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Short communication

Morphometric measurements of the seminiferous tubules of the testes in 2-year-old and 3-year-old European bison males with or without spermiogenesis

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Abstract

The area, perimeter and diameter of the seminiferous tubules in the European bison *Bison bonasus* (L.) were statistically higher in the animals with than in those without spermiogenesis, both among 2-year-old and 3-year-old males ($p<0.001$; $p<0.001$; $p<0.001$).

Key words: *Bison bonasus*, juveniles, morphometric measurements, seminiferous tubules

Introduction

In earlier publication Czykier et al. (1999) analyzed the morphometric assessment of the diameter of the seminiferous tubules in the European bison *Bison bonasus* (L.) ($n=103$) (age 4 months – 17 years) in seven age classes and did not observe any statistically significant differences between the diameters in these classes. Continuing the research, Czykier and Krasińska (2004) compared the histological picture of the testes in 1-year-old, 2-year-old and 3-year-old European bison specimens and found statistically significant differences between the diameters of the seminiferous tubules in these three age classes. However, these authors (2004) did not observe any statistically significant differences between the diameters in 2-year-old and 3-year-old European bison with and without spermiogenesis.

The study objective was to 1) check whether spermiogenesis and age can affect diameter, area and perimeter, 2) compare examined morphometric measurements of the seminiferous tubules between all the groups studied.

Materials and Methods

Fifty seven male European bison (age 18-36 months) were divided into two age groups: young males up to 2-year-old and young males 2-3-year-old, with further separation into the animals with or with-

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out spermiogenesis. Diameters, areas and perimeters of the seminiferous tubules were measured in histological preparations. The presence of spermatids in the seminiferous epithelium or the presence of spermatozoa in the lumen of the seminiferous tubules of the testes was considered the criteria of spermiogenesis. The quantity variables were described by the mean value ± standard deviation (SD). In evaluation, the statistics software SPSS 17.0 was used. At first, the two-way ANOVA was applied to find out whether age (up to 2 or 2-3 years) and the existing spermiogenesis can influence morphometric parameters. This model took also into consideration the interaction between the factors studied. Then to compare all four groups simultaneously, one-way ANOVA was done as well as post hoc Duncan's test, if it was necessary. The results were considered statistically significant at the level of $p<0.05$.

Results and Discussion

In our study, both the age of the European bison (up to 2 or 2-3 years) and the presence or lack of spermiogenesis have a highly significant effect on the three morphometric measurements studied (area, perimeter and diameter) of seminiferous tubules (in each case $p<0.001$). However, the interaction of these two factors had no impact in any of the study cases ($p = 0.619$), ($p = 0.962$), ($p = 0.964$). All morphometric parameters of the seminiferous tubules of the European bison testes were statistically higher in 3-year-old individuals as compared to the 2-year-old animals (Table 1). Next, all the four groups were compared simultaneously with respect to the three morphometric parameters to reveal highly statistically significant differences (in each case $p<0.001$). Therefore, post-hoc tests were additionally performed, showing lack of statistically significant differences only between the 2-year-old specimens with spermiogenesis and 3-year-old without spermiogenesis (Table 1).

In the present study, the area, perimeter and diameter of the seminiferous tubules of the testes were found to be statistically significantly higher in 2-year-old and 3-year-old European bison males with spermiogenesis as compared to their age-matched peers without spermiogenesis. The present results concerning the diameter of the seminiferous tubules in the European bison differ from our previous research (Czykier and Krasińska 2004), when we failed to observe statistically significant differences with regard to the presence or absence of spermiogenesis. It may be a small number of animals in the previous study ($n = 20$), 13 two-year-old and 7 three-year-old individuals, that affected the study outcome (Czykier and Krasińska 2004). The initiation of spermiogenesis leads to a change in the proportions between supporting cells and the number of germinal cells, in favour of the latter (Sysa and Matuszewska 2006). This results in an increase in the surface of seminiferous epithelium, and thus in the dimensions of the area, perimeter and diameter of seminiferous tubules.

References

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Table 1. Area, perimeter and diameter of seminiferous tubules of testes in all young males of the European bison.

Symbol	*n*	Area (μm²)					Perimeter (6μm)					Diameter (μm)				
		Mean	SD	Min	Max	*p*	Mean	SD	Min	Max	*p*	Mean	SD	Min	Max	*p*
I	30	10963.33	6205.56	5494.89	25239.48	p<0.001	380.90	102.85	279.29	597.95	p<0.001	116.39	31.36	85.21	182.72	p<0.001
II	27	22081.67	7450.30	4644.75	34803.56		549.78	104.75	257.00	702.04		167.97	31.951	78.98	213.98	
I A	8	16741.82*	6621.09	5747.12	24889.39		477.29*	103.50	285.93	593.85		145.73*	31.50	87.86	181.29	
I B	22	8862.00	4606.54	5494.90	25239.48	p<0.001	345.85	78.84	279.30	597.95	p<0.001	105.73	24.11	85.21	182.72	p<0.001
II A	19	24930.96	5737.62	13587.42	34803.56		588.69	74.83	407.65	702.05		179.83	22.86	124.78	213.99	
II B	8	15395.49*	6838.03	4644.75	22118.19		454.80*	112.74	257.00	559.15		139.12*	34.32	78.98	170.90	

I – young males aged 18-24 months, II – young males aged 27-36 months. A – young males with spermiogenesis, B – young males without spermiogenesis, *n* – number of individuals, * – insignificant difference