



**ATHENS 10th / OCT.
GREECE 13th / 2014**

PROGRAM TIME TABLE

THURSDAY, OCT. 9TH:

PRE-CONFERENCE FIELD TRIP TO SEE THE GREEK MEADOW VIPER
(*Vipera 'ursinii' graeca*) IN THE MOUNTAINS

FRIDAY, OCT. 10TH:

14:00 - 18:00 REGISTRATION

18:00 - 21:00 OPENING SOCIAL

TIME	PRESENTER	TITLE
9:00 - 10:20	PLENARY SESSION 1 Luca Luiselli	Twenty years of viper research in the west African rainforest
10:20 - 10:50	COFFEE BREAK	
1.DISTRIBUTION PATTERNS & DYNAMICS		
10:50 -11:10	Kate Jackson	Herpetological diversity of the Republic of Congo: Snakes and other reptiles and amphibians
11:10 -11:30	Dušan Jelić	Biogeography of Central and Western Balkan vipers is highly dependent on their ecological inter relationships
11:30 -11:50	Yurii Korniliev	Spatial niche segregation among the viperid snakes (Serpentes: Viperidae) in Bulgaria
11:50 -12:10	Fernando Martínez Freiria	Trapped by climate: interglacial refuge and recent population expansion in the endemic Iberian adder (<i>Vipera seoanei</i>)
12:10 -12:30	Konrad Mebert	Microhabitat Sharing vs. Segregation among sympatric <i>Vipera ammodytes</i> , <i>V. aspis</i> , and <i>V. berus</i> in the Julian Pre-Alps of Slovenia
12:30 -14:30	LUNCH BREAK	
14:30 -14:50	Sylvian Ursenbacher	Postglacial recolonisation in a cold climate specialist in western Europe: patterns of genetic diversity in the adder (<i>Vipera berus</i>) support the central-marginal hypothesis
14:50-15:10	Marco Zuffi	Paleoecological and historical environmental features shaped present distribution of <i>Vipera aspis</i> in northern coastal Tuscany (Central Italy)
2. GENERAL AND POPULATION BIOLOGY		
15:10 -15:30	Joaquim Golay	Population genetics and sex-biased dispersal in the asp viper (<i>Vipera aspis</i>)
15:30 -15:50	Dušan Jelić	Aspects of comparative ecology in a syntopic population of <i>Vipera ursinii</i> and <i>Vipera ammodytes</i> (Reptilia: Squamata: Viperidae)
15:50-16:10	Alexandru Strugariu	Reproductive ecology of the critically endangered Moldavian meadow viper (<i>Vipera ursinii moldavica</i>)
16:10-16:40	COFFEE BREAK	
16:00-19:10	POSTER SESSION	

TIME	PRESENTER	TITLE
9:00 - 10:20	PLENARY SESSION 2 Goran Nilson	Palaearctic vipers - some memories
10:20 - 10:50	COFFEE BREAK	
3. PHYLOGENETICS, PHYLOGEOGRAPHY AND TAXONOMY		
10:50 -11:10	Ulrich Joger	Phylogeography and taxonomy in the <i>Vipera berus</i> group - a riddle
11:10 -11:30	Stephanos Roussos	Phylogeography of the nose-horned viper (<i>Vipera ammodytes</i>) species complex in the Cycladic archipelago
11:30 -11:50	Evgeniy Simonov	Phylogenetic relationships within <i>Gloydus halys-intermedius</i> species group
11:50 -12:10	Richard Wahlgren	What did Linnaeus and his contemporaries know about vipers?
12:10 -12:30	Oleksandr Zinenko	Phylogeny and phylogeography of <i>Vipera ursinii</i> and <i>Vipera renardi</i> complexes
12:30 -14:30	LUNCH BREAK	
4. GENETIC AND PHENOTYPIC VARIATION		
14:30-14:50	Wolfgang Wüster	Toxins in a hybrid zone: concerted presence/absence of the acidic and basic subunits of Mohavetoxin in a likely <i>Crotalus scutulatus</i> x <i>viridis</i> contact zone.
14:50 -15:10	Ivona Buric	Intrapopulation and interpopulation characteristics of meristic and morphological characters in <i>Vipera ursinii macrops</i> (Mehely, 1911) and <i>Vipera ursinii</i> cf. "Croatian subclade"
15:10 -15:30	Sylvain Dubey	Impact of colour polymorphism and thermal conditions on thermoregulation, reproductive success, and development in <i>Vipera aspis</i>
15:30 -15:50	Fernando Martínez Freiria	Exploring genetic and morphological variability in two Western Mediterranean vipers (<i>Vipera aspis</i> and <i>Vipera latastei</i>)
15:50-16:20	COFFEE BREAK	
16:20-19:00	ROUND TABLE 1 Konrad Mebert	IUCN-Red List of Threatened Species - should we Overhaul the Assessment of Vipers from Northeastern Turkey?

TIME	PRESENTER	TITLE
5. CONSERVATION		
9:00 - 9:20	Jelka Crnobrnja-Isailović	The forthcoming Red List assessments of European Vipers
9:20 - 9:40	Bálint Halpern	Post-release tracking of Hungarian meadow vipers (<i>Vipera ursinii rakosiensis</i>)
9:40 -10:00	Daniel Jestrzemski	A field survey of the Cypriot blunt-nosed viper (<i>Macrovipera lebetina lebetina</i>) in northern Paphos province, Cyprus
10:00-10:30	COFFEE BREAK	
10:30 -10:50	Edvárd Mizsei	Present and future of an overlooked European viper: distribution, detectability, population size and conservation status of the Greek meadow viper (<i>Vipera graeca</i>)
10:50 -11:10	Márton Szabolcs	A missing piece of the Balkan viper puzzle: distribution and conservation threats of vipers in Albania
11:10 -11:30	Bálint Üveges	Conservation efforts and grazing exclusion study of the endangered <i>Vipera ursinii graeca</i> in Albania - preliminary results
11:30 -11:50	Stefan Zamfirescu	Current situation of the critically endangered Moldavian meadow viper (<i>Vipera ursinii moldavica</i> Nilson, Andrén & Joger 1993)
12:00 -14:00	LUNCH BREAK	
14:00-16:30	ROUND TABLE 2 Jelka Crnobrnja-Isailović	VSG meeting
19:30-22:30	BANQUET DINNER	

Herpetological diversity of the Republic of Congo: Snakes and other reptiles and amphibians

Kate Jackson¹, Ange-Ghislain Zassi-Boulou², Sylvestre Boudzoumou²,
Lise-Bethy Mavoungou², Ange Mboungou-Louiki² & Eli Greenbaum³

¹Biology Department, Whitman College, Walla Walla, Washington 99362, USA

²Institut National de Recherche en Sciences Exactes et Naturelles (IRSEN),
Brazzaville, République du Congo

³Department of Biological Sciences, University of Texas at El Paso, 500 West
University Ave, El Paso, TX 79968, USA

The amphibians and reptiles of central Africa represent one of the world's most poorly studied herpetofaunas. Over the past decade, we have undertaken a series of expeditions to document the herpetological diversity of the Republic of Congo, at several field sites in habitats which form part of the northwestern Congolian lowland forest and western Congolian swamp forest ecozones. In most cases our studies represented the first of their kind ever undertaken in these areas. Species documented in the course of these expeditions included some 50 amphibian, 15 lizard and 40 snake species, including the viperids, *Atheris squamigera*, *Bitis arietans*, *B. gabonica*, *B. nasicornis*, *Causus maculatus*.

Biogeography of Central and Western Balkan vipers is highly dependant on their ecological interrelationships

Dušan Jelić

Croatian Institute for Biodiversity, Croatian Herpetological Society HYLA,
I. Brezničkuja 5a, 10 000 Zagreb, Croatia.

I investigated the frequency of syntopic relationships and the characteristics that determine the level of ecological niche overlap among three viper species from the Western and Central Balkan, *V. ursinii*, *V. berus* and *V. ammodytes*. Predictive distribution models for these vipers were generated based on all published and unpublished field data (presence-only) from Croatia, Bosnia & Hercegovina, Montenegro, Serbia and Macedonia . By overlaying the models I predicted the zones with high potential for finding sympatric and syntopic populations. In the field I carried out studies on population ecology of all three vipers and their syntopic populations. The aim was to gather information on the population ecology, behaviour and microhabitat preferences in order to define the determinants of ecological niche overlap. My results indicate that ecological niche overlaps among vipers in the Western and Central Balkan are correlated with their evolutionary distinctiveness and that these relationships play a major role in their distribution patterns.

jelic.dusan@gmail.com

Spatial niche segregation among the viperid snakes (Serpentes: Viperidae) in Bulgaria

Georgi Popgeorgiev¹, Nikolay Tzankov² & Yurii Kornilev¹

¹Bulgarian Society for the Protection of Birds, Yavorov district 71, 1111 Sofia, Bulgaria

²Department of Vertebrates, National Museum of Natural History – BAS, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria

Generally, not more than three viperid taxa occur in close proximity in southern Europe. In Bulgaria, these are *Vipera ammodytes ammodytes*, *V. a. montandoni*, and *V. berus bosniensis*. We tested the environmental factors (climatic parameters, topography, and habitats) that best determine the taxa distribution and explored if they are mutually exclusive with respect to one another. Datasets for spatial distribution models (SDMs) were analyzed using Maxent and NextGIS. For *V. a. ammodytes* the factors that contribute the most to the SDM are those related to habitats (land use), climate (precipitation during the hot season), temperature seasonality and temperature during the mating season (wettest month). The SDM corresponds to its known distribution in Bulgaria, which is confined to the continental climatic region. For *V. a. montandoni* the most important factors partially correspond with *V. a. ammodytes* (land use, precipitation during the hot season), but differ significantly in their values, as *V. a. montandoni* is more thermophilous (affected also by annual temperature especially in the coldest month). It has only a limited distribution in the continental region, where it occurs mostly in karstic landscapes along river valleys, a typical transition zone between the continental and Mediterranean climatic regions. *Vipera b. bosniensis* exhibits a distribution mostly confined to mountains; expectedly its SDM is predominantly determined by the temperature in the coldest season and to a smaller degree by the precipitation in the hot season. All three taxa have slightly overlapping distribution supporting the hypothesis about their spatial segregation, which seems to be greatly influenced also by events such as the last glaciation and heavy past and present land use by people.

yukornilev@gmail.com

Trapped by climate: interglacial refuge and recent population expansion in the endemic Iberian Adder *Vipera seoanei*

Fernando Martínez-Freiría¹, Guillermo Velo-Antón¹ & José C. Brito^{1,2}

¹CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto. Instituto de Ciências Agrárias de Vairão. R. Padre Armando Quintas, 4485-661 Vairão, Portugal.

²Departamento de Biologia da Faculdade de Ciências da Universidade do Porto. Rua Campo Alegre, 4169-007 Porto, Portugal.

Variations in climate parameters are among the major forces affecting diversification processes and restricting species to specific habitats and areas. This study aims to reveal the role of climate in the evolutionary history of the nearly endemic Iberian Adder *Vipera seoanei*. We combined genetic analyses with ecological niche-based modelling. Sequencing of two mitochondrial markers for 60 tissue samples from specimens covering the whole species distribution were used for phylogenetic and phylogeographic analyses, spatial interpolations of genetic variability and diversity, and identification of putative geographical origin of the most recent common ancestor of the species. Ecological modelling, based on 352 distributional records, involved the combination of six modelling algorithms and projections to past conditions (Last Inter Glacial LIG, Last Glacial Maximum LGM) and the identification of climatic stable areas. The shallow phylogeographic structure and distribution of the low haplotype diversity indicates three main evolutionary processes, (1) a long term isolation from the Common Adder *V. berus*, (2) posterior persistence as a single population restricted to north-western Iberia, and (3) recent expansion to north-eastern Iberia. Projections of past periods to current genetic results concur with range contractions to north-western Iberia during the LIG and subsequent expansions during the LGM. Accordingly, *V. seoanei* responded as a cold-temperate model to Pleistocene climatic oscillations and fits a simplified example of “R” type species. Our work highlights the importance of climate in explaining evolutionary processes and current biogeographical patterns of species with restrictive ranges.

fmartinez-freiria@cibio.up.pt

Microhabitat Sharing vs. Segregation among sympatric *Vipera ammodytes*, *V. aspis*, and *V. berus* in the Julian Pre-Alps

Konrad Mebert¹, Vesna Cafuta², Tomaz Jagar², Erika Ostanek², Rok Grželj², Luca Luiselli³, Sylvain Ursenbacher¹, Philippe Golay⁴, Sylvain Dubey⁵ & Joaquim Golay⁵

¹Department of Environmental Sciences, Section of Conservation Biology, University of Basel, St. Johannis-Vorstadt 10, CH-4056 Basel, Switzerland

²Societas Herpetologica Slovenica - društvo za preučevanje dvoživk in plazilcev (Societas herpetologica slovenica – Society for the study of amphibians and reptiles), Večna pot 111, 1000 Ljubljana, Slovenia

³F.I.Z.V. (Ecology) and Centro di Studi Ambientali “Demetra” s.r.l., via Olona 7, 00198 Roma, Italy

⁴Elapsoidea, 21 chemin du Moulin, Bernex-Geneva, Switzerland

⁵Department of Ecology and Evolution, Biophore Bld, University of Lausanne, 1015 Lausanne, Switzerland

Variations in climate parameters are among the major forces affecting diversification processes and restricting species to specific habitats and areas. This study aims to reveal the role of climate in the evolutionary history of the nearly endemic Iberian Adder *Vipera seoanei*. We combined genetic analyses with ecological niche-based modelling. Sequencing of two mitochondrial markers for 60 tissue samples from specimens covering the whole species distribution were used for phylogenetic and phylogeographic analyses, spatial interpolations of genetic variability and diversity, and identification of putative geographical origin of the most recent common ancestor of the species. Ecological modelling, based on 352 distributional records, involved the combination of six modelling algorithms and projections to past conditions (Last Inter Glacial LIG, Last Glacial Maximum LGM) and the identification of climatic stable areas. The shallow phylogeographic structure and distribution of the low haplotype diversity indicates three main evolutionary processes, (1) a long term isolation from the Common Adder *V. berus*, (2) posterior persistence as a single population restricted to north-western Iberia, and (3) recent expansion to north-eastern Iberia. Projections of past periods to current genetic results concur with range contractions to north-western Iberia during the LIG and subsequent expansions during the LGM. Accordingly, *V. seoanei* responded as a cold-temperate model to Pleistocene climatic oscillations and fits a simplified example of “R” type species. Our work highlights the importance of climate in explaining evolutionary processes and current biogeographical patterns of species with restrictive ranges.

konradmebert@gmail.com

Postglacial recolonisation in a cold climate specialist in Western Europe: patterns of genetic diversity in the Adder (*Vipera berus*) support the central-marginal hypothesis

Sylvain Ursenbacher¹, Michaël Guillon^{2,3}, Hervé Cubizolle⁴, Andréaz Dupoué², Gabriel Blouin Demers⁵ & Olivier Lourdais^{2,6}

¹Department of Environmental Sciences, Section of Conservation Biology, University of Basel, St. Johanns-Vorstadt 10, CH-4056 Basel, Switzerland

²Centre d'Etudes Biologiques de Chizé, CNRS UPR 1934, 79360 Villiers en Bois, France

³Université de Poitiers, 40 avenue du recteur Pineau, 86022 Poitiers, France

⁴Université de Lyon, EVS-ISTHME UMR 5600 CNRS, 6 rue Basse des Rives, 42023 Saint-Etienne cedex 2

⁵Département de biologie, Université d'Ottawa, Ottawa, Ontario, K1N 6N5, Canada

⁶School of Life Sciences, Arizona State University, Tempe, AZ 85287-4501, USA

Understanding the impact of postglacial recolonisation on genetic diversity is of major interest. The central-marginal hypothesis (CMH) predicts a reduction in genetic diversity from the core of the distribution, or the refugium, to peripheral populations. While the CMH has received considerable empirical support, its broad applicability is still debated and alternative hypotheses predict opposite patterns. Using microsatellite markers, we analysed the genetic diversity of the Adder (*Vipera berus*) in Western Europe to reconstruct postglacial recolonisation. Approximate Bayesian Computation (ABC) analyses suggested a postglacial recolonisation from two routes: a western route from the Atlantic Coast up to Belgium and a central route from the Massif Central to the Alps. This cold-adapted species likely used two isolated glacial refugia in Southern France, in areas free of permafrost during the last glacial maximum. Adder populations further (more northern) from putative glacial refugia have lower genetic diversity and, therefore, our results support the CMH. Finally, our study also illustrates the utility of highly variable nuclear markers, such as microsatellites, and ABC to test competing recolonisation hypotheses.

s.ursenbacher@unibas.ch

Paleoecological and historical environmental features shaped present distribution of *Vipera aspis* in northern coastal Tuscany (Central Italy)

Marco A.L. Zuffi & Elena Foschi

Museum Natural History, University of Pisa, via Roma 79, I-56011, Calci (Pisa), Italy

The Asp Viper around Pisa, Tuscany, is common and widely distributed north to the Serchio and south to the Arno, but it is absent in areas bordered by rivers (“Tenuta di San Rossore”). Due to marine ingression, the whole coastal Tuscany was submerged for the last 10,000 yrs and the last marine regression occurred about 3,000 yrs BP, creating first dune systems, followed inland and eastward by lagoons and retrodunal marshy areas. The area between the two rivers dried naturally more slowly than the neighbouring areas and its dunes originated later. Starting from the Romans, the whole plain around Pisa was rapidly drained to offer suitable areas for human activities. The territory was however preserved as a hunting reserve, and the Tenuta di San Rossore was maintained as a marshy area especially for waterfowl hunting up to the middle of the XIX century. We thus hypothesize that vipers colonized the plain areas around Pisa in recent times coming from more northern and southern hills, likely using the dunal-, coastal- system, but did not get access to the area between the rivers. More recently, the habitats of “Tenuta di San Rossore” have become suitable for vipers, as many reptile species often associated to *Vipera aspis* are currently present. However, given the existing barriers all around San Rossore and the very low vagility of the species, we suggest that *Vipera aspis* has no more possibility to naturally colonize this area, which may explain its absence from the “Tenuta di San Rossore”.

marco.zuffi@unipi.it

Population genetics and sex-biased dispersal in the Asp Viper (*Vipera aspis*)

Joaquim Golay¹, Briséis Castella¹, Philippe Golay², Sylvain Ursenbacher³, Konrad Mebert⁴, David Roy¹, Samuel Neuenschwander¹ & Sylvain Dubey¹

¹Department of Ecology and Evolution, University of Lausanne, Lausanne, Switzerland

²Chemin du Moulin 21, 1233 Bernex, Switzerland

³Department of Environmental Sciences, University of Basel, Basel, Switzerland

⁴Siebeneichstrasse 31, 5634 Merenschwand, Switzerland

Dispersal is an important life history trait and differences between sexes can affect the genetic structure and the spatial distribution of populations. While male-biased dispersal is the norm in mammals and the opposite is true for birds, recent studies on snakes have all demonstrated evidence of male-biased dispersal. Based on 10 microsatellite loci, our study aim to understand the patterns of dispersal in a Swiss alpine population of asp vipers (*Vipera aspis*, Serpentes) and discuss the implications arising for the conservation of this locally endangered species. Our results revealed high levels of gene flow (mean $F_{ST} = 0.06$) and we found a low number of clusters ($K = 2$) in our structure analysis. Females have significantly lower $mAIC$ than males, suggesting female-biased dispersal, but spatial autocorrelation analyses revealed an opposite pattern, with spatial structuring stronger for females than males. Although this study is, to our knowledge, the first to show contradictory patterns of sex-biased dispersal for the same species, further studies using approximate Bayesian computation were not able to reproduce the same pattern and thus showed that these results were most probably due to an unbalanced sampling.

Aspects of comparative ecology in a syntopic population of *Vipera ursinii* and *Vipera ammodytes* (Reptilia: Squamata: Viperidae)

Dušan Jelić¹, Ivona Burić¹, Luca Luiselli² & Ljiljana Tomović^{3,4}

¹Croatian Institute for Biodiversity, Croatian Herpetological Society HYL A, I. Brezničkuj a 5a, 10 000 Zagreb, Croatia

²Institute of Environmental Studies Demetra s.r.l., Rome, Italy

³Institute of Zoology, Faculty of Biology, University of Belgrade, Belgrade, Serbia

⁴Institute for Biological Research, University of Belgrade, Belgrade, Serbia

Although studies on species coexistence in snakes have grown tremendously during the recent years, nearly to nothing has been published as yet as for the eastern European species is concerned. In this paper, we studied some aspects of the ecology of syntopic populations of two *Vipera* species (i.e. *V. ursinii* and *V. ammodytes*) in the National Park “Paklenica” (Dalmatia, southern Croatia). We collected data on body size, microhabitat use, thermal ecology, and activity patterns of these two species along standardized visual field surveys. We showed that these species have very different ways of exploiting ecological niches, and no major overlap can be seen. For instance, these viper species differed significantly in body size and microhabitat use, whereas their thermal ecology was similar.

jelic.dusan@gmail.com

**Reproductive ecology of the critically endangered
Moldavian Meadow Viper (*Vipera ursinii moldavica*)**

Alexandru Strugariu¹, Iulian Gherghel², Tiberiu C. Sahlean³, Paul C. Dincă¹ & Ștefan R. Zamfirescu¹

¹Faculty of Biology, “Alexandru Ioan Cuza” University, Carol I. Blvd. Nr. 20A, 700505, Iași, Romania

²Department of Zoology, Oklahoma State University, 501 Life Sciences West, Stillwater, OK 74078, USA

³Faculty of Biology, University of Bucharest, Splaiul Independentei Nr. 91-95, Sector 5, Bucharest, Romania

The reproductive strategies of viviparous snakes have received a special attention during the last three decades, from both evolutionary and conservation biologists. The meadow viper (*Vipera ursinii*) is a species with a large but extremely fragmented European range and most populations are highly threatened. The Moldavian meadow viper (*Vipera ursinii moldavica*) is a subspecies endemic to eastern Romania, occurring in just six known habitats from two distinct biogeographical and ecological areas. The fact that snakes, in general, usually have a low reproductive output is one of the main biological characteristics which increases these organisms' proneness to extinction. Although preliminary ecological studies have been previously conducted on populations of *V. u. moldavica*, none have been focused on the reproductive biology of this taxon. Our ongoing surveys of most *V. u. moldavica* populations, which began in 2007, indicate that, overall, this taxon is very similar to most other European viper species with regards to the female breeding cycle (that is biennial), copulation period (mid spring) and litter size. Of particular relevance is the fact that there were significant differences regarding several reproductive characteristics (e.g. body size, litter size) between the northern and southern group of vipers with the southern group being superior exhibiting larger body size and higher reproductive output.

alex.strugariu@gmail.com

The diet of the Milos Viper (*Macrovipera schweizeri* [Werner 1935]) from Milos island Greece

Maria Dimaki^{1,2}, Yiannis Ioannidis ¹, Göran Nilson³ & Claes Andrén⁴

¹Regional Development Agency of Cyclades S.A.. Syros island, 84100 Cyclades, Greece

²Goulandris Natural History Museum, Othonos 100, 14583 Kifissia, Greece

³Göteborg University, Sweden

⁴Norden's Ark, Åby säteri, 456 93 Hunnebostrand, Sweden

The results of the food analysis of the Milos Viper (*Macrovipera schweizeri* [Werner 1935]) is presented. A comparison of the different ages and sexes is also included. The species is endemic of Greece, restricted to the islands of Milos, Kimolos, Polyaigos and Sifnos and is an Endangered species at the IUCN list. Sixty specimens were analyzed, all of them have been found killed, mostly run over by cars on Milos island, Greece. The stomach and intestine of each specimen were counted and examined under a dissecting microscope. We identified whole prey items or recognizable prey parts to the ordinal level. The mean SVL of the adult specimens was 55.0 cm (42.5-81.0) and TL was 8.2 cm (6.1-11.5). The Milos Viper is euryphagous, the most prevalent prey types found in their stomachs were lizards (47.5%), small mammals (25.4%) and insects (25.4%). The Milos Wall Lizard (*Podarcis milensis*) was the most important lizard prey taxon (57.1%), 21.4% were geckos, 7.1% the Snake-eyed Skink (*Ablepharus kitaibelii*), 3.6% the Balkan Green Lizard (*Lacerta trilineata*) and 10.7% were undetermined lizards. The diet of the studied species tends to differ between the two sexes and between juveniles and adults. The mean and range of items found were 2 (0-6). Many plant remains were found, also snake teeth, pebbles and parasites that were not considered as food items. Parasites were found in 12 animals, 70 nematodes were found (48 of them in a single specimen) and 12 platyhelminths (Trematoda).

Population characteristics and ecology of the Nose-horned Viper (*Vipera ammodytes montandoni*) at its northern range limit, in Romanian Dobrudja

Alexandru Strugariu¹, Tiberiu C. Sahlean², Iulian Gherghel³ & Ștefan R. Zamfirescu¹

¹Faculty of Biology, “Alexandru Ioan Cuza” University, Carol I. Blvd. Nr. 20A, 700505, Iași, Romania

²Faculty of Biology, University of Bucharest, Splaiul Independentei Nr. 91-95, Sector 5, Bucharest, Romania

³Department of Zoology, Oklahoma State University, 501 Life Sciences West, Stillwater, OK 74078, USA

The nose-horned viper (*Vipera ammodytes*) is a conspicuous element of the south-eastern European herpetofauna. The species reaches its northern limit in southern Romania, where it is restricted to habitats with Mediterranean influences and where it is highly threatened by illegal collecting, deliberate killing and habitat destruction. Here we present preliminary results of an ongoing field study on population characteristics and ecology of the northernmost population of *Vipera ammodytes montandoni* (the north-eastern subspecies of the nose-horned viper), from the “Măcin Mountains” National Park, south-eastern Romania. The sex-ratio of the population was close to 1:1 and immature specimens of both sexes are well represented. Despite the fact that males presented the highest maximum length values, females were, on average, longer and heavier than males. Investigation of feeding habits indicated a high proportion of invertebrate prey, followed by mammals and lizards in the diet of the vipers. With regards to activity patterns, adult males and immature vipers appear to emerge from hibernation sooner than females. During mid-spring, males undergo a relatively synchronized shedding period, which probably triggers the beginning of mating activity. During spring, both sexes inhabit the same type of microhabitats (mostly rocky, sparsely vegetated, southern facing slopes). During the summer, gravid females remain in the previously mentioned habitats while adult males inhabit less rocky, more densely vegetated slopes with a south-western exposure.

alex.strugariu@gmail.com

Notes on the biology of *Vipera ammodytes meridionalis* on Corfu (Kérkíra), Ionian Islands, Greece

Bo Stille & Marie Stille

PO Box 1410, Kokkini Kefalovryso, 49100 Corfu, Greece

The poster presents some preliminary data from an ongoing study of *Vipera ammodytes meridionalis* on Corfu (Kérkyra) initiated in 2011, looking at distribution, activity pattern, size, pattern and color variation and coexistence with the other 12 species of snakes found on Corfu. *Vipera ammodytes* is found throughout Corfu, but absent on the satellite islands of Paxos, Antipaxos, Mathraki, Othonoi and Erikoussa. It is found in a wide variety of habitats, but it is not a common species, only accounting for about 5% of our snake observations on the island. Of the 45 specimens observed 19 were males, 20 females, and 6 juveniles/subadults. Observation of the viper was made from March to November with a peak in May-June. The majority (74%) of males registered were road kills whereas the majority of females (55%) were found active between dusk and midnight. Males were larger than females (mean SVL 53 cm and 48 cm, respectively).

stille.corfu@gmail.com

Common adder (*Vipera berus*) bites in north-eastern Romania: a retrospective analysis

Maria-Cristina Strugariu¹ & Alexandru Strugariu²

¹Department of Gastroenterology and Hepatology "Sf. Spiridon" Clinical Emergency County Hospital Piața Independenței 1, Iași 700111, Romania

²Faculty of Biology, "Alexandru Ioan Cuza" University, Carol I. Blvd. Nr. 20A, 700505, Iași, Romania

Snakebites are relatively rare medical emergencies in Europe, but their evolution may be marked by possible life-threatening complications. The common adder (*Vipera berus*) is the most widespread of the three viper species found in Romania. There is no data regarding *Vipera berus* bites in Romania. This study aims to present the epidemiological, clinical, biological findings, as well as the therapeutic management in seven cases of common adder bites from northeastern Romania. We conducted a retrospective study which included the snake bites cases from the Emergency Room of the "Sf. Ioan cel Nou" Emergency County Hospital, Suceava, between 2003 and 2011. The mean age was 19.57 years (range 5-40 years). In one case, the patient was a pregnant woman. Most of the bites took place in August. Bites occurred more often between 12:00 pm and 6:00 pm and were mostly located in the lower limbs. The mean time between the bite and the access to medical care was 3.8 hours \pm 1 hour. Pain and oedema were the most common local manifestations, followed by bruising. Hypotension occurred in 3 cases. A nine-year old girl had bilateral palpebral ptosis which lasted less than a day. Complications occurred in 3 cases: 2 patients developed cellulitis and one profound thrombophlebitis. All patients, except for one, received specific immunotherapy. No fatal case was reported. Neutrophilic leukocytosis and prolonged prothrombin time were the most common laboratory findings, followed by mild anemia and hypokaliemia.

christina.strugariu@gmail.com

Predicting activity of the Greek Meadow Viper (*Vipera ursinii graeca*) using environmental data from the Pindos

Elizabeth W. Mack^{1,2}, **Stephanos A. Roussos**², Edvard Mizsei³ & Llewellyn D. Densmore III²

¹Northern Illinois University, Department of Biological Sciences, Dekalb, Illinois 60115 USA

²Department of Biological Sciences, Texas Tech University, MS 43131, 79409-3131, Lubbock, Texas USA

³Aggtelek National Park Directorate, Jerikó utca, 15.VI. 44., 4300 Debrecen, Hungary

Vipera ursinii graeca is a under-studied viper species that inhabits high-elevation meadows (1150-2200 m above sea level) in the Pindos Mountain Range of Greece and Albania. *Vipera ursinii graeca* is currently listed as Data deficient by the IUCN and is protected under the Bern Convention because of threats such as the reduction of suitable habitat (sometimes by anthropogenic alteration of landscapes), illegal collecting, human persecution, and road mortality. For future conservation to be effective, the activity patterns of this species need to be considered when making management decisions in order to reduce mortality and better protect natural populations. The purpose of this study was to gain insight into the annual activity cycle of *V. u. graeca* in this region by correlating observations of individuals across the species' entire distribution and using environmental data collected by dataloggers in Greece over the last year. Based on our observations, we were able to estimate the mean daily temperatures which may dictate the vipers' ingress into hibernation and emergence in the spring, as well as the temperatures when vipers seem to be most active. This activity cycle was then compared to activity cycles reported for *V. ursinii* populations in Romania, France, Italy, and Montenegro. These preliminary findings will provide managers with information that can help them predict future activity cycles of *V. u. graeca* and will allow for more targeted conservation efforts when the snakes are most active and exposed.

sa.roussos@ttu.edu

Phylogeography and taxonomy in the *Vipera berus* group - a riddle

Ulrich Joger¹, Karen Hugemann² & Oleksandr Zinenko³

¹State Natural History Museum, Gausstr. 22, D-38106 Braunschweig, Germany

²Geoecology, Technical University of Braunschweig, Germany

³Natural History Museum, Kharkiv, Ukraine

Vipera berus has been subdivided into few subspecies - *V. b. bosniensis* and *V. b. sachalinensis* - and 2 mainly melanistic taxa have been regarded as separate species (*V. barani* and *V. nikolskii*). Another yet unnamed mitochondrial clade was identified in the Alpine region. We studied the contact zones between *V. b. berus* and *nikolskii* as well as between *V. b. berus* and the Alpine clade with both mitochondrial and nuclear markers. The difference between these two types of markers is obvious but difficult to interpret. There is no full reproductive isolation in contact zones, and in these areas mitochondrial haplotypes show a different pattern than nuclear alleles. Haplotypes that probably derived from distinct refugial zones may have mixed secondarily.

u.joger@gmx.de

Phylogeography of the Nose-horned Viper (*Vipera ammodytes*) in the Cycladic archipelago

Stephanos A. Roussos¹, Maria Dimaki², Ljiljana Tomovic³ & Llewellyn D. Densmore III¹

¹Department of Biological Sciences, Texas Tech University, MS 43131, 79409-3131, Lubbock, Texas, USA

²Department of Terrestrial Zoology, Goulandris Natural History Museum, 100 Othonos Str., 145-62, Kifissia, Greece

³Department of Zoology, University of Belgrade, Studenski Trg 16, 11000, Belgrade, Serbia

The Cycladic archipelago is home to the most isolated populations of the Nose-horned Viper (*Vipera ammodytes*) in the southernmost extent of the species distribution in the Balkan Peninsula. These insular populations have always been considered the same subspecies as the mainland conspecifics in Greece (*V. a. meridionalis*) but sometimes described as a smaller, unique form. To understand more about their evolutionary relationships, we integrated both morphometric and phylogenetic analyses between the Cycladic populations and the three Balkan subspecies (*V. a. ammodytes*, *V. a. montadoni* and *V. a. meridionalis*) since sampling and focus on these insular populations has been limited in past studies. We used multivariate morphometrics on a sample size of 744 adult specimens from throughout the Balkan distribution and performed phylogenetic analyses of mitochondrial DNA (~2000 bp) that included representation from 13 of the 15 island populations. Our analysis revealed, that not only is the morphology of Cycladic *V. a. meridionalis* distinct from all three subspecies in the Balkan Peninsula but the group possesses a high level of genetic distinction from mainland conspecifics of *V. a. meridionalis*. There is also genetic characterization among the island populations which allows us to gain some knowledge on the effect of the dynamic land bridge island system they inhabit. Conservation management plans in the Aegean region should recognize these populations as unique to the Cyclades and in some cases threatened.

sa.roussos@ttu.edu

Phylogenetic relationships within *Gloydus halys-intermedius* species group

Evgeniy Simonov^{1,2}, Daniel Melnikov³ & Nikolai Orlov³

¹Institute of Systematics and Ecology of Animals, Siberian Branch of Russian Academy of Sciences, Frunze 11, 630091 Novosibirsk, Russia

²National Research Tomsk State University, Lenina 36, 634050 Tomsk, Russia

³Division of Herpetology and Ornithology, Zoological Institute, Russian Academy of Sciences, St.Petersburg, Russia

Systematics and taxonomy of *Gloydus halys-intermedius* complex is one of the knottiest problems in snake systematics and still far from being resolved. Here, our aim was to establish detailed molecular phylogeny of this group using both mtDNA and nDNA data. We obtained partial sequences of NADH dehydrogenase subunit 4 (ND4), cytochrome c oxidase subunit 1 (CO1) and melanocortin 1 receptor (MC1R) genes for *G. h. halys*, *G. h. caraganus*, *G. h. caucasicus*, *G. intermedius* and *G. ussuriensis* (used as an outgroup). The final dataset comprised 93 individuals from locations scattered throughout the distribution range of each taxa. All examined snakes have been identified by morphological characters prior to tissue sampling. Nucleotide sequences of *G. shedaoensis* were mined from the GenBank. The phylogeny was inferred using Bayesian and maximum likelihood methods. Reconstructed phylogeny strongly supported monophyly of the group (consisting of *G. halys*, *G. intermedius* and *G. shedaoensis*), within which four clades were identified. The first clade consists of *G. intermedius* and *G. shedaoensis*, the second clade includes *G. h. caraganus* and *G. h. caucasicus* (with respective subclades) and two separate clades for *G. h. halys*. MtDNA p-distances between clades ranged from 3.5 to 4.9%. Interestingly, the nuclear DNA data provided evidence of ancestral polymorphism or hybridization between some of these groups.

ev.simonov@gmail.com

What did Linnaeus and his contemporaries know about vipers?

Richard Wahlgren

International Society for the History and Bibliography of Herpetology,
Prennegatan 23 B, SE-22353 Lund, Sweden

Linnaeus listed 12 species that now belong in Viperidae in the 10th (1758) and 17 species in the 12th (1766-1771) editions of *Systema Naturae*. Today 13 species are valid following The Reptile Database. Linnaeus had access to preserved specimens in collections that had been donated to the Academy, specimens collected by his students, or to specimens sent by people living abroad or in Sweden. But when he compiled the editions of *Systema Naturae* he also relied on specimens described and illustrated by other authors as well. In my presentation I will portray the authors of the “pre-Linnaean” sources who Linnaeus cited, the literature they had written and their taxonomic relevance.

richard.wahlgren@live.se

Phylogeny and phylogeography of *Vipera ursinii* and *Vipera renardi* complexes

Oleksandr Zinenko¹ & Ulrich Joger²

¹The Museum of Nature at V. N. Karazin Kharkiv National University, Trinkler str. 8, Kharkiv, 61058, Ukraine

²State Natural History Museum, Gausstr. 22, D-38106 Braunschweig, Germany

The phylogeny of the eastern clade of the group of meadow and steppe vipers, *V. renardi*, is still not well known. We used more than 400 samples from most of the range of this complex and included all representatives of lineages of small vipers in order to reconstruct phylogenetic relationships and clarify historical biogeography of the group using two mitochondrial genes (COI and Cytb). Our results are in line with previous ones: diversification in the group resulted from an initial dispersion in the later Pliocene–Pleistocene in two directions: north-westwards via the Balkans (*V. ursinii* complex) and north-eastwards from Asia Minor via the Caucasus and Tien-Shan (*V. renardi* complex). Both groups are originally mountain-dwellers, but they independently gave rise to lowland forms, now occupying most of the ranges. Nevertheless, demographic histories of the clades of *V. ursinii* and *V. renardi* are contrasting, showing signs of rapid growth in the eastern *V. renardi*, triggered by colonization of Eurasian steppes. This growth was not affected by Pleistocene glaciations when cold but dry conditions favoured species of open grasslands. The high diversity of mitochondrial haplotypes of *V. renardi* in the Northern Caucasus and Tien-Shan could be the result of repetitive expansion-constriction-isolation events in the transition zone between lowland and mountain landscapes. The mitochondrial phylogeny is incongruent with current taxonomy of the *V. renardi* complex. The positions of *V. anatolica* and *V. kaznakovi* relative to the *V. ursinii* and *V. renardi* complexes are also discussed.

zinenkoa@yahoo.com

Phylogenetic relationships within North African *Daboia* species

Fernando Martínez-Freiria¹, José C. Brito^{1,2}, Soumia Fahd³, Pierre-André Crochet⁴, Philippe Geniez⁴ & Guillermo Velo-Antón¹

¹CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto. Instituto de Ciências Agrárias de Vairão. R. Padre Armando Quintas. 4485-661 Vairão Portugal

²Departamento de Biologia da Faculdade de Ciências da Universidade do Porto. Rua Campo Alegre, 4169-007 Porto, Portugal

³Laboratoire Ecologie, Biodiversité et Environnement, Département de Biologie, Faculté des Sciences de Tétouan, Université Abdelmalek Essaâdi. El M'Hannech II, 93030 Tétouan, Maroc

⁴Centre d'Ecologie Fonctionnelle et Evolutive, CNRS-UMR 5175. Route de Mende 1919, F-34293 Montpellier-cedex 5, France

North Africa harbors two closely related species included within the *Daboia* genus: *D. mauritanica* and *D. deserti*. They apparently show parapatric distributions, with *D. mauritanica* occurring along the sub-humid and semi-arid zones of northern Maghreb region (including Morocco, Western Sahara, and northern Algeria and Tunisia), and *D. deserti* restricted to the semi-arid areas of eastern Algeria, central Tunisia and northwestern Libya. Pale specimens of *D. mauritanica*, which are similar to *D. deserti* specimens, have been recorded in southern Morocco, and recent phylogenetic studies based on a few specimens found low genetic differentiation among the two species. In this work we aim to give insights into the evolutionary history of North African *Daboia* species by assessing their phylogenetic relationships based on two mitochondrial DNA markers (cytb and ND4) sequenced for 30 specimens across their distributional ranges. Phylogenetic tree and haplotype network show high levels of genetic diversity and structuring in the western Maghreb region, differentiating three clades in Morocco: (1) Rif, and Middle and High Atlas Mountains, (2) Anti-Atlas Mountains, and (3) northern mountains of the Draa valley. A fourth clade includes specimens from eastern Morocco, Algeria, Tunisia and Libya. The invalidity of *D. deserti* as species is thus recognized. Range contractions in several areas of western Morocco and population expansions during Pleistocene climatic oscillations might explain these phylogenetic patterns. Further studies using palaeoclimatic data should be directed to test this hypothesis.

fmartinez-freiria@cibio.up.pt

Toxins in a hybrid zone: concerted presence/absence of the acidic and basic subunits of Mohavetoxin in a likely *Crotalus scutulatus* x *viridis* contact zone.

Amy Scholes-Higham¹, Axel Barlow^{1,2} & **Wolfgang Wüster**^{1,3}

¹School of Biological Sciences, Bangor University, Environment Centre Wales, Deiniol Road, LL57 2UW Bangor, UK

²Present address: Institute of Biochemistry and Biology, University of Potsdam, Potsdam, Germany

³Chiricahua Desert Museum, Rodeo, New Mexico, USA

Snake venoms are complex cocktails of bioactive peptides acting synergistically to disrupt the physiological functions of a prey item or a predator to the advantage of the snake. The apparent synergy between the activities of different toxins suggests that natural selection should favour the preservation of adaptively advantageous toxin constellations in the face of likely disruptive processes, such as contact zones between conspecific populations with different venoms or interspecific hybridisation. Here, we investigate the presence/absence of the two subunits of Mohavetoxin (a heterodimeric PLA2 associated with neurotoxicity and high lethality in rattlesnake venoms) across a transect spanning populations of the Mohave rattlesnake (*Crotalus scutulatus*) with and without Mohavetoxin and a contact zone with the Prairie rattlesnake (*C. viridis*) in southeastern Arizona and southern New Mexico. The nature of these contact zones is investigated by means of multivariate morphometrics and mitochondrial and single-copy nuclear gene sequences, and the presence or absence of both Mohavetoxin subunits is tested by PCR and sequence confirmation. Morphology and single-copy nuclear genes support the existence of a narrow but self-sustaining hybrid zone between the two species. PCR-amplification and sequencing of both Mohavetoxin subunits show that, contrary to previous reports, the genes for the two subunits are strongly linked across both intra- and interspecific transects, with all specimens having either both genes or neither.

w.wuster@bangor.ac.uk

Intrapopulation and interpopulation characteristics of meristic and morphological characters in *Vipera ursinii macrops* (Mehely, 1911) and *Vipera ursinii* cf. “Croatian subclade”

Ivona Burić¹, Dušan Jelić¹, Jelka Crnobrnja – Isailović^{2,3}, Rastko Ajtić⁴, Bogljub Sterjovski⁵ & Ljiljana Tomović^{3,6}

¹Croatian Herpetological society – Hyla, I. Brezničkuja 5a, 10 000 Zagreb, Croatia

²Department of Biology and Ecology, Faculty of Sciences and Mathematics, University of Niš, Niš, Serbia

³Institute for Biological Research “S. Stanković” University of Belgrade, Belgrade, Serbia

⁴Institute for Nature Conservation of Serbia, Belgrade, Serbia

⁵Macedonian Ecological Society – Herpetology Biodiversity Section, Skopje, Former Yugoslav Republic of Macedonia

⁶Institute of Zoology, Faculty of Biology, University of Belgrade, Belgrade, Serbia

Vipera ursinii macrops, karst viper inhabits high mountain grasslands in Croatia, Bosnia and Herzegovina, Macedonia, Montenegro and Albania. It is endemic species for Balkan Dinaric mountain range. In recent study it was suggested by molecular data that Croatian populations are distinct as separate subclade, here referred to as *V. u. macrops* cf. “Croatian subclade”. Our goal was to collect data for 3 populations from 3 different localities: Velebit – Croatia (“Croatian subclade”), Bjelasica – Montenegro and Bistra - Macedonia (*macrops*). We wanted to find out if there are some differences in morphological characters and meristic characters of the head that can separate these three populations and two subclades. The data were compared with morphology and meristic values that were used to determinate the subspecies of *ursinii* complex. Other question was is there intrapopulation and interpopulation variability of characters. We observed and measured 247 individuals for 4 morphological and 17 meristic characters. Results show that there are statistical significant differences in some characters between populations. When we compare population’s descriptive statistics, for Velebit population none of the values are in described range for *V. u. macrops* but show similarity with values described for *V. u. ursinii*. Population from Bjelasica has values that are close to described values for *V.u.macrops* and population from Bistra has values that are between *V. u. macrops* and *V. u. graeca*. Also there is sexual dimorphism between males and females in number of pileus scales and in snout to vent length.

ivona.burich@gmail.com

Impact of colour polymorphism and thermal conditions on thermoregulation, reproductive success, and development in *Vipera aspis*

Sylvain Dubey¹, Johan Schürch¹, Joaquim Golay¹, Briséis Castella¹, Laura Bonny¹, Sylvain Ursenbacher², Philippe Golay¹, Konrad Mebert² & Sébastien Biollay¹

¹Department of Ecology and Evolution, Biophore Building, University of Lausanne, CH-1015 Lausanne, Switzerland

²Section of Conservation Biology, Department of Environmental Sciences, University of Basel, St. Johans-Vorstadt 10, CH-4056 Basel, Switzerland

Intraspecific variations in melanin-based colorations are widespread in ectothermic vertebrates. However, information concerning the impact of such variations in relation to different environmental conditions on thermoregulation processes, development and fitness is still poorly documented. The present study tested experimentally if temporal variation of basking gravid Asp Vipers, and later their progeny, were different between melanistic and non-melanistic individuals. We demonstrated that in cold conditions, melanistic gravid females heat up faster than non-melanistic ones. In addition, we revealed that the embryogenesis and reproductive output is affected by both the thermal conditions provided during gestation and the skin colouration of gravid females. Similarly, body condition of juveniles, as well as locomotor performances, were affected by parameters such as postpartum environmental conditions, their colouration and colouration of their mother. Moreover, despite the strong genetic component determining body colour, prepartum temperature conditions had an impact on the coloration of one-year-old offspring.

sylvain.dubey@unil.ch

Exploring genetic and morphological variability in two Western Mediterranean vipers (*Vipera aspis* and *Vipera latastei*)

Fernando Martínez-Freiria¹, Guillermo Velo-Antón¹, José C. Brito^{1,2}, Juan M. Pleguezuelos³, Xavier Santos¹, Marco A.L. Zuffi⁴ & Sylvain Ursenbacher⁵

¹CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto. Instituto de Ciências Agrárias de Vairão. R. Padre Armando Quintas, 4485-661, Vairão Portugal.

²Departamento de Biologia da Faculdade de Ciências da Universidade do Porto. Rua Campo Alegre, 4169-007 Porto, Portugal.

³Departamento Biología Animal, Universidad de Granada. E-18071, Granada, Spain.

⁴Museum Natural History and Territory, University of Pisa. Via Roma 79, 56011, Calci (Pisa), Italy.

⁵Department of Environmental Science, Section of Conservation Biology, University of Basel. St. Johanns-Vorstadt 10, CH – 4056, Basel, Switzerland.

In European vipers, several studies have found strong correlations between morphological traits and environmental gradients, suggesting an adaptive role for these traits. However, the influence of evolutionary history explaining morphological variation is largely neglected. We aim to evaluate the role of historical and climatic factors in explaining morphological variation within two sister Mediterranean vipers (*Vipera aspis* and *Vipera latastei*) in Western Europe. We interpolated genetic distances from phylogenetic trees using 170 mitochondrial DNA sequences (cytochrome b; 78 for *V. aspis*, 92 for *V. latastei*). We derived maps that predict occurrence of lineages and identify potential contact zones between lineages by using multiple thresholds in the phylogenetic trees. Morphological interpolations were calculated using four meristic traits, including three pholidotic (number of ventral, subcaudal and apical scales) and one colouration trait (number of dorsal marks) from 1,343 specimens (691 *V. aspis*, 652 *V. latastei*). Spatial principal component analyses were derived from the four morphological traits. Then, we analyzed correlations between genetic and morphological surfaces, and the latter with climatic variables. Genetic divergence surfaces show higher and deeper genetic structuring in *V. latastei* than in *V. aspis*. Regarding morphological surfaces, cline patterns of variation were obtained in *V. aspis*, while *V. latastei* showed morphological clusters patchily distributed. In *V. aspis*, correlations of genetic and morphological surfaces ranged from low to moderate, while correlations of morphological surfaces and climatic factors were high. In *V. latastei* both correlates were mostly low. We discuss the discordance between the two species related to historical and ecological factors.

fmartinez-freiria@cibio.up.pt

Teeth number variation and cranial morphology within *Vipera aspis* group.

Marco A. L. Zuffi

Museum Natural History, University of Pisa, via Roma 79, I-56011, Calci (Pisa), Italy

In European vipers, several studies have found strong correlations. The huge morphological variability of asp viper (*Vipera aspis*) snakes has been addressed and studied for a long time to solve systematic and phylogeographic questions, with emphasis mainly to external morphology, distributive patterns and genome analyses, aimed at solving systematic and phylogeographic questions. Teeth number and skull size variation are presently considered in order to contribute to the definition of the morphological puzzle that characterise the asp viper, comparing these structures among age classes and subspecies. The results indicated that, on the whole, teeth number did not vary between sexes, ii) right palatine, total palatine and right dental teeth number varied among taxa and iii) skull length was markedly dimorphic. These differences apparently do fit with taxonomic position and to published phylogeographic patterns.

marco.zuffi@unipi.it

Intraspecific variation in hemipenial morphology of *Vipera ammodytes* (Linnaeus, 1758)

Kostadin Andonov¹ & Nikolay Tzankov²

Department of Zoology and Anthropology, Faculty of Biology, Sofia University "St. Kliment Ohridski", 8 Dragan Tzankov Blvd., Sofia 1000, Bulgaria

²Department of Vertebrates, National museum of natural history, 1 Tsar Osvoboditel Blvd., Sofia 1000, Bulgaria

Hemipenial morphology is considered to be an important complement in snake systematics. It has evolved independently of other commonly used morphological traits and is likely the result of sexual selection rather than natural selection. Widespread acceptance of hemipenial description as a complement to the general description has resulted in a vast swathe of data encompassing hundreds of species. However, aside from the present work, few studies have focused on intraspecific hemipenial differentiation. The present study considers the hemipenial variation in the Nose-horned viper, *Vipera ammodytes* a species of well-known intraspecific variability. Available material from a total of 16 hemipenes, including six of *V. a. ammodytes* (originating from Bulgaria), three from *V. a. meridionalis* (Greece and Bulgaria) and seven prepared from *V. a. montandoni* (Bulgaria) was studied. Subspecific rank was assigned in accordance with currently available morphological and molecular data. Standard methods were used for dissection, preparation and colouration of the hemipenes. Morphological examination was based on various proportions along with ornamentation of the intromittent organs. The main source of variation was found in the parasulcular region, expressed in the sulcus spermaticus lips and the dimension of the parasulcular spines. Significant traits also included the lobe areas covered by calyces and spines, respectively. Consequently, *V. a. meridionalis* exhibits a close relationship to *V. a. montandoni* based on these characteristics while *V. a. ammodytes* was found to be more distantly related. In conclusion, in species with a well-expressed intraspecific differentiation hemipenial morphology serves as a complimentary source for deterministic traits.

k_andonov91@abv.bg

Using plasticine replicas for testing the role of predator pressures on *Vipera seoanei* phenotypic variability.

Fernando Martínez-Freiria¹, António Pinto², Tiago Pinto³ & Xavier Santos¹

¹CIBIO/InBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos da Universidade do Porto. Instituto de Ciências Agrárias de Vairão. R. Padre Armando Quintas. 4485-661 Vairão Portugal

²Faculdade de Ciências da Universidade do Porto. Rua Campo Alegre, 4169-007 Porto, Portugal

³Faculdade de Ciências e Tecnologia da Universidade de Coimbra. Calçada Martim de Freitas, 3000-456, Coimbra, Portugal

Vipera seoanei is a highly polymorphic species showing four geographically structured phenotypes (*bilineata*, *cantabrica*, classical and uniform) and high frequency of melanistic specimens in mountains. In this work we aimed to explore the role of predation as selective pressure on *V. seoanei* phenotypic variability. We conducted a field experiment using plasticine models of the four phenotypes plus melanistic and white “control” replicas in three mountain localities with contrasted frequencies of melanistic and phenotypic individuals: Castro-Laboreiro (74% melanistic and 26% classic), Ancares (57% melanistic and 43% *cantabrica*) and Picos de Europa (53% *bilineata*, 27% melanistic and 20% classic). In general, there was low frequency of predation events over the models ($n = 42$), higher for raptors ($n = 24$) than for mammals ($n = 18$). When locals are compared, total (mammals + raptors) and by raptors frequency of predation showed significant differences, presenting Castro-Laboreiro the lowest rates (14% for total, 0.06% for raptors) and Picos de Europa the highest (57% for total, 75% for raptors). When analysed within each local, melanistic and *bilineata* models were significantly more predated than the other models in Ancares (55% of attacks) and Picos de Europa (64%), respectively. Our results found that raptors predate over the most frequent phenotypes in each local thus, suggesting predation as not directly affecting the phenotypic geographical variability in the species. Findings on the ecological costs derived from the thermal melanistic hypothesis and the aposematic function of the zigzag pattern of European vipers are supported in *V. seoanei*.

fmartinez-freiria@cibio.up.pt

***Montivipera* from Syria – a short contribution**

Deyan Duhalov¹ & Nikolay Tzankov²

¹Bul Bio, Laboratory “Animal blood products”, National Center of Infectious and Parasitic Diseases, Sofia, Bulgaria

²Departement of Vertebrates, National Museum of Natural History – BAS, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria

We present the general external morphological traits of a specimen coming from the mountainous region of Northwest Syria. Until now, there is only scarce data concerning *Montivipera* presence in Syria and no data about the morphology was published elsewhere. We compare the specimen's pholidotic traits with those of the geographically closest members of the genus *Montivipera*, namely *M. bulgardaghica* from Bolkar Mts (Cilician Taurus) and *M. bornmuelleri* from Mt. Lebanon and Mt. Hermon. These species belong to the same haplogroup according to the published data and form a well-distinct group. Color and marking pattern are also discussed in relation to the variability of the group as a whole. Activity mode and microhabitats characteristics of the collected specimen are also provided and discussed in the context of the overall trends seen in this group of mountainous vipers. The climate in this region of observation is defined as oro-mediterranean and the new locality falls into the lower limit of the vertical distribution of the species'group, e.g. 1400 m a.s.l.

ntzankov@gmail.com

Effects of environmental factors on the activity of the Adder (*Vipera berus bosniensis*) in Bulgaria

Andrey Stojanov¹, Angel Dyugmedziev² & Nikolay Tzankov¹

¹Departement of Vertebrates, National Museum of Natural History – BAS, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria

²Departement of Zoology and Anthropology, Sofia University “St. Kliment Ohridski”, 8 Dragan Tsankov blvd., 1164 Sofia, Bulgaria

The study was conducted in reserve “Torfeno branishte”, situated in Vitosha Mt. The study site (1750-1850 m a.s.l.) comprises of a broad ridge terrace above the tree line with scattered rock assemblages, alpine and boreal ericoid communities and transitional floating, quaking bogs and subarctic shrubs (*Salix* spp. and *Juniperus sibirica*). Dataset for 53 individuals was separated in three time classes: 9–12; 12–15; 15–18h. For each individual we measured the following temperatures: body T at the cloaca, substrate surface T, air T at 1 m and at 0.15–0.20 m above ground. We analyzed nine additional environmental factors (mean, minimal and maximal air temperature; dew point and relative humidity (index between both); wind speed; pressure; barometric pressure change for 3h) by obtaining data from the closest meteorological station. A statistically significant difference for days with finding or not finding individuals has been established for dew point and change in barometric pressure. The mean values for dew point are lower for the first two time classes, which corresponds to observing the most individuals. The change in barometric pressure decreases throughout the day and observations of individuals correlate with lower changes in values. The correlation between body T, substrate T, and air T throughout the day shows a tendency for convergence for females and a divergence for males. The differences between body T and substrate T are more variable within male individuals. Those results determine the females as more sensitive towards extreme T that correspond with their reproductive cycle.

angel_diugmedjiev@abv.bg

Diurnal and seasonal activity patterns in viperid snakes (Serpentes: Viperidae) in Bulgaria

Nikolay Tzankov¹, **Georgi Popgeorgiev**², Andrey Stojanov¹, Borislav Naumov³, Alexander Westerström^{1,4}, Angel Dyugmedziev⁵ & Yurii Kornilev²

¹Department of Vertebrates, National Museum of Natural History – BAS, 1 Tsar Osvoboditel Blvd., 1000 Sofia, Bulgaria

²Bulgarian Society for the Protection of Birds, Yavorov district 71, 1111 Sofia, Bulgaria

³Institute of Biodiversity and Ecosystem Research – BAS, Sofia, Bulgaria

⁴Department of Physics, Albanova University Centre, Stockholm University, Stockholm, Sweden

⁵Department of Zoology and Anthropology, Sofia University “St. Kliment Ohridski”, 8 Dragan Tsankov blvd., 1164 Sofia, Bulgaria

Overall activity patterns have been postulated to be a factor influencing spatial niche separation. We aim to compare the diurnal and the seasonal activity of three taxa (*Vipera ammodytes ammodytes*, *V. a. montadoni* and *V. berus bosniensis*) whose distribution on a small-scale overlap only partially and to a limited extent. A dataset with 436 records was analysed. The diurnal activity was grouped into two hour intervals. The monthly activity was grouped into quarters: Q1 March–May, Q2 June–August, Q3 September–November. In *V. a. ammodytes* (confined to the continental climatic region) the activity pattern during Q1 is monomodal, in Q2 bimodal; the lowest activity is in Q3. In comparison to *V. a. m.*, the activity is more limited. However, as *V. a. montadoni* is more thermophilous than *V. a. ammodytes*, the peak activity in Q1 is later: 14–16h (vs. 10–12h). In Q2 there is greater disjunction between the two peaks of the bimodal pattern (10–12h and 18–20h vs. 12–14h and 16–18h). In Q3 *V. a. montadoni* has a slightly more prolonged diurnal activity (10–12h to 18–20h vs. 10–12h to 16–18h). Results are predictable based on the distribution of *V. a. montadoni* that is mainly in the transitional and continental-Mediterranean climatic regions. Given the mountainous distribution of *V. b. bosniensis* its activity pattern in all three quarters is monomodal with Q1 peak in the midday interval (12–14h), earlier in Q2 (10–12h) and shifts toward the afternoon (14–16h) in Q3. The highest number of observations is from Q2.

georgi.popgeorgiev@gmail.com

The forthcoming Red List assessments of European Vipers

Jelka Crnobrnja-Isailović^{1,2}, Johannes Penner³ & Christopher L. Jenkins⁴

¹Department of biology and ecology, Faculty of sciences and mathematics University of Niš, Višegradska 33, 18000 Niš, Serbia

²Department of evolutionary biology, Institute for biological research “S. Stanković” University of Belgrade, 11000 Belgrade, Serbia

³Museum für Naturkunde, Leibniz Institute for Research on Evolution and Biodiversity, 10115 Berlin, Germany

⁴IUCN Viper Specialist Group CEO, The Orianne Society, South Clayton, GA, USA 30525

The last Red List assessment of European reptiles was completed and published in 2009. Eleven viper species occurred on the list, with two of them having status of Not Evaluated (NA), and another three being categorized as threatened solely on the basis of criteria A (reduction in population size) or B (geographic range). The remaining six species were entitled as Least Concern (LC) due to size of distribution range and to lack of studies explicitly proving impact of threats. As the next assessment round is getting close, the main aims of expert bodies such as European Viper Specialist Group should be defined. The following three are supposed to be compulsory: a) to evaluate status of newly described taxonomic entities for eventual inclusion on IUCN Red List; b) to check proposed changes to conservation status of individual species; and c) to re-evaluate current conservation status on the basis of results published in peer-reviewed journals since year 2009. A brief overview of species assessments pointed on consistent gaps regarding criteria A, C, D and especially E. Evaluation of population decline is restricted on “unlikely to be declining fast enough”. Moreover, population size of LC species is, without exception, described as “presumed to be large”. Taking also into account the effect of Europeans’ attitude toward vipers, it becomes clear that more efforts should be put in quantifying population status and trends of European vipers to obtain precise information about their actual vulnerability.

jelka.c.i@gmail.com

Post-release tracking of Hungarian meadow vipers (*Vipera ursinii rakosiensis*)

Bálint Halpern¹, Tamás Péchy¹, Tibor Somlai², Róbert Dankovics³, Endre Sós⁴ & Chris Walzer⁵

¹Hungarian Meadow Viper Conservation Centre, MME BirdLife Hungary, Költő u. 21., H-1121 Budapest, Hungary

²Fűvészkert Társaság, Nagyecsed, Hungary

³Savaria Museum, Szombathely, Hungary

⁴Budapest Zoo, Budapest, Hungary

⁵Department of Integrative Biology and Evolution, Research Institute of Wildlife Ecology, University of Veterinary Medicine Vienna, Vienna, Austria

In order to stop the decline of Hungarian meadow viper (*Vipera ursinii rakosiensis*), we started a complex conservation program in 2004, supported by LIFE-Nature fund. Hungarian Meadow Viper Conservation Centre was started with 16 adult individuals, collected from 6 different populations. By 2013 number of vipers bred reached nearly 1700. First reintroduction took place in March 2010, releasing 30 snakes into a reconstructed habitat in Kiskunság National Park. Since that altogether 300 vipers were reintroduced to 5 different locations, including sites in Fertő-Hanság National Park. In order to develop a remote tracking method, pre-programmed radio-tags with a detection range of 100-150m were implanted surgically into the abdomen of vipers. These tags also operate as temperature loggers, recording data every five minutes for a year-long operation period. After successful testing during 2010 and 2011, we released 6 tagged individuals in July 2012. All 6 snakes survived until November, even though wild boars dig large part of the site in September. We detected regular movements within the area, with tendencies to higher parts later in the season. On sunny spells of mid-November and late December, after emerging for basking, 3 and later 2 snakes disappeared, very likely due to predation by raptors like Common Buzzards or Hen Harriers. One tag was found on the site and logged temperature data proved our theory. As surface and ground environmental temperatures were recorded simultaneously, we were able to figure out daily activities of the tracked individuals more accurately than when using just their average optimal body temperatures.

balint.halpern@mme.hu

A field survey of the Cypriot blunt-nosed viper (*Macrovipera lebetina lebetina*) in northern Paphos province, Cyprus

Daniel Jestrzemski

Department of Forest Zoology and Forest Conservation, Faculty of Forest Sciences and Forest Ecology, University of Goettingen, Buesgenweg 3, 37077 Goettingen, Germany

The Cypriot blunt-nosed viper (*Macrovipera lebetina lebetina*) is the largest viper in the European Union and strictly protected by the Berne Convention (Appendix II). So far, few studies on the ecology, biology and conservation status of the snake were available for Cyprus. This survey aimed at 1) identifying key habitats of *Macrovipera l. lebetina* in northern Paphos province, 2) gaining information on morphological traits of the species, and 3) recording threats to the viper. From 24 March to 04 June 2014, *Macrovipera l. lebetina* was surveyed opportunistically and systematically on 16 transects distributed over four different habitats in coastal lowlands, including garrigue slopes on Akamas peninsula, goat pastures and edges along streams and farmlands. Additionally, nine interviews with representatives of institutions related to rural development and nature conservation were carried out. A total of 25 live and 13 dead specimens were recorded, with 16 vipers captured, processed and released. Seventeen live specimens were found at the edges of agricultural fields, including nine snakes next to the stream banks. Of the four vipers recorded on transects, three were captured at stream edges and one on a local goat pasture. While potential hiding places were present in all surveyed habitats, common prey species of *M. lebetina* (rats and small birds) were only recorded on farmlands, in gardens and along streams. Seven interview partners indicated that local people kill blunt-nosed vipers whenever encountering them. Car traffic is another threat, as dead vipers found on roads were showing severe injuries.

danjetski@gmx.de

Present and future of an overlooked european viper: distribution, detectability, population size and conservation status of the Greek Meadow Viper, *Vipera graeca*

Edvárd Mizsei¹, Bálint Üveges, Balázs Vági, Stephanos A. Roussos, János Pál Tóth & Yannis Ioannidis

¹Aggtelek National Park Directorate

Vipera ursinii complex is one of the most endangered taxa among the European fauna, and the Greek meadow viper (*Vipera ursinii graeca*) is the least researched within the group and we argue for the elevation of its taxonomic status to the species level. We modeled its potential distribution, which enabled us to discover seven new populations in Albania. The surveyor's movements in all searching occasions were tracked with GPS units, and rectangular distance from the surveyor path to the detected viper specimen or shed skin was used for population density estimation. The detectability was determined as ~25 km/1 specimen, while population density was estimated as 157.34 ± 26.72 specimen/km². Following the IUCN Red List criteria we proposed the conservation status of this taxon to be Endangered (B2abiii), because the area of occupancy is less than 500 km², the subpopulations are fully isolated and there is continuing decline of habitat quality.

edvardmizsei@gmail.com

A missing piece of the Balkan viper puzzle: distribution and conservation threats of vipers in Albania

Edvárd Mizsei¹ & Márton Szabolcs²

¹Aggtelek National Park Directorate, Jósvalfó, Hungary

²Department of Ecology, University of Debrecen, Egyetem tér 1, 4032 Debrecen, Hungary

We collected information on the distribution of and assessed conservation threats to four viper taxa presented in Albania by following the methods of previous works done by Jelic and colleagues in the Western Balkans. We completed our dataset from literature and museum sources with our own unpublished records on *Vipera ammodytes*, *Vipera berus* and the two occurring *Vipera ursinii* subspecies - *macrops* and *graeca*. Distribution data were visualised in 10x10 km UTM cells. *Vipera ammodytes* showed a high occupancy with presence in nearly 60% of the cells, while the others were present in less than 10%. We found that Prokletije and the East-Albanian mountain ranges have high importance to viper diversity and conservation. We assessed threats by using 10 variables known to influence survival and reproduction of snake populations. We classified the variables into four categories from least risk to high risk. Except for *Vipera ammodytes*, the studied species were found to be susceptible to decline. Our results attested the importance of Albania and provided insights regarding conservation of diversity of vipers in that particular part of the Balkans.

szabolcs.marci@gmail.com

Conservation efforts and grazing exclusion study of the endangered *Vipera ursinii graeca* in Albania - preliminary results

Edvárd Mizsei¹, Márton Szabolcs², **Bálint Üveges**^{3,4} & Balázs Vági⁵

¹Aggtelek National Park Directorate

²Department of Ecology, Conservation Ecology Research Group, University of Debrecen

³Konrad Lorenz Institute of Ethology, Department of Integrative Biology and Evolution, University of Veterinary Medicine Vienna, Vienna, Austria

⁴Lendület Evolutionary Ecology Research Group, Plant Protection Institute, Centre for Agricultural Research, Hungarian Academy of Sciences, Herman Ottó út 15, 1022 Budapest, Hungary

Vipera ursinii is one of the most endangered snake species in Europe and provoked strong conservation approaches, except for the Greek meadow viper (*Vipera ursinii graeca*). This taxon lives in alpine grasslands (between 1600-2200 m a.s.l.) which are exploited as sheep and goat pastures, where variable levels of grazing may degrade the vipers' habitat. In 2014, at 1850m a.s.l. we started to study the effects of grazing by building three 20×20 m grazing- excluded monitoring sites using stainless metal piles and concertina razor wire while also designating three grazed monitoring sites close to the fenced ones, at an important meadow viper habitat in S-Albania. Our monitoring sites were thoroughly surveyed for vegetation, orthopteran fauna and viper occurrence: we detected 58 meadow viper specimens and one recapture in less than five monitoring occasions in the project area. In the future, these characteristics of grazing exclusion sites will be monitored at least yearly in cooperation with local and international research groups. Apart from direct conservational measures, our project also aims to educate local people to be aware of the unique natural values surrounding them and to motivate them to contribute, at least passively, to the conservation of their local environment.

edvardmizsei@gmail.com

Current situation of the critically endangered Moldavian meadow viper (*Vipera ursinii moldavica* Nilson, Andrén & Joger 1993)

Ștefan R. Zamfirescu¹, Alexandru Strugariu², Iulian Gherghel³, Oana Zamfirescu⁴, Tiberiu C. Sahlean⁵ & Paul Dincă⁶

¹Faculty of Biology, Alexandru Ioan Cuza University of Iași, Bd. Carol I, 20A, 700505, Iași, Romania

²Faculty of Biology, Alexandru Ioan Cuza University of Iași, Bd. Carol I, 20A, 700505, Iași, Romania

³Department of Zoology, Oklahoma State University, 501 Life Sciences West, OK 74078, Stillwater, USA

⁴Faculty of Biology, Alexandru Ioan Cuza University of Iași, Bd. Carol I, 20A, 700505, Iași, Romania

⁵Faculty of Biology, University of Bucharest, Splaiul Independentei 91-95, 050095, București, Romania

⁶Faculty of Biology, Alexandru Ioan Cuza University of Iași, Bd. Carol I, 20A, 700505, Iași, Romania

Habitat alteration and persecution caused the meadow viper as the most endangered snake in Europe, being classed as Vulnerable by the IUCN and included in the European Habitat Directive. The Moldavian meadow viper (*Vipera ursinii moldavica*) is endemic for Eastern Romania and it is considered a critically endangered taxon. This study aims to provide an update of the current distribution and situation of the Moldavian meadow viper populations and habitats. In Romania, there are two groups of populations, corresponding to two types of landscapes: one in Romanian Moldavia inhabiting Ponto-Sarmatic steppes and one in the Danube Delta inhabiting Mediterranean salt meadows. Beside the two known steppe populations, we identified a third and a possible fourth one. In the Delta, we have confirmed the persistence of three populations, the northern one, after almost a decade since the last record. Regardless of morphological (e.g. labial scales colour pattern) differences, both population groups are genetically similar (ND4 mitochondrial marker). Both groups displayed similar annual activity patterns. Regarding the microhabitat selection, the most important microhabitats are the small bluffs of the steppes and the elevated sand terraces in the Delta, which provide optimal conditions for hibernation, thermoregulation behaviour, and protection. The bioclimatic niche models in the context of climate change scenarios indicate an extension of the species' current range. Although bioclimatically appropriate, many potential habitats might be improper due to anthropogenic alterations that appear to be stronger in steppes. The anthropogenic threats must be continuously monitored to avoid the loss of habitats and populations.

s.zamfirescu@gmail.com

Our present knowledge about the Anatolian Viper (*Vipera anatolica* Eiselt et Baran, 1970) with remarks about species ecology and conservation status

Oleksandr Zinenko¹, Aziz Avcı², Friederike Spitzenberger³, Andriy Tupikov⁴, Konstantin Shiryayev⁵, Emin Bozkurt², Çetin Ilgaz⁶ & Nikolaus Stümpel⁷

¹The Museum of Nature at V. N. Karazin Kharkiv National University, Trinkler str. 8, Kharkiv, Ukraine

²Department of Biology, Faculty of Art and Science, Adnan Menderes University, Aydın, Turkey

³BatLife Austria, c/o Naturhistorisches Museum Wien, Wien, Austria

⁴Dvorichansky National Park, Dvorichna, Kharkiv Region, Ukraine

⁵Tula Regional Exotarium, Tula, Russia

⁶Department of Biology, Faculty of Science, Dokuz Eylül University, Buca-İzmir, Turkey

⁷Staatliches Naturhistorisches Museum, Braunschweig, Germany

The Anatolian viper (*Vipera anatolica*) is the least known species of European vipers of subgenus *Pelias*, listed as Critically Endangered according to the IUCN. In the frames of the conservation project funded by The Mohamed bin Zayed Species Conservation Fund the type locality of the species was inspected and the species was found for the first time after the last observation almost three decades ago. Altogether 17 individuals from three subpopulations were observed, and data on morphological variation, ecology and genetics were collected. However, snakes were found in numbers which exceeded entire number of specimens known before and local abundance is comparable with similar mountainous species of vipers. *Vipera anatolica* has a very restricted distribution area and is under a severe threat because of overgrazing and other negative factors. Further monitoring of the known populations and search of additional localities should be followed by effective conservation measures.

zinenkoa@yahoo.com

Distribution and status of the vipers in the United Arab Emirates

Johannes Els¹, Pritpal Soorae² & Husam El Alkamy³

¹Herpetology and Freshwater Fishes, Environment and Protected Areas Authority (EPAA) / Breeding Centre for Endangered Arabian Wildlife (BCEAW), P O Box 29922, Al Sharjah, United Arab Emirates

²Terrestrial Assessment and Monitoring, Environment Agency-Abu Dhabi (EAD), Abu Dhabi, United Arab Emirates

³Environmental Information Sector (EIS) ,Environment Agency-Abu Dhabi (EAD), Abu Dhabi, United Arab Emirates

The United Arab Emirates (UAE) has a total of four viper species namely the Arabian Horned Viper (*Cerastes gasperettii*), Sindh Saw-scaled Viper (*Echis carinatus sochureki*), Oman Carpet Viper (*Echis omanensis*) and the Persian False-horned Viper (*Pseudocerastes persicus*) do have overlapping ranges but the Arabian Horned Viper is limited to the interior mega-dune and coastal soft sand dune areas. The Sindh Saw-scaled Viper has a distribution limited mainly along the coastal belt and stretching inland, but is a species found also on more disturbed habitats. The Oman Carpet Viper is found in the mountainous areas with wadi's (seasonal rivers in mountainous areas) and specializes in this habitat. The Persian False-horned Viper is a relic and is isolated to the high mountain tops. Conservation threats for the four species were assessed, of which the Persian False-horned Viper is the only species currently threatened by habitat loss due to increasing levels of quarrying within the United Arab Emirates.

johannes.els@bceaw.ae