

Heavy metal concentrations in the lesser white-toothed shrew (*Crocidura suaveolens*, Pallas 1811) as zoomonitor for anthropogenic impact in Strandja Mountain region (South-East Bulgaria)

G. MARKOV¹, TS. CHASSOVNIKAROVA¹, D. MITEV², H. DIMITROV², ¹Institute of Zoology, Bulgarian Academy of Sciences, 1, Zar Osvoboditel Blvd., Sofia 1000, Bulgaria, e-mail: geomar@datacom.bg, ²Plovdiv University "St. P. Hilendarski", Faculty of Biology, Department of Zoology, 24, Zar Assen Str., Plovdiv 4000, Bulgaria

The lesser white-toothed shrew (*Crocidura suaveolens*, Pallas 1811) is considered a suitable bio-indicator species for monitoring of environment toxicity in localities under different degree of anthropogenic impact because of its short lifespan, low space requirements and high metabolic rate. The present study was undertaken to evaluate the heavy metal contaminants in the lesser white-toothed shrew inhabiting Strandja Natural Park in South-East Bulgaria. This was achieved through establishing regional characteristics of content of elements with concentration dependant toxic effect (Cu, Co, Ni, Zn) and elements with proven highly toxic effect on living organisms (Pb, Cd) in the liver of adult male shrews with diploid chromosome number $2n=40$; $NFa=46$; $NF=50$.

The residual quantities of investigated heavy metals found in the liver of *C. suaveolens* specimens (Cu 36.229 ± 12.468 ; Co 5.171 ± 2.406 ; Ni 35.045 ± 7.111 ; Zn 281.984 ± 164.307 ; Cd 3.4963 ± 1.307 ; Pb 6.127 ± 3.956 expressed in \bar{X} [mg/kg dry weight] \pm SD) characterize the species as regional zoo-monitor and enhance the ability to monitor and assess the risk of anthropogenic pollution of the environment in Strandja Mountain region (SE Bulgaria).

The bio-indicator characteristics found create a starting basis for estimation of toxic metals accumulation in internal organs of lesser white-toothed shrew in the South-eastern part of Balkan Peninsula thus implying that it may be useful in comparative analysis of toxic anthropogenic hazards in the natural environment in other regions of its wide area of distribution in Palaearctic.

Acknowledgements: This study was supported by grant BU-B-5-2005 from the National Science Fund of the Bulgarian Ministry of Education and Science.

New insights into mating strategies of raccoons (*Procyon lotor* L.) in northeastern Germany determined by VHF telemetry and paternity tests

I. MUSCHIK*¹, A. PETER², H. SCHULZ², B. A. KÖHNEMANN*³, F.-U. MICHLER*⁴

*Society for Wildlife Ecology and Nature Conversation e.V., „Projekt Waschbär“, Goldenbaum 38, 17237 Carpin, Germany, e-mail: info@projekt-waschbaer.de, ¹Ruhr-University Bochum, Department of General Zoology and Neurobiology, Universitätsstr. 150, 44780 Bochum, Germany, e-mail: irina.muschik@rub.de, ²University of

Koblenz-Landau, Department of Environmental Science, Forstr. 7 / C1, 76829 Landau / Pfalz, Germany, e-mail: anja.peter@online.de, h.schulz@uni-landau.de, ³University of Applied Science Eberswalde, Faculty of Forests and Environment, Department of Wildlife Biology & Management, A.-Müller-Str. 1, 16225 Eberswalde, Germany, e-mail: koehnmann@projekt-waschbaer.de, ⁴Technical University Dresden, Institute of Forest Zoology, Piennner Str. 7 (Cotta-Bau), 01737 Tharandt, Germany, e-mail: michler@projekt-waschbaer.de

We monitored 51 reproductive (28 adult males, 23 adult females) radiocollared raccoons (*Procyon lotor* Linné, 1758) during the 2006-2009 mating seasons and beyond to investigate consortship behaviour and mating strategies for this allochthonous carnivore. Additionally we genotyped reproductive raccoons ($n=58$) and their progeny ($n=55$) to determine paternity as a proxy for male mating success (unpublished data). These studies are part of a research project about population ecology of raccoons in a bog and swamp area of the German lowlands (www.projekt-waschbaer.de).

The main mating season spans up to 18 days from 21th of January to 17th of February with marginal shifts according to the length of winter season. A second oestrus leading to late parturitions during July and August could be proven for two females. Spatial analysis of male and female distribution yielded an extensive intersexual spatial overlap with one male overlapping up to three female home ranges. During a mating season some males ($n=8$) increased their home range size and nightly movements noticeable compared to their annual home range. Determined as den sharing, consortship events occurred between up to four females per male within a mating season and females consorted with up to three males during an oestrus period. The number of multiple consortships varied between mild and cold winter seasons, whereas male excursions decreased during a cold mating season. Therefore we expect that the percentage of multiple paternities could also be weather-dependent. For the first time we could document intersexual den sharing outside the mating season for two females and four males. Thereby every female shared dens alternating or together with two males. We suggest that this kind of consortship behaviour outside the mating season leads to higher familiarity between resident raccoons and therefore to higher mating success for resident males than for passing males during mating season. Furthermore, we could confirm a promiscuous breeding system for both sexes as supposed and observed in recent studies on raccoons in North America.