish population in this part of the Adriatic.

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## ANALIZA LICZBY KRĘGÓW CHROMISA KASZTANOWEGO (*CHROMIS CHROMIS* L.) W ŚRODKOWYM ADRIATYKU

## STRESZCZENIE

Liczba kręgów chromisa kasztanowego z regionu kanału wyspy Hvar a regionu morza otwartego (region poza wyspami Vis i Biševo) wahała się pomiędzy 24 a 27. Wartość modalną 26 kręgów stwierdzono we wszystkich próbach. Średnia wartość liczby kręgów chromisa kasztanowego z regionu kanału wyspy Hvar wynosiła 25.64, a z regionu wysp Vis i Biševo 25.84. Stwierdzono, że nie istnieją statystycznie istotne różnice w liczbie kręgów chromisa kasztanowego z tych regionów. Stwierdzono również, że nie istnieją statystycznie istotne różnice w liczbie kręgów u ryb pochodzących z tego samego regionu, co wskazuje na jednorodność stada chromisa kasztanowego w środkowej części Adriatyku

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