Turk J Zool
29 (2005) 189-191

Sexual Dimorphism in *Podarcis sicula campestris*

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Received: 14.04.2004

Abstract: Morphometric characters (snout-vent length, tail length, head length, head width, and number of ventrals and gulars) were analysed in 58 male and 44 female Italian Wall Lizards, *Podarcis sicula campestris*, from the Adriatic coast of Slovenia. The Italian Wall Lizard is significantly dimorphic in most characters analysed. Males were significantly larger than females. No differences between sexes were found in the number of gulars, whereas the number of transversal rows of ventrals was significantly higher in females (27-30) than in males (24-27).

Key Words: Italian Wall Lizard *Podarcis sicula*, meristic characters, sexual dimorphism, ventrals

Introduction

Concerning the Italian Wall Lizard *Podarcis sicula*, it is generally recognised that there is clear sexual dimorphism in a variety of morphometric characters such as maximum total length, relative tail length, size of the head, and number of dorsals, ventrals, and femoral pores (see Henle and Klaver, 1986). However, most of these diagnoses are based on mere observations rather than on analyses.

This study describes sexual dimorphism in *Podarcis sicula campestris* by the analysis of metric and meristic characters, and aims towards its application in sexing immature individuals.

Study area and Methods

The study was performed in the urban area of Lucija near Portoroz on the Adriatic coast (SW Slovenia). All species were caught in an area of 4.8 ha. The habitat consists of an open area with some stones and grasses, mainly on the edges. The climate is submediterranean (Gams 1972).

One hundred and two adult (58 males, 44 females) *Podarcis sicula campestris* were captured during July, August and September, 1996. Males and females were collected at the same time in the same microhabitats. Sex was determined according to the recommendation of Henle and Klaver (1986). The following counts and measurements were taken: number of transversal rows of ventrals (VS) (from collar to preanal scales); longitudinal number of gulars (G); snout-vent length (SVL) (tip of the snout to posterior margin of anal scale); tail length (TL) (posterior margin of anal scale to tip of the tail); head length (HL) (tip of snout to posterior margin of occipital scale); and head width (HW) (widest part of head). All measurements were recommended to the nearest 0.1 mm (dial callipers) by the author to avoid interobserver variability. The condition of the tail, whether broken or intact, was also recorded.

True lengths were transformed into the ratios 100 x SVL/TL, 100 x SVL/HL, 100 x SVL/HW, and 100 x HL/HW.

All statistical tests were done with the SPPS 8.0 for Windows statistical package. One-way ANOVA was performed (Sokal and Rohlf, 1995). Where significant differences were found, Scheffe's post-hoc test was run. Since data were not normally distributed (Kolmogorov-Smirnov test), the Spearman rank correlation coefficient (r_s) was used. An error probability of $P < 0.05$ was considered significant.

Results

The apparent sex ratio was 1.32:1 in favour of males, but the difference was not statistically significant (chi-square = 1.92, $P > 0.05$). Metric and meristic data as well as ratios of males to females are given in the Table. Snout-vent length was significantly shorter in the females

Table. Snout-vent length (SVL), head length (HL), head width (HW), number of ventrals (VS) and number of gulars (G) in male (M) and female (F) *Podarcis sicula campestris* from SW Slovenia. SD = standard deviation, n = sample size.

Parameter	Mean		SD		Minimum		Maximum		n	
	F	M	F	M	F	M	F	M	F	M
SVL	61.5	66.9	3.73	4.97	52.7	56.0	68.0	76.9	44	58
TL	105.1	121.4	7.26	13.5	92.1	86.9	124.7	145.3	28	45
HL	13.4	16.6	0.7	1.33	11.6	13.8	14.8	18.8	44	58
HW	7.6	9.1	0.5	0.8	6.2	7.5	8.9	10.5	44	58
VS	29	25	0.8	0.73	27	24	30	27	44	58
G	9	10	1.0	0.93	7	7	11	11	44	58
SVL/TL	58.0	55.1	3.0	5.0	53.2	48.1	66.0	77.2	28	45
SVL/HW	810.1	739.4	48.0	48.2	729.1	674.1	907.3	870.3	44	58
SVL/HL	458.0	403.1	14.1	11.2	418.3	378.2	483.3	429.0	44	58
HL/HW	177.0	184.0	10.0	--	157.0	--	199.0	227	44	58

than in the males ($F = 36.6$, $P < 0.001$). The tail was significantly longer in the males than in the females ($F = 34.4$, $P < 0.005$). Males had also longer ($F = 206.5$, $P < 0.005$) and wider ($F = 110.4$, $P < 0.005$) heads.

The number of ventrals was significantly higher in females than in males ($F = 448.5$, $P < 0.005$). Females had shorter SVLs than males, but had more transversal rows of ventrals and, thus, smaller ventrals. However, the sexes did not differ in the number of gulars ($F = 1.3$, $P > 0.05$).

Males and females also differed in all indexes: 100 x SVL/TL ($F = 7.0$, $P < 0.05$),100 x SVL/HL ($F = 496.8$, $P < 0.001$), 100 x SVL/HW ($F = 55.6$, $P < 0.001$) and 100 x HL/HW ($F = 8.6$, $P < 0.005$).

There was no significant correlation between snout-vent length and number of ventral scales either in the females ($r_s = 0.27$, $P > 0.05$) or in the males ($r_s = -0.16$, $P > 0.05$). The relationships between snout-vent length and tail length were statistically significant in both sexes: males ($r_s = 0.99$, $P < 0.001$), females ($r_s = 0.61$, $P < 0.001$).

Discussion

Henle and Klaver (1986) described methods for sex determination based on the difference in the number of femoral pores, size (body and tail length), and on differences in the number of ventrals. However, these methods were not statistically tested. According to my data, *P. sicula campestris* shows significant sexual dimorphism in all external morphometric characters analysed in this study, except in the number of gulars. The same data were also obtained by Tome (1995) for this subspecies in Croatia, when she compared different subspecies in the Istra peninsula. However, she did not specifically refer to these differences. It is also worth mentioning that the animals she measured were larger than those in my study. This could be due to the more southrly position of her study area and to the fact that my study area is in the northern range of the species (Corti et al., 1997).

Sexual dimorphism is most pronounced in the number of transversal rows of ventrals. In my study, the number of rows is 24-27 in males and 27-30 in females. Tome (1995), for example, determined 27 to 32 rows for females (n = 26) and 24 to 30 (n = 41) for males which is very close to my data. Less than 2% (only 1 individual) of the males and 9% (5 individuals) of the females analysed had 27 scale rows. It will be very interesting if such differences also apply to other populations of Italian Wall Lizard and to immature lizards. To determine this it will be necessary to test animals in captivity.

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