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Erythrocyte Measurements of some Scincids from Turkey

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Abstract: The aim of this study was to determine the erythrocyte and nucleus sizes of some scincids (*Ablepharus chernovi, Chalcides ocellatus, Eumeces schneideri, Mabuya aurata, Mabuya vittata, and Ophiomorus punctatissimus*) from Turkey by means of blood smears stained with Wright's stain. The largest erythrocytes were observed in the smears of *E. schneideri*, and the smallest in *M. vittata*, while the largest nuclei were observed in *E. schneideri* and the smallest were in *M. aurata*. In terms of the studied species, the nucleus and erythrocyte sizes were found to be correlated (r= 0.302, P< 0.01).

Key Words: Scincidae, Blood smears, Erythrocyte – nucleus sizes, Wright's stain.

Türkiye'den Scincidae Familyasına ait Bazı Türlerde Eritrosit Ölçümleri

Özet: Bu çalışmada, Wright boyasıyla boyanmış yayma kan preparatlarından yararlanılarak Türkiyedeki Scincidae familyası türlerinde (A*blepharus chernovi, Chalcides ocellatus, Eumeces schneideri, Mabuya aurata, Mabuya vittata, Ophiomorus punctatissimus*) eritrosit ve nukleus büyüklükleri tespit edilmiştir. Buna göre, en büyük eritrositler *E. schneideri*'de, en küçüğü *M. vittata*'da; en büyük nukleuslar *E. schneideri*'de, en küçüğü de *M. aurata*'da bulunmuştur. İncelenen türler arasında nukleus ve eritrosit büyüklüğü korelasyonu önemli bulunmuştur (r = 0.302, P < 0.01).

Anahtar Sözcükler: Scincidae, Yayma kan preparatı, Wright'ın boyası, Eritrosit-nukleus büyüklüğü.

Introduction

The earliest studies of the haematology of reptiles were comparative works on the structures of various elements in the blood (1, 2, 3). The most important works on the comparative morphologies of blood elements (4-21) were concerned with the seasonal and sexual variations in cell counts, cell sizes and blood parasites. Duguy (22) gave the erythrocyte sizes of various reptiles comparatively. The work of Saint Girons and Saint Girons (23) includes the erythrocyte morphologies of 76 species from 29 families of 4 reptile orders.

The present paper reports the erythrocyte and nucleus measurements of some scincids from Turkey.

Material and Methods

Specimens of 6 scincid species *(Ablepharus chernovi, Chalcides ocellatus, Eumeces schneideri, Mabuya aurata, Mabuya vittata, and Ophiomorus punctatissimus)*, which were used for the present study, were collected from various localities in Turkey (Fig. 1) between the years 1992-1997. This material is now deposited at the Zoology Department of Ege University (ZDEU) under the following museum codes:

Wright-stained blood smears were used in the measurement and evaluation of the erythrocyte and nucleus sizes. The necessary blood samples were taken from the postorbital sinuses of the specimens (24) via heparinized haematocrit tubes. Erythrocyte and nucleus measurements were taken by means of a BBT Krauss ocular micrometer. On each blood smear; the lengths (L) and widths (W) of 40 randomly chosen cells (in addition to their nuclei, NL and NW) were measured. The areas of optical sections through the two longer dimensions of the cells and their nuclei (cell and nucleus sizes) were estimated as $LW\pi/4$ and as $NLNW\pi/4$. Cell and nucleus shape comparisons were also made from their respective L/W ratios. Statistical calculations were made utilizing Sigma Plot, V. 4.

	Species	Museum code	Locality	Altitude	Collection Date
1.	*Ablepharus chernovi*	ZDEU 149/96	Çamardı-Niğde	1750 m	10 July 1996
2.	*Chalcides ocellatus*	ZDEU 85/92	Finike-Antalya	3 m	03 July 1992
3.	*Eumeces schneideri*	ZDEU 72/97	Meke Tuzlası-Konya	1075 m	31 May 1997
4.	*Mabuya aurata*	ZDEU 129/96	Karapınar-Konya	1075 m	07 July 1996
5.	*Mabuya vittata*	ZDEU 67/96	Kırobası, Mut-Mersin	1385 m	08 May 1996
6.	*Ophiomorus punctatissimus*	ZDEU 9/97	Kaş-Antalya	50 m	09 April 1997

Results

As in other cold-blooded vertebrates and in birds, the erythrocytes of reptiles (ergo of scincids) are oval-shaped with centrally located oval nuclei. In Wright-stained smears, rather chromophilic nuclei were observed within homogenously yellowish cytoplasms in the cells.

The measurements, sizes and related ratios of the erythrocytes and their nuclei in the six scincid species studied are given in Tables 1 and 2, respectively.

In the investigated species, erythrocyte lengths and sizes varied between 14.13 μm and 15.17 μm, and 83.77 μm^2 and 92.31 μm^2 respectively. The longest and largest erythrocytes were observed in *E. schneideri*, with the widest in *C. ocellatus*, the shortest in *A. chernovi*, and the narrowest and smallest in *M. vittata*. In terms of L/W ratio; the most ellipsoidal cells were those of *E. schneideri* while the least ellipsoidal ones were observed in *C. ocellatus* (Table 1, Figure 2).

The longest and largest nuclei were again observed in *E. schneideri*, with the shortest and smallest in *M. aurata*, and the narrowest in *A. chernovi* and *M. vittata*. The most ellipsoidal nuclei were observed in the cells of *E. schneideri* and the least ellipsoidal nuclei were found to be in *C. ocellatus*. The highest nucleocytoplasmic ratio was that of *E. schneideri*, while the lowest ratios were those of *C. ocellatus* and *M. aurata* (Table 2, Figure 2).

Table 1. Mean erythrocyte lengths (L), widths (W), sizes (S) and length/width ratios (L/W) of six scincid samples from Turkey, together with ± standard errors of the means. N: specimen numbers in each sample.

Scincids	N	L (mm)	W (mm)	S (mm2)	L/W
C. ocellatus	6(40)	14.68 ± 0.057	7.92 ± 0.038	91.33 ± 0.607	1.86 ± 0.010
E. schneideri	5(40)	15.17± 0.057	7.74 ± 0.035	92.31 ± 0.561	1.97 ± 0.011
A. chernovi	4(40)	14.13 ± 0.073	7.58 ± 0.024	84.12 ± 0.565	1.87 ±0.010
O. punctatissumus	4(40)	15.14 ± 0.060	7.73 ± 0.039	92.08 ± 0.637	1.96 ± 0.011
M. vittata	4(40)	14.14 ± 0.082	7.55 ± 0.019	83.77 ± 0.530	1.87 ± 0.012
M. aurata	4(40)	14.27 ± 0.083	7.56 ± 0.020	84.88 ± 0.543	1.90 ± 0.012

Table 2. Mean nucleus lengths (NL), widths (NW), sizes (NS), length/width ratios (NL/NW) and nucleus/cytoplasm ratios (N/C) of six scincid samples from Turkey, together with ± standard errors of the means. N: specimen numbers in each sample.

Scincids	N	NL (mm)	NW (mm)	NS (mm2)	NL/NW	N/C
C. ocellatus	6(40)	5.15 ± 0.027	2.64 ± 0.026	10.70 ± 0.121	1.98 ± 0.018	0.12 ± 0.001
E. schneideri	5(40)	7.11 ± 0.043	2.54 ± 0.016	14.20 ± 0.126	2.81 ± 0.021	0.15 ± 0.001
A. chernovi	4(40)	6.12 ± 0.049	2.50 ± 0.000	12.01 ± 0.096	2.45 ± 0.020	0.14 ± 0.001
O. punctatissumus	4(40)	6.05 ± 0.049	2.68 ±0. 035	12.70 ± 0.208	2.30 ± 0.027	0.14 ± 0.002
M. vittata	4(40)	6.14 ± 0.050	2.50 ± 0.000	12.06 ± 0.098	2.46 ± 0.020	0.14 ± 0.001
M. aurata	4(40)	5.06 ± 0.022	2.52 ± 0.014	10.02 ± 0.065	2.01 ± 0.011	0.12 ± 0.001

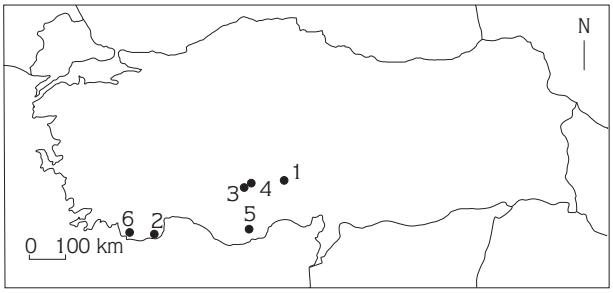

Figure 1. Collection localities. Refer to the materials list for details

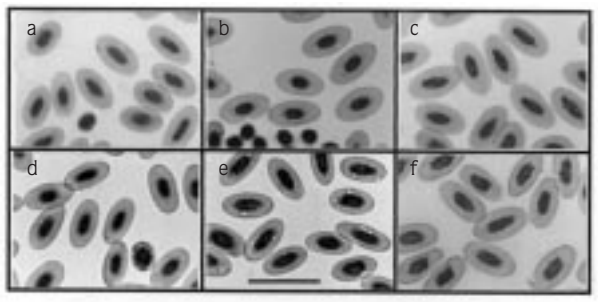

Figure 2. Erythrocyte and nucleus sizes of some scincids from Turkey. *a. Ablepharus chernovi, b. Chalcides ocellatus, c. Eumeces schneideri, d. Mabuya aurata, e. Mabuya vittata f. Ophiomorus punctatissimus.* Horizontal bar: 20 mm.

Discussion

Of the vertebrates, the largest known erythrocytes are in urodeles (18, 25). Wintrobe (13) stated that the erythrocyte size reflects the position of a species on the evolutionary scale, that in lower vertebrates and those with a not-so-successful evolutionary past, i.e., in cyclostomes, elasmobranchs and urodeles, the erythrocytes are large, but in higher vertebrates (mammals) the same cells are smaller and do not contain nuclei. From this standpoint, reptiles accupy an intermediate position between amphibians and birds (20, 26). A general consideration is that in poikilotherms erythrocytes are larger but low in number, while in homoiotherms the reverse is true (27).

According to the detailed survey of Saint Girons and Saint Girons (23), the largest erythrocytes in reptiles belong to the member of an ancient group, *Sphenodon punctatus*, and then those of the turtles and crocodilians; the smallest are those of the members of Lacertidae, a group with a wide evolutionary potential. Erythrocyte counts are much lower in reptiles than in birds and mammals, and in reptiles the same counts are high in lizards and low in turtles; so there is a negative correlation between the erythrocyte counts and sizes (22).

According to some authors (18, 21, 23), erythrocyte sizes vary between lizard families, sometimes even between species of the same family.

Our results demonstrate the presence of some differences in terms of erythrocyte sizes, between the 6 scincids from Turkey (Table 1, Figure 2). These differences probably stem from different activity levels and/or different environmental factors. Some variations in the nuclear morphologies of these species were also evident. The nuclei were generally more or less rounded and regular, except in *Eumeces schneideri*, in which the nuclei were irregular and more ellipsoidal (Table 2, Figure 2). A positive correlation was evident ($r = 0.302$, $p < 0.01$) between the erythrocyte and nucleus sizes of the scincids investigated. While the scincid samples were collected from localities at different altitudes (see the materials list), no altitude-related correlation was evident in the erythrocyte and/or nucleus measurements, sizes or ratios. There may be a correlation between altitude and cell count, but we did not have the equipment necessary for determining cell counts accurately in the field.

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