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PRELIMINARY OBSERVATIONS ON SNAKE POPULATIONS FROM POIANA CU SCHIT – BÂRNOVA FOREST (IAŞI COUNTY)

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Key words: *snakes*, *population, morphology*

INTRODUCTION

In the Bârnova forest, were identified four species of snakes: *Zamenis longissimus* (Laurenti, 1768), *Coronella austriaca* (Laurenti, 1768), *Natrix natrix* (Linnaeus, 1758), and *Vipera berus* (Linnaeus, 1758) [2].

As recent observations lack, the objective of our study was to verify the persistence of the previously identified snake populations in the study area.

MATERIAL AND METHOD

The investigations were performed during the year 2004, in a meadow called Poiana cu Schit of 9.5 ha, located in the Bârnova Forest, at 2.5 km SSE from the B. Bârnova Sanatorium. The vegetation layer consists of associations with *Festuca valesiaca* and *Festuca sulcata*, and with *Agrostis tennuis*. The surface of the meadow is scattered with stone sculptures and in the eastern part there is a small lake.

The snake specimens were captured directly. All the specimens have been released after the identification of species and the morphological investigation.

Species identifications were carried out according to the existent descriptions and identification keys [2, 4].

For each specimen we recorded pholidosis and biometrical traits (Table 1) and the temperature of the body and of the environment.

Table 1. Investigated Traits

Abbreviation	Trait
Tot	Total length
L	Body length
Cd	Tail length
L c	Head length
Lt c	Head width
d v o	Vertical diameter of eye
d o b	Distance between eye and upper
L R	Rostral length
Lt R	Rostral width
L F	Frontal length
Lt F	Frontal width
Dist R-F	Distance between rostral and
L par S	Left parietal length
L par D	Right parietal length
Lt par S	Left parietal width
Lt par D	Right parietal width
Gul	Gular scales
Sq G	Dorsal scales – neck level
Sq M	Dorsal scales – mid-body level
Sq A	Dorsal scales – anal plate level
V	Ventral scales
Sub Cd	Sub-caudal scales
A	Anal plate
Supra Lb S	Left supra-labial scales
Supra Lb D	Right supra-labial scales
Infra Lb S	Left infra-labial scales
Infra Lb D	Right infra-labial scales
Temp 1 S	Left temporal scales – first row
Temp 2 S	Left temporal scales – second row
Temp 1 D	Right temporal scales – first row
Temp 2 D	Right temporal scales – second
Post Oc S	Left post-ocular scales
Post Oc D	Right post-ocular scales
Pre Oc S	Left pre-ocular scales
Pre Oc D	Right pre-ocular scales
Peri Oc S	Left peri-ocular scales
Peri Oc D	Right peri-ocular scales
Cant S	Left canthus scales
Cant D	Right canthus scales

The numerical data were statistically described [1, 3].

For the bilateral traits we investigated the asymmetry through the calculation of an asymmetry index [5].

RESULTS AND DISCUSSIONS

During the research of the study area we identified three species of snakes: *Coronella austriaca* (3 males and 3 females), *Natrix natrix* (16 males and 21 females), and *Vipera berus* (1 male and 2 females).

The descriptive statistic of the biometrical traits and the pholidisis characters of the individuals of *Coronella austriaca* (Table 2) revealed no deviations from the normal values. Similarly, the descriptive statistic for *Natrix natrix* (Table 3) and *Vipera berus* (Table 4) showed that the characters of the investigated specimens are between normal limits.

Table 2. Descriptive statistics of morphologic traits in *Coronella austriaca*

Trait	Count	Mean	Std. Error	Std. Deviation	Variance	Minimum	Maximum	Confidence Level (95.0%)
Tot	6.00	49.25	7.03	17.21	296.18	19.50	70.00	18.06
L	6.00	40.28	5.84	14.32	204.98	16.50	59.00	15.02
Cd	6.00	8.97	1.26	3.10	9.59	3.00	11.50	3.25
L c	6.00	1.53	0.16	0.38	0.15	0.90	1.95	0.40
Lt c	6.00	0.85	0.11	0.26	0.07	0.50	1.20	0.27
d v o	6.00	0.20	0.02	0.04	0.00	0.15	0.25	0.05
d o b	6.00	0.13	0.01	0.02	0.00	0.10	0.15	0.02
L R	6.00	0.27	0.03	0.08	0.01	0.20	0.38	0.08
Lt R	6.00	0.19	0.03	0.08	0.01	0.10	0.30	0.08
L F	6.00	0.37	0.03	0.08	0.01	0.30	0.50	0.08
Lt F	6.00	0.24	0.02	0.06	0.00	0.20	0.33	0.06
Dist R-F	6.00	0.20	0.03	0.08	0.01	0.10	0.30	0.08
L par S	6.00	0.54	0.03	0.08	0.01	0.40	0.60	0.08
L par D	6.00	0.54	0.03	0.08	0.01	0.40	0.60	0.08
Lt par S	6.00	0.31	0.02	0.05	0.00	0.25	0.40	0.06
Lt par D	6.00	0.31	0.02	0.05	0.00	0.25	0.40	0.06
Gul	6.00	6.33	0.33	0.82	0.67	5.00	7.00	0.86
Sq G	6.00	20.50	0.34	0.84	0.70	19.00	21.00	0.88
Sq M	6.00	19.33	0.33	0.82	0.67	19.00	21.00	0.86
Sq A	6.00	16.17	0.17	0.41	0.17	16.00	17.00	0.43
V	6.00	176.50	4.51	11.06	122.30	171.00	199.00	11.61
Sub cd	6.00	53.67	1.76	4.32	18.67	48.00	59.00	4.53
A	6.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Supra Lb S	6.00	7.00	0.00	0.00	0.00	7.00	7.00	0.00
Supra Lb D	6.00	7.00	0.00	0.00	0.00	7.00	7.00	0.00
infra Lb S	6.00	9.67	0.21	0.52	0.27	9.00	10.00	0.54
infra Lb D	6.00	9.67	0.21	0.52	0.27	9.00	10.00	0.54
Temp 1 S	6.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Temp 2 S	6.00	2.50	0.22	0.55	0.30	2.00	3.00	0.57
Temp 1 D	6.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Temp 2 D	6.00	2.33	0.21	0.52	0.27	2.00	3.00	0.54
Post Oc S	6.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Post Oc D	6.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Pre Oc S	6.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00
Pre Oc D	6.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00

Table 3. Descriptive statistics of morphologic traits in *Natrix natrix*

Trait	Count	Mean	Std. Error	Std. Deviation	Variance	Minimum	Maximum	Confidence Level (95.0%)
Tot	37.00	55.18	2.84	17.27	298.13	20.70	97.00	5.76
L	37.00	44.06	2.29	13.93	194.18	15.90	77.00	4.65
Cd	37.00	11.05	0.61	3.72	13.80	4.80	20.00	1.24
L c	37.00	1.63	0.06	0.38	0.14	0.90	2.50	0.13
Lt c	37.00	1.06	0.05	0.32	0.10	0.60	2.00	0.11
d v o	37.00	0.34	0.03	0.18	0.03	0.20	1.34	0.06
d o b	37.00	0.19	0.01	0.07	0.01	0.10	0.40	0.02
L R	37.00	0.36	0.02	0.11	0.01	0.20	0.70	0.04
Lt R	37.00	0.22	0.01	0.09	0.01	0.10	0.60	0.03
L F	37.00	0.46	0.01	0.08	0.01	0.28	0.60	0.03
Lt F	37.00	0.28	0.01	0.07	0.00	0.15	0.45	0.02
Dist R-F	37.00	0.35	0.02	0.10	0.01	0.20	0.70	0.03
L par S	37.00	0.61	0.03	0.15	0.02	0.32	1.05	0.05
L par D	37.00	0.61	0.02	0.15	0.02	0.39	1.09	0.05
Lt par S	37.00	0.39	0.02	0.11	0.01	0.20	0.80	0.04
Lt par D	37.00	0.39	0.02	0.11	0.01	0.20	0.80	0.04
Sq G	37.00	19.00	0.04	0.24	0.06	18.00	20.00	0.08
Sq M	37.00	19.00	0.00	0.00	0.00	19.00	19.00	0.00
Sq A	37.00	17.65	0.13	0.79	0.62	16.00	19.00	0.26
V	37.00	175.30	0.88	5.36	28.71	161.00	185.00	1.79

Trait	Count	Mean	Std. Error	Std. Deviation	Variance	Minimum	Maximum	Confidence Level (95.0%)
Sub cd	37.00	66.22	1.21	7.37	54.29	46.00	78.00	2.46
A	37.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Gul	37.00	4.32	0.11	0.67	0.45	4.00	6.00	0.22
supra Lb S	37.00	7.00	0.00	0.00	0.00	7.00	7.00	0.00
supra Lb D	37.00	7.00	0.00	0.00	0.00	7.00	7.00	0.00
infra Lb S	37.00	10.41	0.12	0.72	0.53	9.00	12.00	0.24
infra Lb D	37.00	10.51	0.10	0.61	0.37	9.00	12.00	0.20
Temp 1 S	37.00	1.05	0.04	0.23	0.05	1.00	2.00	0.08
Temp 2 S	37.00	2.22	0.07	0.42	0.17	2.00	3.00	0.14
Temp 1 D	37.00	1.05	0.04	0.23	0.05	1.00	2.00	0.08
Temp 2 D	37.00	2.19	0.07	0.40	0.16	2.00	3.00	0.13
Post Oc S	37.00	3.03	0.05	0.29	0.08	2.00	4.00	0.10
Post Oc D	37.00	3.03	0.05	0.29	0.08	2.00	4.00	0.10
Pre Oc S	37.00	1.03	0.03	0.16	0.03	1.00	2.00	0.05
Pre Oc D	37.00	1.11	0.06	0.39	0.15	1.00	3.00	0.13

Table 4. Descriptive statistics of morphologic traits in *Vipera berus*

Traits	Count	Mean	Std. Error	Std. Deviation	Variance	Minimum	Maximum	Confidence Level (95.0%)
Tot	3.00	63.67	6.84	11.85	140.33	50.00	71.00	29.43
L	3.00	58.00	6.00	10.39	108.00	46.00	64.00	25.82
Cd	3.00	5.67	0.88	1.53	2.33	4.00	7.00	3.79
L c	3.00	1.80	0.06	0.10	0.01	1.70	1.90	0.25
Lt c	3.00	1.50	0.06	0.10	0.01	1.40	1.60	0.25
d v o	3.00	0.27	0.03	0.06	0.00	0.20	0.30	0.14
d o b	3.00	0.19	0.01	0.01	0.00	0.18	0.20	0.03
L R	3.00	0.38	0.02	0.03	0.00	0.35	0.40	0.07
Lt R	3.00	0.30	0.00	0.00	0.00	0.30	0.30	0.00
L F	3.00	0.43	0.03	0.06	0.00	0.40	0.50	0.14
Lt F	3.00	0.29	0.01	0.01	0.00	0.28	0.30	0.03
Dist R-F	3.00	0.43	0.03	0.05	0.00	0.40	0.48	0.11
L par S	3.00	0.43	0.03	0.04	0.00	0.40	0.48	0.11
L par D	3.00	0.39	0.05	0.09	0.01	0.30	0.48	0.22
Lt par S	3.00	0.14	0.02	0.04	0.00	0.10	0.18	0.10
Lt par D	3.00	0.19	0.01	0.01	0.00	0.18	0.20	0.03
Sq G	3.00	21.00	0.00	0.00	0.00	21.00	21.00	0.00
Sq M	3.00	21.00	0.00	0.00	0.00	21.00	21.00	0.00
Sq A	3.00	16.00	0.58	1.00	1.00	15.00	17.00	2.48
V	3.00	147.00	1.53	2.65	7.00	145.00	150.00	6.57
Sub cd	3.00	29.33	3.38	5.86	34.33	25.00	36.00	14.56
G	3.00	5.33	0.33	0.58	0.33	5.00	6.00	1.43
Cant S	3.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Cant D	3.00	2.00	0.00	0.00	0.00	2.00	2.00	0.00
Peri Oc S	3.00	9.67	0.33	0.58	0.33	9.00	10.00	1.43
Peri Oc D	3.00	9.33	0.67	1.15	1.33	8.00	10.00	2.87
Prefront.	3.00	10.00	1.15	2.00	4.00	8.00	12.00	4.97
Ap.	3.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00
A	3.00	1.00	0.00	0.00	0.00	1.00	1.00	0.00
supra Lb S	3.00	8.67	0.33	0.58	0.33	8.00	9.00	1.43
supra Lb D	3.00	8.67	0.33	0.58	0.33	8.00	9.00	1.43
infra Lb S	3.00	11.00	0.58	1.00	1.00	10.00	12.00	2.48
infra Lb D	3.00	10.67	0.33	0.58	0.33	10.00	11.00	1.43

Regarding the bilateral characters, we observed trait asymmetries in all the investigated species. In *Coronella austriaca* the asymmetry was found in one individual and affecting the second row of temporal scales (Temp 2). The bilateral asymmetry in *Natrix natrix* was displayed by the parietal length, in six individuals, the parietal width, in three individuals, the pre-ocular scales, in three individuals, the infra-labial scales, in 10 individuals, and by the second temporal row of scales, in three individuals. In *Vipera berus*, the asymmetry occurred in the peri-ocular scales, in one individual, in infra-labial scales,

in one individual, in parietal length, in one individual, and in parietal width, in two individual. The small number of individuals of each species does not allow the validation of the fluctuant asymmetry. However, if the identified asymmetry is a fluctuant one, it would indicate a developmental instability caused by an environmental stress [5]. Thus, a certain degree of environmental alteration may be present in the study area.

On the subject of thermoregulation, we compared for each individual the body and the environmental temperature (Table 5).

Table 5. Body and environmental temperature (°C)

Species	Environment temp.	Body temp.
Natrix natrix	24.5	26
Natrix natrix	23	26.3
Natrix natrix	20.6	23.6
Natrix natrix	31	32.5
Natrix natrix	23	27
Natrix natrix	25.1	29.5
Natrix natrix	23.1	26
Natrix natrix	25	28
Natrix natrix	25.5	25.6
Natrix natrix	23.8	25
Natrix natrix	24.8	28
Natrix natrix	25.3	27.8
Natrix natrix	25	26
Natrix natrix	25	30
Natrix natrix	25	27
Natrix natrix	24	25
Natrix natrix	25.5	27
Natrix natrix	20	23
Natrix natrix	30.5	32.3
Natrix natrix	33.5	39.7
Natrix natrix	27.3	28.6
Natrix natrix	31.2	32
Natrix natrix	29	30
Natrix natrix	26	29
Natrix natrix	24.2	24.9
Natrix natrix	24.2	28.5
Natrix natrix	25.2	28
Natrix natrix	23	23.3
Natrix natrix	22.6	24
Natrix natrix	27	28
Natrix natrix	27.8	28.8
Natrix natrix	23	24
Natrix natrix	21	24
Natrix natrix	23	27
Natrix natrix	24	27
Natrix natrix	25.3	28.9
Natrix natrix	23.4	26
Coronella austriaca	20	15
Coronella austriaca	27	28
Coronella austriaca	27.6	26.3
Coronella austriaca	27	28.6
Coronella austriaca	18	18.5
Coronella austriaca	25.9	26
Vipera berus	19	20.1
Vipera berus	19.4	19
Vipera berus	20	21

In all the cases, the body temperature was higher than the environmental one. This indicates that the specimens were captured during the thermoregulatory exposure to the sun.

Species distribution within the study area was different. *Natrix natrix* individuals occupy the periphery of the meadow, from where move to the nearby forested area for cooling or to the lake for feeding. The individuals of *Coronella austriaca* and *Vipera berus* inhabit the central part of the meadow, with sparse vegetation and scattered with stones.

CONCLUSIONS

1. We identified in the study area three species of snakes: *Coronella austriaca* (6 individuals), *Natrix natrix* (37 individuals), and *Vipera berus* (3 individuals).
2. The metrical and meristic traits are within the normal limits of each species.
3. Some bilateral traits displayed asymmetries which may indicate a potential environmental stress.
4. The body temperature of the snakes was generally higher than the environmental temperature.
5. *Natrix natrix* individuals occupy the meadow's periphery, from where they move towards the woody areas for thermoregulation, or towards the lake, for foraging. *Coronella austriaca* and *Vipera berus* dwell the central part of the meadow, with sparse vegetation and scattered with stones.
6. *Coronella austriaca* and *Vipera berus* are species of community and national interest, respectively that need strict protection.
7. Further study is needed in order to verify the presence of *Zamenis longissimus*, which was previously identified from the study area, and which is also a species of community interest in need of strict protection.

REZUMAT

Scopul acestei cercetări este de a confirma persistența unor specii de şerpi, care au fost identificați în trecut, în zona pădurii Bârnova. În urma observațiilor realizate în decursul anului 2004, am identificat 3 specii de şerpi: *Natrix natrix*, *Coronella austriaca* şi *Vipera berus*. Pentru toți indivizii s-au determinat o serie de caractere biometrice si de folidoză care au fost comparate cu cele din literatură. Confirmarea existenței viperei comune si a şarpelui de alun este importantă deoarece ambele sunt specii strict protejate în România.

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