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Preliminary Data on Age Estimation and Body Size of the Dwarf Lizard, Parvilacerta parva (Boulenger, 1887) (Reptilia: Lacertilia) from Akşehir, Konya (Turkey)

Batuhan Yaman Yakin, Mert Gürkan, Sibel Hayretdağ, Cemal Varol Tok*

Çanakkale Onsekiz Mart University, Faculty of Sciences and Arts, Department of Biology, Zoology Section, Terzioğlu Campus, 17100 Çanakkale, TURKEY

* Corresponding author: cvtok@comu.edu.tr, cvtok44@gmail.com

Abstract. In this study, age determination was done by using the skeletochronology method on Akşehir, Konya (Turkey), 14 (5♂♂; 9♀♀) *Parvilacerta parva* specimens. Cross-sections of femurs were examined in total 14 individuals, the lowest number of LAGs was seen in one female and one male individuals as 4, the highest number of LAGs were seen in two female individuals as 8. Average SVL was found 50.8 mm (SD=2.27) in male individuals, and 53.1 mm (SD = 3.27) in females. For all the samples, the age-length equation was calculated as SVL (mm) = 37.82 + (2.47 * age). As a result of Pearson correlation analysis, a significant positive correlation (r=0.93, P<0.01) between age and SVL. Pileus length does not increase constantly with age (r=0.007, P=0.98), while pileus width increases normally together with age (r=0.212, P=0.46).

Key words: Skletochronology, *Parvilacerta parva*, lacertidae, LAGs, Turkey.

Introduction

Parvilacerta parva, which was defined as *Lacerta parva* in 1887 by BOULENGER; HARRIS *et al.* (1998) was added to a new genus different from *Lacerta*, MÜLLER (2002) as referred to the name *Parvilacerta* used as a subgenus. *Parvilacerta parva* is distributed in a large part of Anatolia as well as Armenia and the north-west of Iran in the east (IUCN, 2009). These species is named 'dwarf lizard' as its total length is shorter than the other Lacertid lizards.

Various methods are used for the age estimation of animals. The most useful methods among these are nature tracking and mark-recapture (DURHAM & BENETT, 1963). But this method has disadvantages such as requiring too much effort and long time to reach the results. In many other methods, growth frequency, lens thickness, tooth abrasion, gonad formation, isotropic rate and morphometric data of phased-developed bone tissue and other hard tissues are being used (CASTANET *et al.*, 1993).

The skeletochronology method is based on counting the lines of growth (LAGs) in cross-sections of the long bone diaphysis such as femur, humerus (CASTANET *et al.*, 1993). In this method, growth marks (GM) are shaped by various internal and environmental factors. According to these factors, growth marks in bones can be examined in three parts as opaque zone, translucent zone (annuli) and the lines of arrested growth (LAGs). LAGs show that growth in bone has stopped temporarily (SMIRINA *et al.*, 1986).

Skeletochronolgy method is commonly used for age estimation of amphibians and reptiles (SMIRINA, 1974, 1986; CASTANET & SMIRINA, 1990; CASTANET *et al.*, 1993;

CASTANET, 1994; SNOVER & RHODIN; 2008; AVENS *et al.*, 2009; GUARINO *et al.*, 2010). By using this technique, it is possible to gather information about the age of individuals, longevity, sexual maturity age and activity period of the species (KLEINENBERG & SMIRINA, 1969; CASTANET & SMIRINA, 1990; CASTANET *et al.*, 1993; CASTANET, 1994; SMIRINA, 1994; MIAUD *et al.*, 1999).

In Turkey, skeletochronology studies are done generally on amphibians (OLGUN *et al.*, 2001; OLGUN *et al.*, 2005; GUARINO & ERIŞMIŞ, 2008; ÜZÜM, 2009; ÜZÜM & OLGUN, 2009; ÜZÜM *et al.*, 2011). Studies of the age structure of lizard populations are very rare. So far there are no studies on the age structure of *P. parva*. This study aims to calculate the age of *P. parva* specimens collected from Akşehir (Konya) by using the skeletochronology and then examine the relationship between the age and the total body length.

Material and methods

In the current study, 14 *P. parva* (5 ♂♂; 9 ♀♀) samples were used, which were collected from Akşehir (Konya). The material deposited in the collection of Faculty of Sciences and Arts, Çanakkale Onsekiz Mart University and incorporated into the collection of ZDEU-ÇOMU (Zoology Department Ege University-Çanakkale Onsekiz Mart University), Turkey. Total body length, pileus length and pileus width were measured by using a digital caliper (Mitutoyo, CD-20 CPX) with an accuracy of 0.01 mm. For the age estimation, right femurs of the individuals were removed and they were cleaned of muscles. Then the bones were decalcified in 5% nitric acid for 3-5 hours depending on bone thickness. Decalcified femurs were embedded in paraffin; cross-sections of 10 µm were stained with Ehrlich's hematoxylin and examined under a light microscope.

Kruskal Wallis test was used to understand the relationship between age and total body length. Furthermore, age-SVL relationships were tested by linear regression and Pearson rank order correlation coefficient. Statistical analyses were performed; SPSS (vers. 16.0) and alpha set 0.05.

Results and Discussion

According to morphological measurements, SVL of males varies between 46.92-52.51 mm, and the average SVL was calculated as 50.81 mm (SD=2.27). Regarding females, SVL is between 47.98-58.62 and average SVL is 53.11 mm (SD=3.27) (Table 1). MÜLAYIM *et al.* (2001), reported that there is a statistically important difference in SVL, pileus length, pileus width between female and male individuals of *P. parva* samples collected from Beyşehir in 2001. In our study, it is observed that the male individuals have bigger average pileus length and width than females, while female individuals were bigger in average SVL than males.

Age estimation was done for 14 (5♂♂; 9♀♀) individuals from Akşehir (Konya) population samples. In cross-sections of the femur diaphysis of *P. parva*, 4-8 LAGs were counted (Fig. 1). When females and males are evaluated together, it is seen that number of LAGs varies between 4 and 8. 6 LAGs were seen among 8 individuals in total (Fig.2).

Table 1. Snout-vent length, pileus length and pileus width of males and females *P. parva* (SVL: Snout-Vent Lenght; PL: Pileus Length; PW: Pileus Width; SE: Standard Error; SD: Standard Deviation).

	n	Min	Max	Mean	SE	SD
SVL ♂♂	5	46.92	52.51	50.81	1.016	2.272
SVL ♀♀	9	47.98	58.62	53.11	1.091	3.274
PL ♂♂	5	10.64	11.70	11.28	0.181	0.404
PL ♀♀	9	10.18	12.15	11.05	0.212	0.636
PW ♂♂	5	5.30	5.90	5.66	0.106	0.237
PW ♀♀	9	5.31	6.20	5.59	0.094	0.282

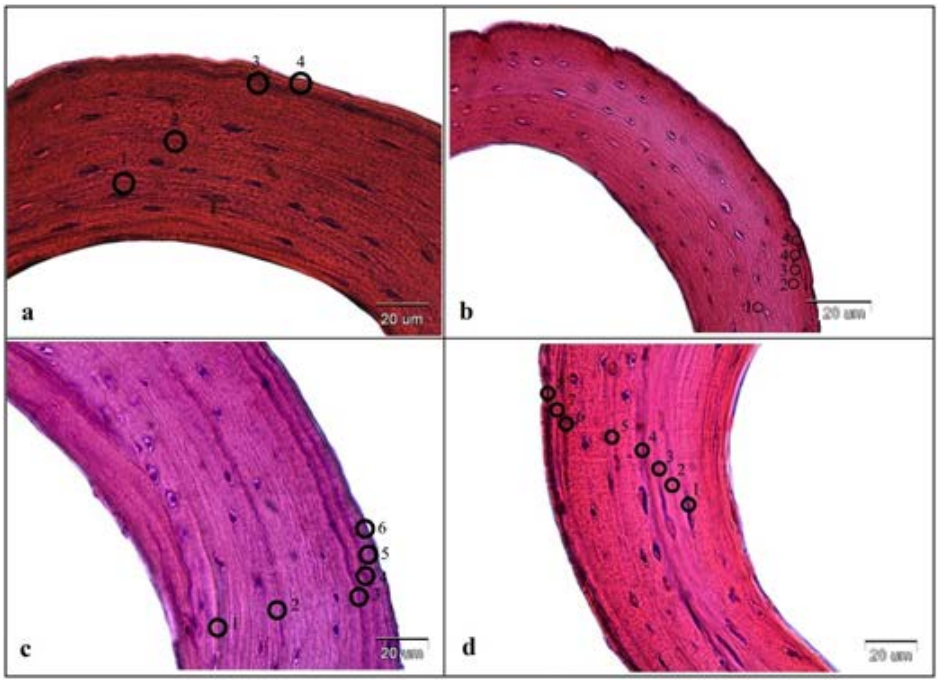

Fig. 1. Cross-sections of the femur diaphysis of adult *P. parva* specimens (a: Male 46.92 mm SVL with 4 LAGs; b: Female 50.15 mm SVL with 5 LAGs; c: Female 51.75 mm SVL with 6 LAGs; d: Female 57.12 mm SVL with 8 LAGs).

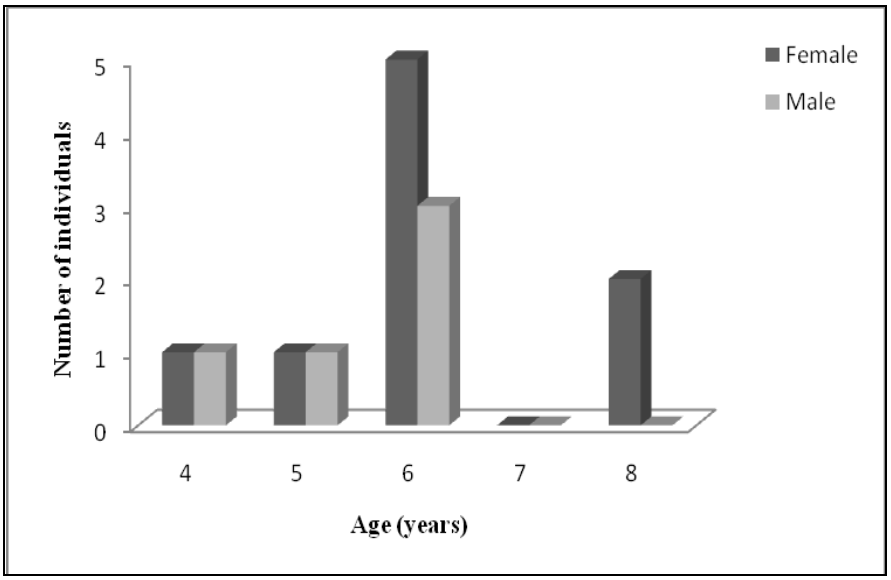

Fig. 2. Frequencies (number of individuals) by age class of *P. parva* in males and females.

Age and SVL relationships are examined in the samples which were used in the study. As a result of Kruskal-Wallis test, the difference between age and SVL was significant (P=0.032). Age-SVL equation is calculated as SVL=37.82 + (2.47 * age). Pearson correlation coefficient is calculated as r=0.93 between age (years)-SVL. In addition, as a result of linear regression analysis, a strong positive relationship between age and SVL is observed (ANOVA: F=84.77; df=1; P<0.00) (Fig. 3).

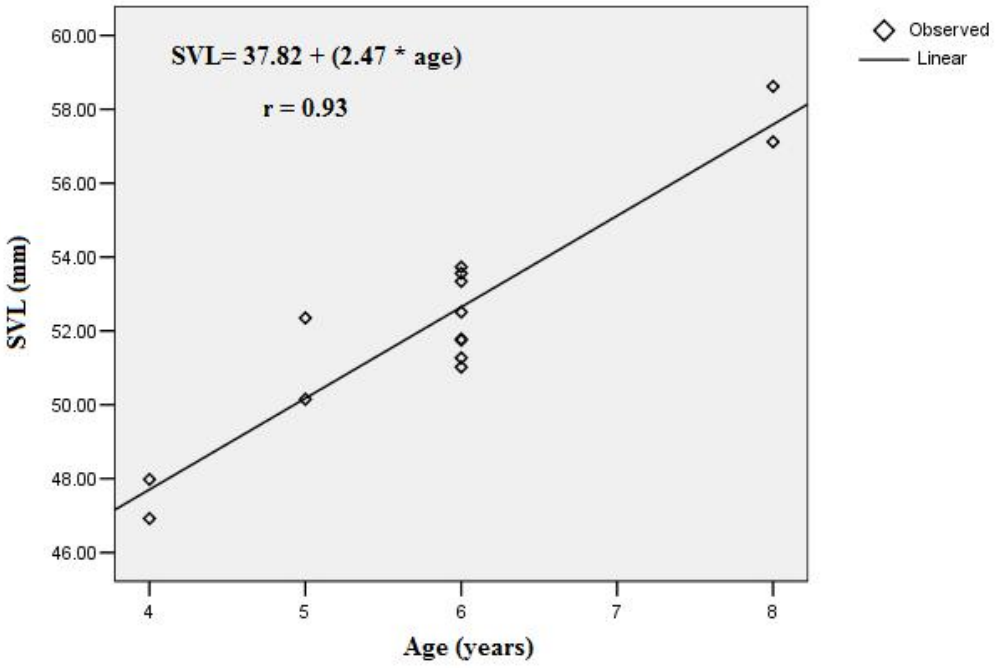

Fig. 3. Age (years) – SVL relationship of *P. parva*

In conclusion, a positive correlation (r=0.93, P<0.01) is seen between the age and the SVL is observed. The increase in SVL value and age for the current material is directly proportional.

Similarly, considering the relationship between the length and the width of pileus, it is observed that pileus length does not increase constantly with age (r=0.007, P=0.98), while width increases normally together with age (r=0.212, P=0.46).

The age formula of SVL=37.82 + (2.47*age) is seen suitable for *P. parva* samples living in this locality. Thus, it is thought that individual age estimation can be done without harming the species gathered from the aforementioned locality whose SVL value is calculated.

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