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PRELIMINARY DATA ON THE HERPETOFAUNA OF THE COZIA MASSIF (ROMANIA). 1. REPTILES

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Abstract. The preliminary results of herpetological studies in the Cozia massif in Vâlcea county, Romania, are presented; the 10 reptile species identified in the field (4 of which are new records) are presented together with data on their habitat association, abundance and impact of human activity.

Résumé. On présente les résultats préliminaries des études herpétologiques dans le massif de Cozia (département de Vâlcea, Roumanie). Les 10 espèces, identifiées sur le terrain (dont 4 nouvellement signalées), sont présentées avec les données concernant leur biotope, leur abondance et l'effet de l'impact des activités humaines.

Key words: Cozia, reptiles, records, abundance, disturbance, habitat.

INTRODUCTION

The Cozia Massif (Vâlcea county, Romania) is remarkable for its geological complexity, its richness in vegetation types and the long-time resilience of its biocenoses to human pressure (Ploaie, 2004). It is primarily a massive horst consisting of a core of gneisses, micaschists and paragneisses, and a periphery of conglomerates, sandstones and occasionally limestone. Its landscape is picturesque, with abrupt hanging cliffs, old (fixed) and recent screes and eroded rocks giving a superficial impression of ruins. The maximal altitude is 1668 m above sea level in the Cozia (Ciuha Neamțului) peak, while the minimal altitude is 350 m (Turnu reservoir along Olt river). The Olt river, now dammed, is the most important water course in this area; some rivulets such as Lotrişoru, Băiaşu, Păuşa and Păteşti originate in the massif and eventually drain into the Olt. The thermophilous vegetation on the skirts of the massif includes shrub thickets comprising species such as the smoketree (*Cotinus coggygria*), whitebeam (*Sorbus aria* f. *cretica*), meadowsweet (*Spiraea chamaedryfolia* var. *ulmifolia*), spurge laurel (*Daphne mesereum*), apple rose (*Rosa villosa* f. *coziae*) etc. Forests dominated by the sessile oak (*Quercus petraea*) but including ash (*Fraxinus excelsior*), manna ash (*F. ornus*), hornbeam (*Carpinus betulus*), linden (*Tilia tomentosa*, *T. cordata*) and walnut (*Juglans regia*) occur between 350 and 1300 m, and beech (*Fagus sylvatica*, *F.* x *taurica*) woods range from 400 to 1500 m. Rocky peaks and slopes and higher altitudes are occupied by Scots pine (*Pinus sylvestris*), spruce (*Picea abies*), fir (*Abies alba*), birch (*Betula verrucosa*), juniper (*Juniperus communis*, *J. nana*), bilberry (*Vaccinium myrtillus*), Blagay's Daphne (*Daphne blagayana*) etc.; alders (*Alnus viridis* f. *dacica*), poplars (*Populus* spp.) and willows (*Salix* spp.) are to be found along water courses. Altitudinal inversions are found here, with thermophilous associations sometimes occupying sunny slopes and summits, while ombrophilous associations occupy shaded valleys. The flora and vegetation of the Cozia massif has been well investigated (Nyárády, 1955; Popescu et al., 1970; Sanda et al., 1973; Dihoru, 1990 etc.) like the invertebrates (Kiss, 1970; Săvulescu,

1972; Berbece, 1973 etc.) but the vertebrates have remained less studied. As for the herpetofauna, eight reptile species are recorded for the Cozia massif (Fuhn & Vancea, 1961, mention *Vipera ammodytes*, and later Berbece, 1968 [with some records outside Cozia massif despite the title] and Ploaie, 2004 add *Emys orbicularis*, *Lacerta viridis* [a photo of a female *L. viridis* is labelled *L. agilis* in Ploaie, 2004], *Podarcis muralis*, *Anguis fragilis*, *Natrix natrix*, *Zamenis longissimus* and *Vipera berus*); three amphibian species (*Bufo viridis*, *Hyla arborea*, *Rana temporaria*) are recorded for the very close locality of Călimănești by Fuhn (1960); later Cogălniceanu et al. (2000) in a compilation of published and original data reflected in distribution maps made in the UTM system, place *Salamandra salamandra* and *Bufo bufo* records which can be interpreted as close enough to Cozia, and Ploaie (2004) quotes *Salamandra salamandra*, *Triturus cristatus*, *T. montandoni* (!), *Rana dalmatina* and *R. ridibunda* as present in the Cozia massif. These sporadic and sometimes doubtful records, as well as an expectation of high diversity, encouraged us to pursue a thorough investigation of the herpetofauna of the Cozia massif and of its response to the human disturbance observed in the field, preliminary results of which are given here.

MATERIALS AND METHODS

This paper is based upon field work performed in June, July and August 2005. The study of reptiles was carried following the active transects method (after Heyer et al., 1994, and McDiarmid, 1992, in Cogălniceanu, 1997), the transect being 4 m wide. Abundance classes were established by us as follows: 0 (not found); 1 (<1 ex/ 500 m stretch of transect); 2 (1-10 ex/ same length); 3 (10-30 ex/ same length); 4: > 30/ same length). Four transects were checked: T1 along Olt river (Turnu reservoir) from Turnu monastery upstream to the mouth of Dumbrăvița rivulet – three times; T2 along the base of cliffs and the forest skirt from Turnu monastery to Păușa - once; T3 from Păușa to Stânișoara monastery at 1000 m altitude - twice; T4 from Stânișoara monastery to Turnu monastery - once. The reptiles were observed in the field, and captured by hand if necessary for identification and measurements, and then released. Photographs were taken whenever possible. Relations were recorded between habitat type, human disturbance and presence of reptile species.

RESULTS

10 species of reptiles were recorded by us (see table 1 for their distribution and abundance in the checked transects).

Their association with different habitat types in the massif is given in table 2.

Their tolerance of different types of human disturbance is given in table 3.

Additionally, we report the observation of animals exhibiting symptoms of disease, namely one Green Lizard and one Diced Snake, both juveniles. The first presented lethargy, inflamed and closed eyes, skin lesions and nodules, incomplete shedding, persistently raised head and tail, some of which symptoms have been associated with viral infections in lacertids (Raynaud & Adrian, 1976; Uller et al., 2003); the second exhibited a swelling at the joining of head and neck, indicating a possible tumor or parasitic cyst.

Another interesting observation is that of a "record-length" Slowworm: a mature female of 535 mm total length, considerably above the maximal value of

Table 1

Distribution and abundance of reptile species along transects.

Species	Abundance along transect:			
	T1	T2	T3	T4
Lacerta viridis (Green Lizard)	3	3	2	2
Lacerta agilis (Sand Lizard) *	0	1	2	0
Lacerta praticola (Meadow Lizard)*	0	0	1	1
Podarcis muralis (Wall Lizard)	3	4	1	2
Anguis fragilis (Slowworm)	1	0	1	0
Natrix natrix (Grass Snake)	1	1	1	0
Natrix tessellata (Diced Snake) *	1	0	0	0
Zamenis longissimus (Aesculapian Snake)	0	0	1	0
Coronella austriaca (Smooth Snake) *	0	1	0	0
Vipera ammodytes (Nose-Horned Viper)	1	0	0	0

An * marks a species now firstly recorded in the massif.

Table 2

Association of reptile species with habitat types.

Species	Broadleaf forest, skirt and meadows	Thermophilous thicket on rocky ground	Rocky slope and scree	River-side coppice
Lacerta viridis (Green Lizard)	+	+	+	+
Lacerta agilis (Sand Lizard)	+	-	-	-
Lacerta praticola (Meadow Lizard) **	+	-	-	-
Podarcis muralis (Wall Lizard)	+	+	+	-
Anguis fragilis (Slowworm)	+	+	-	-
Natrix natrix (Grass Snake)	+	+	-	+
Natrix tessellata (Diced Snake)	+	-	-	+
Zamenis longissimus (Aesculapian Snake)	+	-	-	-
Coronella austriaca (Smooth Snake)	+	-	-	-
Vipera ammodytes (Nose-Horned Viper)	-	+	+	-

+ = recorded, – = unrecorded in given habitat. ** Found up to 1000 m altitude, the highest record for this species in Romania.

507 mm given by Fuhn & Vancea (1961) which is itself above any other measurement of this species found by us in Romanian or foreign literature.

The analysis of the populations of Sand Lizard (*Lacerta agilis*) is of systematical interest as we have observed specimens intermediary in scalation and color pattern between the subspecies *L. a. agilis* and *L. a. chersonensis*. Although on the whole the population is closer to *L. a. agilis*, we recorded a dorsal stripe coloration tending to greenish (as compared to brown in *agilis* and green in *chersonensis*) in some males, and some specimens exhibiting one postnasal scale as typical for *chersonensis* (as opposed to two as typical for *agilis*). Other "*chersonensis*-like" traits noted are the reduction or disappearance of the vertebral line (which is generally marked in *agilis*), narrowing of the dorsal stripe (wide in *agilis*) with disappearance of dorsal-stripe ocelli (present in *agilis*) and presence of larger dorsal spots (smaller in *agilis*) and a tendency for the individualization of the

Table 3

Reptile species found in areas of different disturbance types.

Species	Frequent camping, parking, fires, littering	Nonrecurring habitat altering e.g. road talus etc.	Cattle grazing and transit	Unintrusive human presence (walking on paths etc.)
Lacerta viridis (Green Lizard)	+	+	+	+
Lacerta agilis (Sand Lizard)	-	+	+	+
Lacerta praticola (Meadow Lizard)	-	-	-	+
Podarcis muralis (Wall Lizard)	-	+	+	+
Anguis fragilis (Slowworm)	-	-	+	+
Natrix natrix (Grass Snake)	-	+	+	+
Natrix tessellata (Diced Snake)	-	+	-	+
Zamenis longissimus (Aesculapian Snake)	-	-	+	+
Coronella austriaca (Smooth Snake)	-	-	-	+
Vipera ammodytes (Nose-Horned Viper)	-	+	-	+

+ = recorded, - = unrecorded in area with given disturbance.

Table 4

L. a. agilis-like and *L. a. chersonensis*-like traits in *Lacerta agilis* specimens.

Specimen	Postnasal scale	Dorsal stripe coloration	Dorsal stripe width	Dorsal stripe spots/ ocelli	Vertebral line	Paravertebral lines
Păușa valley, #1	2	2	2	2	2	2
Păușa valley, #2	2	2	2	2	2	1
Păușa valley, #3	1	2	2	2	2	2
Păușa valley, #4	2	0	2	0	0	0
Păușa valley, #5	1	1	2	2	1	2
Turnu lake shore	2	2	1	1	1	1

2 = *agilis*-like state; 1 = *chersonensis*-like state; 0 = neutral (*erythronotus* coloration occurring in both subspecies).

two clear white paravertebral lines (seen in *agilis* as indistinct lighter areas). The occurrence of *agilis*-like and *chersonensis*-like traits is summed in table 4.

DISCUSSION

Of the 10 species that we found, we can observe that all of the newly recorded ones are present in low abundance and density (see table 1); this may be a reason for their being overlooked by previous workers. The only species previously recorded and not found by us as yet are the European Pond Turtle (*Emys orbicularis*) which is

recorded by Berbece (1968) in the hills surrounding Cozia massif, and the Adder (*Vipera berus*); both may still be present.

From a zoogeographical point of vue, the record of the Meadow Lizard (*Lacerta praticola*) is interesting as it is separated by more than 100 kms from other *L. praticola* populations – the closest being in Ilfov county (Fuhn & Vancea, 1961), Hunedoara county (Ghira et al, 2002) and Dolj county (Lazăr, 2004). At 1000 m a.s.l. this is also the altitudinally highest ranging population of this species in Romania.

The presence of intermediate morphologies between *Lacerta agilis agilis*[1] and *L. a. chersonensis* is extremely interesting. As noted by Kirițescu (1930), Fuhn & Vancea (1961), Borcea (1974) and Kalyabina et al. (2001), pholidosis variability in *L. a. chersonensis* encompasses the range of *L. a. agilis* (and *L. a. exigua*) while the reciprocate situation does not occur, *agilis* being far more uniform in expressing its typical characters than *chersonensis* (Kirițescu, 1930; Fuhn & Vancea, 1961). Therefore we may reasonably conclude that the presence of *chersonensis*-like morphology (and coloration) in a population where *agilis* morphology predominates implies an intergradation between the western and montane subspecies *L. a. agilis* and the eastern and lowland subspecies *L. a. chersonensis*, especially as this population is altitudinally spread from 350 to ca. 800 m a.s.l. and the closest specimen to *chersonensis* was found at the lowest altitude by the dam lake. Further investigations are needed in order to determine the precise distribution of the two subspecies in the Olt valley and adjacent heights and the extent of the intergradation area between them.

The rarity of all snake species, and also of the Slowworm and the Meadow Lizards, in Cozia massif which is a national park, further highlights the need for efficient protection. The most abundant species are the Green Lizard and the Wall Lizard, a situation comparable with that found by us in the Southern Banat (see Iftime, 2002, 2003, 2005).

The Green Lizard is both the most eurytopic and the most resilient of all reptile species in the Cozia Mountains (see tables 2, 3). It is the only that occurs in heavily disturbed areas such as those frequently occupied by campers, with the additional nuisances of parking cars, camp fires, noise and abundant littering. It can be noticed that such recurrent disturbance as camping is keeping practically all reptile species away, while non-recurring disturbance even as it alters habitat, does not preclude recolonization of the altered habitat by some species once the disturbance has ceased. Thus, road taluses, railway embankments, culverts and protection lining works made of cast concrete slabs can be colonized by various species (Tab. 3). A minority of species are disturbed by such low-impact grazing as practiced in this area, and none by "friendly" activities such as limited touristic transit along footpaths. A conclusion is that recurring touristical activities are more disturbing on the long term than practices that are initially more invasive, but allow habitat recovery and recolonization.

[1] We do not follow Bischoff (1988) which attributes central European *L. a. agilis* populations to a separate subspecies, *L. a. argus* (Laur., 1768); see Kalyabina et al. (2001), p. 154 for some counter-evidence. Likewise, we do not follow Arribas (1997) and some subsequent workers in admitting *Darevskia* (which would include *Lacerta praticola*) as a full genus rather than a sub-genus of *Lacerta*.

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DATE PRELIMINARE ASUPRA HERPETOFAUNEI MASIVULUI COZIA (ROMÂNIA). 1. REPTILE.

REZUMAT

Sunt expuse rezultatele preliminare ale unor investigații herpetologice pe teritoriul masivului Cozia (jud. Vâlcea, România); cele 10 specii identificate în teren (dintre care 4 nou semnalate) sunt prezentate împreună cu date legate de biotopul în care au fost găsite, abundența lor și efectul perturbărilor antropice.

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Fig. 1 – A: *Lacerta agilis*, adult male, Păuşa, showing *chersonensis*-like olive-greenish dorsal coloration and one postnasal scale (photo by O. Iftime); B: *Lacerta viridis*, diseased juvenile (photo by A. Iftime).

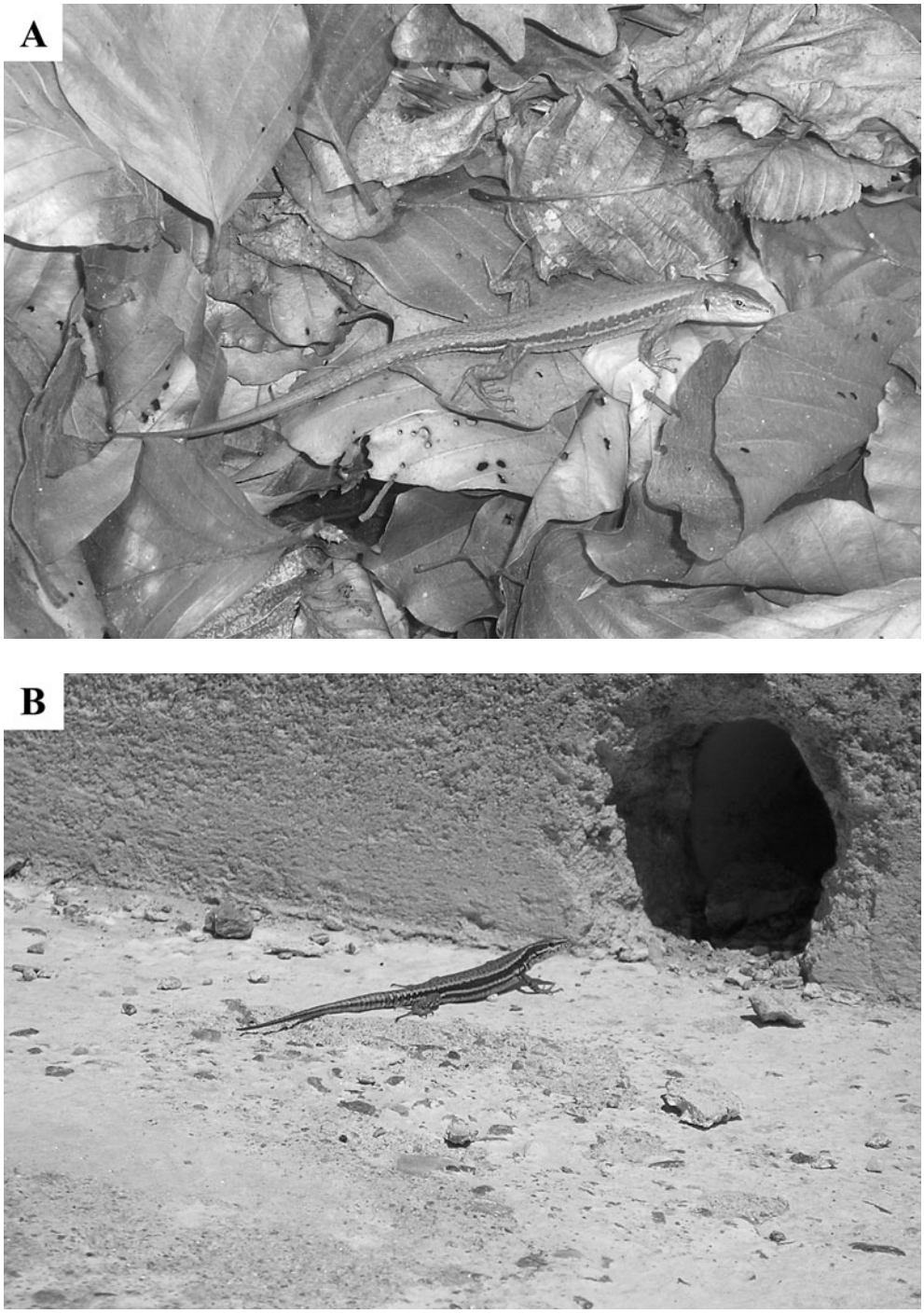

Fig. 2 – A: *Lacerta praticola*, Păușa (photo by A. Iftime); B: *Podarcis muralis*, on concrete embankments, along Olt (photo by O. Iftime).

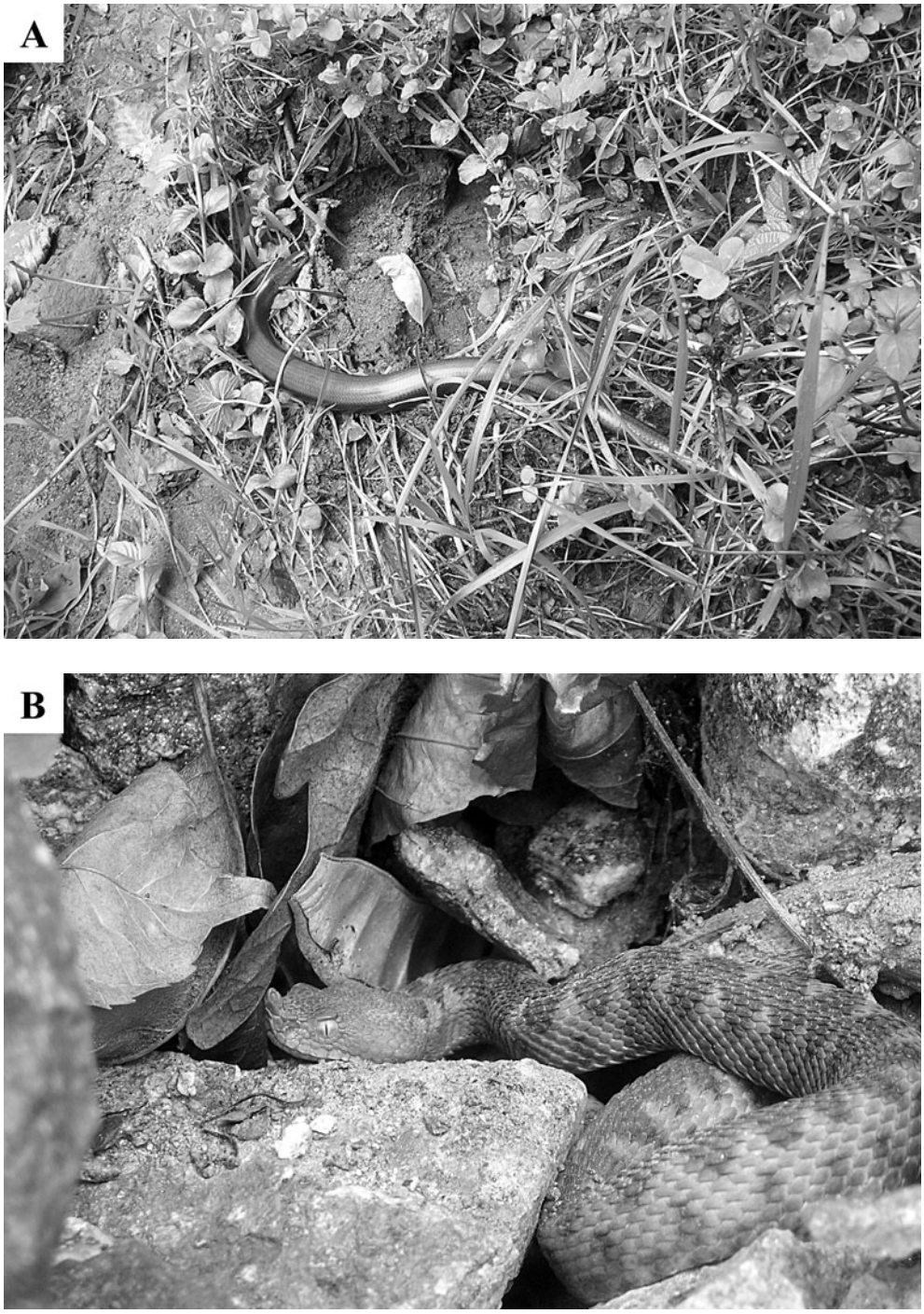

Fig. 3 – A: *Anguis fragilis*, adult female, 535 mm (photo by O. Iftime); B: *Vipera ammodytes*, subadult (photo by A. Iftime).