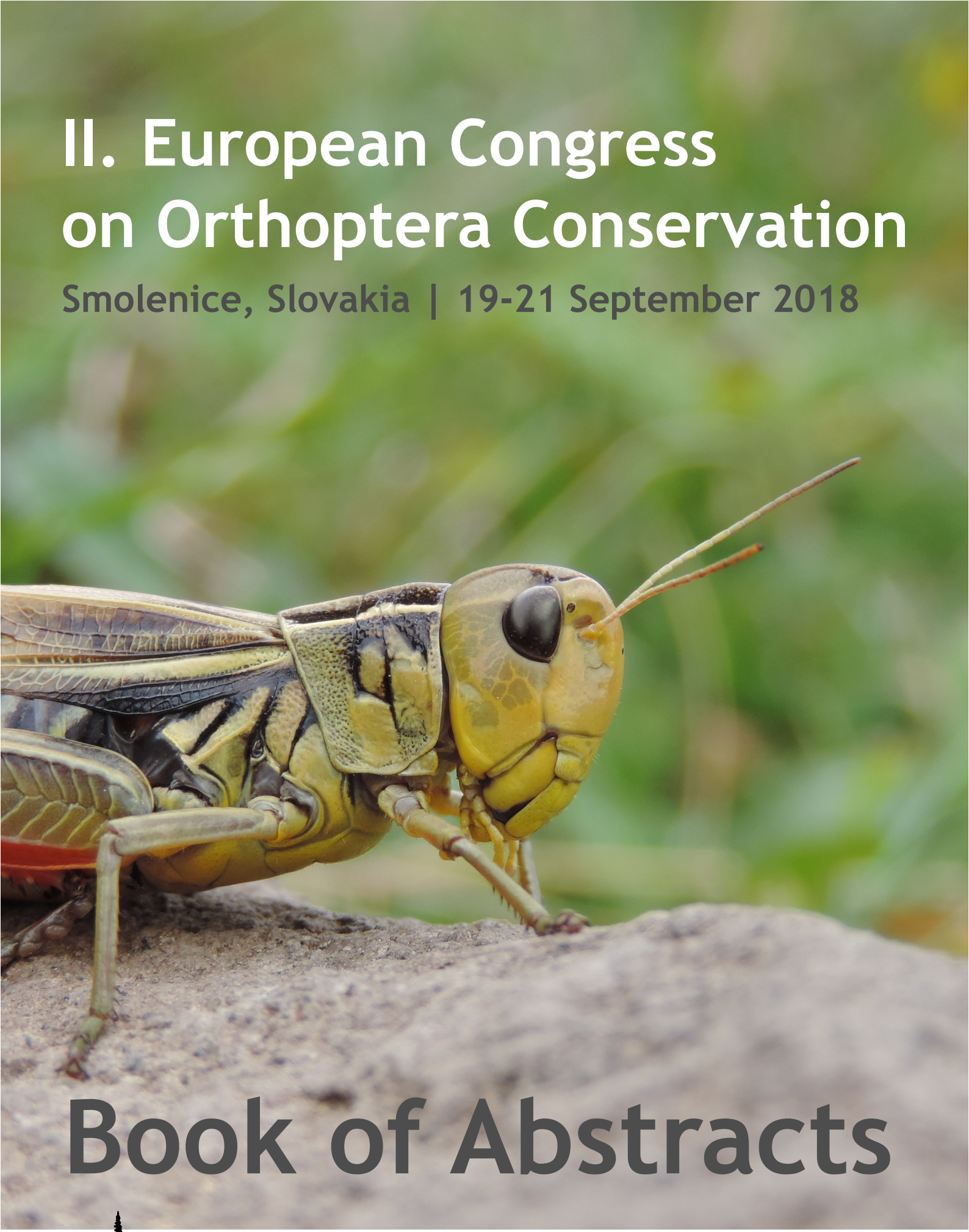
II. European Congress on Orthoptera Conservation

Smolenice, Slovakia | 19-21 September 2018



Book of Abstracts

INSTITUTUM OECOLOGIAE SILVAE SAV ZVOLEN

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GSG

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Editors
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Welcome

Dear Orthoptera friends,

as the field season 2018 for grasshoppers and crickets in Europe is coming to an end, it is a great pleasure for us to welcome you to the 2nd European Congress on Orthoptera Conservation, here in the Slovak Carpathian mountains, where 127 Orthoptera species occur, four of which are endemic.

The congress is co-organized by the IUCN SSC Grasshopper Specialist Group and the host institution, the Institute of Forest Ecology of the Slovak Academy of Sciences, which has a focus on ecology of forest and forest living organisms. Members of the local organizing committee, from the Department of Evolutionary and Behavioural Ecology, besides other topics are studying also ecology of orthopterans, in particular their distribution, adaptations and reproductive strategies with final application in conservation actions. We believe that our congress will promote interactions of international scientists, lead to new fruitful cooperation and help to foster species and habitat conservation not only in Europe.

The meeting takes place not long time after finalization and publication of the European Red List of Orthoptera, which for the first time gathered the available knowledge on the conservation status of all 1082 European Orthoptera species and described briefly their distributional patterns and ecology. This result of cooperation of 59 European Orthopterists has accelerated the studies on Orthoptera, because it has shown how many knowledge gaps and Data Deficient species still exist.
We hope that our congress will be a good opportunity to discuss new ideas and widen our knowledge. It surely will be continued in the future and will help also to re-assess the Red List status and conservation of the European Orthoptera species.

We are happy to present you a rich programme of almost four dozens of interesting and diverse presentations of participants from 20 different countries. The programme is divided into four sections: 1. Species diversity and conservation status, 2. Endangered species, 3. Distribution and ecological miscellanea and 4. Evolutionary ecology and bioacoustics.

We wish you an interesting congress, fruitful discussions, serious wine tasting and also a nice visit of Slovakia, Smolenice Castle and nice species and habitats in Slovak Carpathians.

Editors

Programme

Wednesday (19 September)

14:00 Registration desk will be open

19:00 > Welcome reception < Opening words (Dr Anton Krištín & Professor Axel Hochkirch, organizers and Dr P. Puchala, director of the Little Carpathians Protected Landscape Area)

Thursday (20 September)

07:30 > Breakfast <

Plenary lecture

09:00 Hochkirch A.: From Red List assessment to conservation action: The European Red List of Orthoptera

10:00 > Coffee break <

Section 1: Species diversity and conservation status (chair A. Hochkirch)

10:20 Krištín A. & Kaňuch P.: Species diversity and conservation status of grasshoppers and crickets in Slovakia

10:40 Landmann A. & ARGE Heuschrecken Österreichs: Conservation and threat status of Austrian Orthoptera

11:00 Vlk R., Holuša J., Kočárek P. & Marhoul P.: Species protection of the Orthopteran insects in the Czech Republic

11:20 Brodacki M.: New and reappearing species of Orthoptera in Poland

11:40 Vlk R., Holuša J., Kaláb O., Kočárek P., Kuřavová K., Marhoul P., Musiolek D. & Rada S.: Seventh year of extensive mapping of orthopterans in the Czech Republic

12:00 > Lunch <

Section 2: Endangered species (chair T. Zuna-Kratky)

14:00 Cassar L. F.: *Brachytrupes megacephalus*: annotations from the field notebook on the species' behaviour and ecology

14:20 Chobanov D., Borisov S., Iorgu E. I. & Iorgu I. Ș.: New distribution data in some rare Balkan Orthoptera species and comments on their IUCN Red List conservation status

14:40 Grzędzicka E.: Habitat and population status of the heath bush-cricket *Gampsocleis glabra* (Orthoptera, Tettigonidae) on xerothermic habitats in SE Poland

15:00 Szövényi G.: Initial steps of the active conservation of the large banded grasshopper (*Arcyptera fusca*) in Hungary

15:20 > Coffee break <

Poster session (chair L. Willemse)

16:00 *Sections 1 & 2 (ca. 5 min oral presentation of each)*

Černecký J., Čuláková J., Saxa A., Ďuricová V., Gajdoš P., Krištín A., Jarčuška B. & Puchala P.: Orthoptera monitoring and the improvement of their protection in Slovak Natura 2000 sites

Iorgu E. I., Popa O. P., Popa L. O. & Iorgu I. Ș.: Habitat fragmentation and genetic variability in populations of *Pholidoptera transsylvanica* in a protected area from Romania: ROSCI0083 Frumoasa

Landmann A. & ARGE Heuschrecken Österreichs: The Orthoptera fauna of Austria – an overview

Nuhlíčková S. & Svetlík J.: Habitat requirements and conservation management of Keeled Plump Bush-Cricket (*Isophya costata*): first results from a pilot study in Slovakia
Pina S., Vasconcelos S., Reino L., Santana J., Beja P., Sánchez-Oliver J. S., Catry I., Moreira F. & Ferreira S.: The Orthoptera of Castro Verde Special Protection Area (southern Portugal): new data and conservation value
Puskás G. & Szövényi G.: Notes on Orthoptera fauna of Bosnia and Herzegovina
Şirin D., Sevgili H. & Taylan M. S.: Distribution of endemic Ensifera species in Anatolia
Vahed K. & Poston-Saynor R.: Surveying one of Britain's rarest crickets: the Scaly cricket, *Pseudomogoplistes vicentae*

18:00 > Dinner <

Photo session (chair A. Krištín)

19:30 Iorgu I. Ş.: Singers in the grasslands: a photographic and videographic journal of the Carpathians and the western Black Sea coast
20:15 Puskás G. & Szövényi G.: Grasshoppers from the Dinarides
21:00 Krištín A. & Rakotondranary J.: Orthopteroid insects in changing habitats of Central and Southern Madagascar

Friday (21 September)

07:30 > Breakfast <

Plenary lecture

09:00 Berggren Å., Kaňuch P. & Lundhagen A.: Large-scale long-term studies of *Metrioptera roeselii* in Scandinavia – lessons for conservation

10:00 > Coffee break <

Section 3: Distribution and ecological miscellanea 1 (chair K.-G. Heller)

10:20 Tatin L., Bröder L., Gibault C. & Hochkirch A.: How to gain insight into the world of an invisible grasshopper?
10:40 Bröder L., Tatin L., Besnard A. & Hochkirch A.: Capture-recapture and detection dogs: Two potential monitoring tools for a highly cryptic grasshopper
11:00 Zuna-Kratky T. & ARGE Heuschrecken Österreichs: Recent range-expansions of Orthoptera-species in Austria
11:20 Jarčuška B., Kaňuch P., Naďo L., Dorková M. & Krištín A.: Quantitative biogeography of Carpathian Orthoptera with an example of boundary permeability
11:40 Landmann A.: Orthoptera and climate change in the Austrian Alps: Are there clear signals of altitudinal range shifts following the global warming trend?

12:00 > Lunch <

Section 3: Distribution and ecological miscellanea 2 (chair D. Chobanov)

14:00 Schirmel J., Wedel F., Schulz T. & Buchholz S.: Urbanization effects on diversity and traits of dry grassland Orthoptera
14:20 Zuna-Kratky T.: Effects of grazing on the Orthoptera assemblages of lowland floodplain meadows at the Morava river (Lower Austria)
14:40 Kozánek M., Valaška D. & Kodada J.: Application of interactive 3D visualization techniques in taxonomic research of Orthoptera

15:00 > Coffee break <

Section 4: Evolutionary ecology and bioacoustics (chair K. Vahed)

15:20 Borisov S. & Chobanov D.: Comparison between environmental niche modelling and molecular marker analysis of the *Poecilimon jonicus* group in southern Greece and Crete

15:40 Dorková M., Krištín A., Jarčuška B. & Kaňuch P.: Allotopic distribution may prevent population decline in species with imperfect reproductive isolation

16:00 Grzywacz B., Lehmann A. W., Chobanov D. P. & Lehmann G. U. C.: Molecular differentiation in the flightless bushcrickets (Orthoptera: Phaneropteridae: Phaneropterinae)

Poster session (chair R. Kleukers)

16:40 *Sections 3 & 4 (ca. 5 min oral presentation of each)*
Kaláb O., Musiolek D., Kočárek P., Hurtík P., Rusnok P. & Tomis M.: How heavy radio telemetry transmitters can be used on ground dwelling Orthoptera species?
Özdemir H., Sevgili H. & Özdemir E.K.: Spermatophore characteristics in three closely related species of the genus *Isophya* (Orthoptera: Phaneropterinae: Barbitistini)
Prunier F.: Assessing the value of hedgehog-heath for Orthoptera
Marhoul P., Holuša J. & Vlk R.: Military training areas are refuges of endangered orthopterans
Şirin D., Sevgili H., Taylan M. S. & Mol A.: Song diversity in the Anatolian predatory bush-cricket species of the genus *Saga* (Orthoptera: Saginae)

17:30 Closing remarks

18:00 > Dinner <

19:30 > Wine testing <

Saturday (22 September)

07:30 > Breakfast <

09:00 Post-congress tour (guide A. Krištín)

Abstracts

Large-scale long-term studies of *Metrioptera roeselii* in Scandinavia – lessons for conservation

Berggren Å.[1], Kaňuch P.[2] & Lundhagen A.[1]

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[2]Institute of Forest Ecology, Slovak Academy of Sciences, Slovakia
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The bush-cricket *Metrioptera roeselii* has been studied since 1994 in a multitude of studies where several have been running for many years and conducted over large-scales. The majority of work has been conducted in Sweden, but also areas in Scandinavia and Northern Europe have been involved. Experimental introductions where the effect of propagule size and the surrounding landscape on colonisation success, population growth and spread and genetic diversity have been studied. Additionally, intra-specific behavioural responses and dispersal movements related to landscape features have been studied on small-scales. All together the findings points out different features that might be useful for managing threatened orthopteran species as well as for introductions for conservation purposes. The results also highlight the need of considering species characteristics when translating findings to other species for best management purposes.

plenary lecture

Comparison between environmental niche modelling and molecular marker analysis of the *Poecilimon jonicus* group in southern Greece and Crete

Borisov S. & Chobanov D.

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The *Poecilimon jonicus* species group is distributed in the south Balkans (Albania, FYR Macedonia, Central Greece), Peloponnese and Crete, reaching south-west Anatolia. This corresponds with the Hellenic arc – a region with complex geotectonic features since Oligocene. All species in the studied group are wingless and prone to isolation and allopatric speciation. Closely related species occur from sea level to above 1,500 m of altitude. Changes in dispersion routes and range shifts probably happened during glacial and interglacial cycles due to radical climate changes. The complex, bidirectional song in the group is another factor that can boost speciation. An integrated re-

search on the faunistics, ecology and evolution of the group is important and sheds additional light on Mediterranean paleogeography. The present study concentrates on the Balkan and Cretan populations and aims to match morphological and genetic data with known habitat changes in the past. Occurrence recordings, both from field trips and literature, were selected and processed for species distribution modelling. Models were based on freely available climate data using maximum entropy algorithm Maxent. DNA sequences of a commonly used molecular marker (NADH2 dehydrogenase subunit 2 gene) were isolated with standard methodology and used for different analysis. Sequences available from GenBank were downloaded for calibration. Songs, including male-female duets, were recorded and compared with the genetic data. The current presentation evaluates the results and discusses diversity, radiation and relations within the group. The study has been supported by the National Science Fund (MES) of Bulgaria – project DN11/14-18.12.2017 to Dragan Chobanov and by The Theodore J. Cohn Research Fund (OSF) – grant to Simeon Borisov.

oral presentation

New and reappearing species of Orthoptera in Poland

Brodacki M.

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In the 21st century several species of Orthoptera were recorded in Poland for the first time or reappeared in this country after a long period of lack of records. Among the new species are Schmidt's Bright Bush-cricket *Poecilimon schmidtii* (Fieber, 1853), Southern Oak Bush-cricket *Meconema meridionale* A. Costa, 1860, Large Cone-head *Ruspolia nitidula* (Scopoli, 1786), Transsylvanian Dark Bush-cricket *Pholidoptera transsylvanica* (Fischer, 1853), and Marsh-cricket *Pteronemobius heydenii* (Fischer, 1853). Reappearing species include Migratory Locust *Locusta migratoria* (Linnaeus, 1758), Verge Cricket *Eumodicogryllus bordigalensis* (Latreille, 1804), and European Tree-cricket *Oecanthus pellucens* (Scopoli, 1763). Good flying *R. nitidula* and *L. migratoria* probably expanded to Poland naturally from adjacent Slovakia and/or Ukraine. The appearance of flightless *M. meridionale* and *P. heydenii* can be attributed to accidental introduction by man. E. bordigalensis, previously recorded once in the middle of the 20th century, as well as the recently found *P. schmidtii* and *P. transsylvanica*, were probably continually present in Poland but remained undetected. The most remarkable is the rapid reappearance of *O. pellucens*. This species was recorded occasionally in Poland in 19th and the first half of the 20th century. Despite extensive research carried out by Polish orthopterologists it was not found in this country in the second half of the 20th century. Declared extinct, European Tree-cricket was found again in Poland in 2011. The author's ongoing research has shown that presently it occurs at numerous localities in

broad area of south-eastern part of the country. The expansion of this species probably took no more than 20 years and may be attributed to natural causes facilitated by accidental introduction.

oral presentation

Capture-recapture and detection dogs: Two potential monitoring tools for a highly cryptic grasshopper

Bröder L.[1], Tatin L.[2], Besnard A.[3] & Hochkirch A.[1]

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The Crau Plain Grasshopper, *Prionotropis rhodanica*, is a Critically Endangered grasshopper species that experienced an extreme population decline during the last twenty years and nowadays only three spatially separated populations are known to be left. For identifying further population declines, it is particularly important to monitor ongoing population dynamics. Hence, capture-recapture studies were repeatedly performed during the last five years. The main difficulty in monitoring the species is its perfect camouflage. For this reason, the mean capture probability during the entire adult season was only 7%. For reducing study effort and for improving population size estimations, an optimal period for capture-recapture sessions was determined and a simulation study showed that a minimum of fourteen sessions is needed for calculating reliable population size estimates. Overall, capture-recapture has to be considered as a time- and resource-consuming monitoring tool for *P. rhodanica*. Alternatively, detection ability of dogs was tested in order to improve the species detection.

oral presentation

Brachytrupes megacephalus: annotations from the field notebook on the species' behaviour and ecology

Cassar L. F.

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Brachytrupes megacephalus Lefèbvre, 1827 is known from both coastal and desert locations in North Africa, as well as from central Mediterranean Europe. This crepuscular species occurs within psammophilous biocoenoses in Italian and Maltese coastal locations, on the islands of Sardinia, Sicily, Malta, Gozo, Lipari, Vulcano, Limosa and more recently, Lampedusa. Given the species' restricted distribution within EU territories, it is legally protected through the Habitats Directive (92/43/EEC) as well as the BERN Convention. Moreover, the species is afforded protection in more than 20 Natura 2000 sites across the territories in which it occurs. IUCN lists its conservation status as Vulnerable in Europe, while, contrastingly, it is treated as an agricultural pest in northern Africa, particularly the Maghreb, where the species is relatively quite common. The present work focuses on the author's research on the species, essentially but not exclusively in the Maltese Islands, over the last four decades, providing insights on its behaviour, habitat specificities and population numbers. Furthermore, these insights foster information on the species' vulnerabilities to environmental change and perturbations, particularly through human-induced activities, ranging from habitat alteration and fragmentation, which are critical for the species' long-term conservation within European territory.

oral presentation

New distribution data in some rare Balkan Orthoptera species and comments on their IUCN Red List conservation status

Chobanov D.[1], Borisov S.[1], Iorgu E. I.[2] & Iorgu I. Ș.[2]

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When considering the anthropogenic pressure, the orthopterans are amongst the most important invertebrate groups used for environmental monitoring. In order to effectively manage their conservation, it is imperious to have a clear understanding of their ecological requirements and geographic distribution. The Balkan Peninsula is an area with various complex habitats, supporting a rich Orthoptera fauna, with numerous en-

demics. Many of these habitats are yet unexplored and can still yield surprises. Within the past years, during our field campaigns in the Balkan Peninsula, we found new populations of several overlooked species from the genera *Poecilimon*, *Pholidoptera*, *Eupholidoptera*, *Myrmecophilus*, *Stenobothrus* etc. Thus, we are discussing the IUCN Red List conservation status in some of these, based on our new data.

oral presentation

Orthoptera monitoring and the improvement of their protection in Slovak Natura 2000 sites

Černecký J.[1,2], Čuláková J.[1], Saxa A.[1], Ďuricová V.[1], Gajdoš P.[3], Krištín A.[4], Jarčuška B.[4] & Puchala P.[1]

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Thanks to the mosaic of extensively farmed non-forest habitats, preserved forest habitats and various ecotones, Slovakia is a suitable area for more than 120 Orthoptera species. However the changes in land use and management practices in last decades caused that the populations of several orthopterans in some regions come to the decline. Approval of the extension of the National List of Sites of Community Importance (SCI) in 2017 provides territorial protection for Orthoptera and their habitats. An important step forward is also the introduction of a complex monitoring of Orthoptera species of Community interest. State Nature Conservancy of the Slovak Republic prepared a proposal for 169 new SCIs as a result of the long-term process of completing the Natura 2000 ecological network. 11 of these sites are designed to protect 4 out of 6 species of Orthoptera species of Community Interest. Based on the conclusions of the European Commission set in biogeographical seminar, the final design of the new SCIs has been prepared since 2012. The process involved activities related to data collection, field verification, mapping and realizing hundreds of negotiations with land owners and land users. In October 2017 SCIs were approved by the Government of the Slovakia and officially sent to the European Commission. In 2013–2015, monitoring of six Orthoptera species was carried out by 4 experts, who realized 164 field visits on 59 permanent monitoring sites (PMSs). In the near future the monitoring will be extended by the newly discovered species in Slovakia *Isophya costata*. In 2017, monitoring was performed on 15 PMSs, and in 2018 continued on 29 PMSs. Results and the relevant statistics are published on www.biomonitoring.sk as well as in the book Monitoring of Animal Species of Community Interest in the Slovakia.

poster

Allotopic distribution may prevent population decline in species with imperfect reproductive isolation

Dorková M., Krištín A., Jarčuška B. & Kaňuch P.

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Two closely related and morphologically similar bush-cricket species *Pholidoptera aptera* and *Pholidoptera transsylvanica* have sympatric distribution in north-eastern part of their European ranges. In Slovakia, where both species reach northern margins, long-term and extensive field mapping have found distinct distribution of *P. aptera* and *P. transsylvanica* with very rare syntopic occurrence of these two flightless and large bush-crickets. Thus we have hypothesised about a mechanism that may shape such interesting pattern. Along with occurrence data we have analysed basal environmental (climate and habitat) variables to find possible differences which could explain species coexistence in sympatric range. Subsequently, using cross mating experiments in controlled conditions we tested strength of reproductive isolating barrier between two siblings in regard to nuptial gift-giving system that characterises these insects. Nuptial gifts appear to be an important aspect, because its nutritional effect is not dependent on genetic effects in a potential inter-specific mating.

oral presentation

Habitat and population status of the heath bush-cricket *Gampsocleis glabra* (Orthoptera, Tettigonidae) on xerothermic habitats in SE Poland

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Worldwide grasslands are crucial for primary production, but are the most endangered terrestrial ecosystem. Xerothermic habitats are hotspots of biodiversity, including rare species of insects. Some insects belonging to Orthoptera are sensitive indicators of habitat quality and protecting orthopterans associated with xerothermic habitats can be a way of protecting this ecosystem. An example is the heath bush-cricket *Gampsocleis glabra*, which is threatened with extinction in the whole Europe, mainly due to progressive degradation of steppes dominated by grasses belonging to *Stipa* genus. In Poland, its population is only a few hundred individuals, living mainly in several localities in south-eastern Poland. Just like all Tettigonioidea, those insects produce ener-

getically costly songs that are sexually selected traits used by females for mate recognition. Starting from May 2018 in the south-eastern Poland (Małopolska Upland), a bioacoustic project has been implemented, which was awarded in the Wildlife Acoustics Grants competition (https://www.wildlifeacoustics.com/). The aim of this project is to investigate whether degradation of xerothermic grasslands affects the song parameters of male heath bush-crickets. Firstly, acoustics will allow to detect presence, distribution and number of *G. glabra*. As the variation in song frequency may be explained by costs associated with history of species in particular environment, the second goal of research is to show whether *G. glabra* modifies acoustic signals in response to changing environment and competition with other crickets; lack of such modification may be a reason of decline. During the presentation, habitat status and size of the population of *G. glabra* will be shown along with the preliminary results of the bioacoustic analyses of these insects' songs in various locations. The cooperation with scientists from Slovakia would be very valuable for the protection of this species in Europe.

oral presentation

Molecular differentiation in the flightless bushcrickets (Orthoptera: Phaneropteridae: Phaneropterinae)

Grzywacz B.[1], Lehmann A. W.[2], Chobanov D. P.[3] & Lehmann G. U. C.[4]

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The subfamily Phaneropterinae contains more than 2,000 predominantly long-winged species in the tropics. However, the roughly 300 European representatives are mainly short-winged. Phylogenetic relationships within this subfamily are poorly understood. To estimate molecular phylogeny we used sequences of three DNA fragments (18S, H3, ITS2) from 42 short-winged species and members of all European long-winged genera. Considering the overall topology, four phylogenetic lineages were distinguished in the combined tree. Short-winged species belonging to the genus *Odontura* were clustered together. The South-American short-winged *Cohnia andeana* formed separate lineage. Acrometopini, Ducetiini, Phaneropterini, and Tylopsidini were separated by long branches and their status as separate tribes was confirmed. Species of the tribe Barbitistini form a monophyletic group. Loss of flight ability has evolved multiple times in Phaneropterinae. In the Barbitistini, speciation led to an impressive number of mainly allo- and parapatrically distributed species in Southeastern Europe,

Anatolia and the Middle East. In the Odonturini, a limited number of species occurred in South-western Europe and Northern Africa.

oral presentation

From Red List assessment to conservation action: The European Red List of Orthoptera

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The European Red List of Orthoptera has been published in 2016 and includes Red List assessments of 1,082 Orthoptera species. The assessment process took two years and involved numerous experts from all over Europe. For the first time, we have created distribution maps for all species and gathered all available information about their status. Overall, 25.7% of the European Orthoptera species are threatened, which illustrates the strong need for conservation action on the ground. However, the Red List process also showed how little we know about many species. The distribution of many species is still insufficiently known and the taxonomy of some species or genera is in need of revision. For many species, we lack detailed knowledge on their ecology and threats, which makes Red List assessments difficult. Even though only 107 species (10%) have been assessed as Data Deficient, the population trends of most species are unknown and could only be inferred from habitat trends. The European Red List assessments have instigated some new research, including explorative faunistic research for lost species or those that have only been documented a few times. The Limnos Plum Bush-cricket (*Isophya lemnotica*), which had not been documented since 1927 was found to be very common on Limnos island (Greece) in 2015 by Luc Willemse. The Gran Canaria Crested Grasshopper (*Dericorys minutus*) was rediscovered in 2015 in the north of Gran Canaria and funding by the Mohamed bin Zayed Species Conservation Fund helped us to find another large population in a protected area in the east of the island. For two species, the Crau Plain Grasshopper (*Prionotropis rhodanica*) and the Adriatic Marbled Bush-Cricket (*Zeuneriana marmorata*), conservation strategies have been developed and are meanwhile being implemented. It will now be important to instigate similar measures for other threatened species.

plenary lecture

Habitat fragmentation and genetic variability in populations of *Pholidoptera transsylvanica* in a protected area from Romania: ROSCI0083 Frumoasa

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The Transylvanian Dark Bush-cricket, *Pholidoptera transsylvanica* (Fischer) (Orthoptera: Tettigoniidae), is an alpine species endemic to the Carpathians. It is a mesophytic species, with a broad ecological spectrum, found mainly in alpine and subalpine meadows or in ecotonal areas – at the edge of the forests. *P. transsylvanica* is listed as least concern in the IUCN Red List and is included in Annex II of the Habitats Directive. The species is locally threatened by habitat fragmentation, habitat loss, use of insecticides and overgrazing. It is protected by designating Special Areas of Conservation, where current populations are assessed to determine their health status and to establish the necessary conservation measures. The purpose of this study is to analyze the genetic diversity of *P. transsylvanica* populations in a Romanian protected area, ROSCI0083 Frumoasa, located in the Southern Carpathians. We have collected tissue samples from 135 individuals, grouped in six populations from ROSCI0083. The individuals from the six populations were genotyped using eleven microsatellite markers to estimate their genetic variability and structure and were also sequenced for a fragment of the mitochondrial COI gene in order to establish haplotype diversity. We found that the genetic variation is relatively high in all six populations, with a high number of alleles per locus (8.5–17.67) and small to moderate population differentiation (F_{ST}=0.074). In Frumoasa, there is a traditional seasonal sheep grazing management since hundreds of years. In the last years though, the pressures increased from local communities through intensive grazing (changing the grazing management), deforestations, reforestations and constructions, all these leading to habitat fragmentation. Our data suggest that habitat fragmentation represents a real pressure for the populations of *P. transsylvanica*, leading to differentiation and loss of genetic variation. Conservation measures should be considered for maintaining the genetic structure of populations.

poster

Singers in the grasslands: a photographic and videographic journal of the Carpathians and the western Black Sea coast

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The present work aims to showcase the orthopteran species diversity from the Carpathian meadows and the steppes and forests of Dobrogea, the north-easternmost extremity of Balkan Peninsula: a photographic and videographic guide for delighting the naturalist's eye as well as other passionate people. The Carpathians proved to be one of the main glacial refugia, as during the Last Glacial Maximum these mountains were mostly unglaciated and provided appropriate conditions for survival of many orthopteran species. The Eastern and Southern Carpathians proved to be important biodiversity hotspots – the richest areas in endemic species, such as *Isophya harzi* Kis, 1960; *Isophya ciucasi* Iorgu & Iorgu, 2010; *Isophya sicula* Orci, Szövényi & Nagy, 2010, *Isophya dochia* Iorgu, 2012; *Isophya nagyi* Szövényi, Puskás & Orci, 2012, *Isophya bucovinensis* Iorgu, Iorgu, Szövényi & Orci, 2017, *Odontopodisma acuminata* Kis, 1962, *Odontopodisma carpathica* Kis, 1961, *Zubovskya banatica* Kis, 1965, *Pseudopodisma transilvanica* Galvagni & Fontana, 1993, *Podismopsis transsylvanica* Ramme, 1951, *Chorthippus acroleucus* Muller, 1924. The historical region of Dobrogea contains some of the oldest geological structures in Europe, as well as largest compact reedbed on the planet, the Danube Delta. In this area, the steppe species meet the Balkan fauna: *Isophya hospodar* (Saussure, 1898); *Isophya zubowskii* Bey-Bienko, 1954; *Gampsocleis schelkovnikovae* Adelung, 1916; *Tessellana carinata* (Berland & Chopard, 1922); *Paraholidoptera castaneoviridis* (Brunner von Wattenwyl, 1882); *Bucephaloptera bucephala* (Brunner von Wattenwyl, 1882); *Onconotus servillei* Fischer von Waldheim, 1846; *Bradyporus dasypus* (Illiger, 1800); *Gryllotalpa unispina* Saussure, 1874, *Bruntridactylus tartarus* (Saussure, 1874); *Asiotmethis limbatus* (Charpentier, 1845); *Stenobothrus eurasius macedonicus* Willemse, 1974; *Chorthippus macrocerus purpuratus* (Voroncovskij, 1927) etc. Only one endemic orthopteran lives here: *Isophya dobrogensis* Kis, 1994.

oral presentation

Quantitative biogeography of Carpathian Orthoptera with an example of boundary permeability

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The first biogeographic boundary between Western and (South)-Eastern Carpathians was established based on qualitative observational floristic data more than 100 years ago. This boundary represents also the westernmost distribution limit of several (South)-Eastern Carpathian animal species belonging to various taxonomic groups. To evaluate quantitatively some current biogeographical regionalization of Carpathians, we analysed the distribution patterns of 139 orthopteran species native to the Carpathian Mts. We used published species distribution maps (IUCN extent of occurrence) to compile data on potential species richness within 2,576 squares of 10×10 km UTM grid. Distinct biogeographic units based on faunistic data were determined using cluster analysis. We also identified characteristic and endemic species for these regions. To illustrate biogeographic region's boundary permeability we analysed distributional pattern of Orthoptera species assemblages in two adjacent mountains that were previously thought to belong into different zoogeographic regions, Western and Eastern Carpathians, respectively.

oral presentation

How heavy radio telemetry transmitters can be used on ground dwelling Orthoptera species?

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Radio telemetry tracking is widely used method in studies of animal movement, dispersal and space use. It's based on using active transmitters attached on the animal's body. Unique frequency signal that single transmitter emits is detectable with a handheld antenna system and a radio receiver. Since the small weight transmitters were developed, it was applied in many studies focussed on insects. In Orthopterans it was successfully used only on relatively big, robust species. Despite increasing use of telemetry in Orthoptera and in insects generally, there is only few information about ef-

fect of transmitter attachment on species mobility and behaviour. Aim of our study is to clarify the usability of radio telemetry on medium-size Orthoptera species by testing how the weight of three lightest commercially available transmitters affect movement of ground dwelling cricket *Gryllus assimilis*, using video records analysis and 3D printed dummy transmitters. We used 180 individuals in 9 groups. In each group there were 5 individuals for each transmitter category, and 5 control individuals marked only with piece of paper attached in the same way. Each group was recorded in an arena in a dark room under UV light for 10 minutes repeatedly in three consecutive days. Three different temperature conditions were simulated, each with three groups of individuals. Video-records were analysed with an original tracking algorithm. Our preliminary results show that even lightest transmitter decreased the walking speed and distance. Negative effect of heavier transmitters was more significant. We also observed an interesting influence of a high temperature to animal's movement which has to be further discussed. In summary: before conducting radio telemetry survey, it's necessary to consider the effect of transmitter attachment on species of interest. Project is supported by University of Ostrava grant (SGS14/PřF/2018) and the Orthopterist's Society The Theodore J. Cohn Research Fund.

poster

Application of interactive 3D visualization techniques in taxonomic research of Orthoptera

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The progress in the development of 3D visualization techniques opens new possibilities for the study of morphological characters in biological sciences. Multilayer photography, object panoramas and 3D models can be utilized to accurately display the characters used in insect taxonomy. Application of proper software allows browsing of the visualizations, magnification change and continuous or gradual rotation. Three dimensional visualization techniques can be effectively used in entomology for the design of electronic interactive keys or databases of species which can be easily accessible by any portable telecommunication devices (mobile phone, ipad, etc.). The aim of this presentation is to demonstrate how 3D visualization techniques can be used in the taxonomic research of Orthoptera.

oral presentation

Species diversity and conservation status of grasshoppers and crickets in Slovakia

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In changing world, an updated information on species spectra, their population size and distribution in each country is needed for conservation measures of species and habitats. Orthoptera are appropriate bioindicators of habitat quality and conservation status of sites. Based on the critical revision of all published (from 1868) and our data from mapping of more than 1,800 sites (in 1994–2018) across all area of Slovakia (ca 50,000 km^2), we found 127 Orthoptera species (58 Ensifera, 69 Caelifera). Of them, 51 species reach the limit of their distribution (often northern) in Slovakia that is important in studies of current range shifts. Relatively rich species spectrum reflects various habitats within altitudes 94–2,655 m a.s.l., while 109 species were found in Pannonian and 98 in the Alpine bioregion, respectively. We emphasize changes comparing to previous check-lists published in 1977 and 1999 (e.g. 118 species were listed 20 years ago). We provide information on first recorded species after 1999 (9 species) and revise questionable data. Species spectra of Central European countries are also compared and brief account of the research history is outlined. Based on the actual IUCN Red List criteria, we assessed all current species; two species were listed in the category RE (*Celes variabilis*, *Acrotylus insubricus*), 7 CR (*Isophya beybienkoi*, *I. costata*, *Poecilimon fussi*, *Pachytrachis gracilis*, *Saga pedo*, *Paracaloptenus caloptenoides*, *Stenobothrus fischeri*), 4 EN (*Poecilimon intermedius*, *Gampsocleis glabra*, *Pholidoptera frivaldszkyi*, *Myrmeleotettix antennatus*), 9 VU, 19 NT. Another 74 species were assessed as LC and there are still 12 species as DD. In total seven species are Species of European Community interest and four are endemic to Slovakia. Range expansions and/or contractions in several species and their reasons are analysed and discussed within their European range.

oral presentation

Orthopteroid insects in changing habitats of Central and Southern Madagascar

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As the fourth-largest island in the world, Madagascar is one of the areas, where is recorded very quickly change and devastation of native habitats. It is reflected in the massive extinction and enormous range contraction in many animal species. Madagascar-India landmass separated from Africa-South America landmass around 135 million years ago and later split from India about 88 million years ago, allowing plants and animals on the island to evolve in relative isolation. Similar as in other invertebrates, also within the orthopteroid insects, there are mostly endemic species living in Madagascar, being under strong human pressure. In March 2015, we studied orthopteran assemblages on 41 sites along environmental gradients. We found there more than 100 Orthoptera species, six mantid, and four phasmid species. In the slide show we will bring the most frequent as well as characteristic species and habitats from the sea level up to 2250 m a.s.l. (along the route of 3900 km).

oral presentation

Orthoptera and climate change in the Austrian Alps: Are there clear signals of altitudinal range shifts following the global warming trend?

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More than 62% of the surface of Austria is covered by the Eastern Alps which can be subdivided into three major ranges – the Northern-, the Central-, and the Southern Calcareous Alps. Since 1980 in Austria the mean annual temperature showed an increased rise of approximately 1 ℃ compared to the global increase of about 0.5 ℃. Signals of accompanying altitudinal range expansions and contractions so far have been demonstrated mainly for vascular plants in the high Alps but are not well investigated for animals. As distribution and abundance patterns as well as life cycles of the thermophilic Orthoptera in mountainous regions are primarily shaped by the recurrence of adverse climatic conditions and by the dominating temperature regimes at different

altitudes, effects of the strong climate warming in the Alps can be expected. For instance, one could forecast elevational distribution bands of lowland species to show an upward movement, and on the contrary could fear range contractions for specialized high-altitude species which would also raise concerns from a conservation point of view. The Austrian Orthoptera working group can dispose over a rather huge stock of more than 270,000 altitudinal records of the 139 extant species. Most of our data (>95%) stem from recent decades which is especially promising in the light of climatic developments. In particular data of "elevational ubiquists" and of some high-altitude species offer excellent possibilities to test for effects of climate warming. Although there are some indications for an increase of records at very high altitudes for some species, patterns are inconsistent between species and between the main mountain ranges. Overall there is no clear evidence for a general pronounced upward movement of elevational distribution bands of Orthoptera in the Austrian Alps since 1980, and our findings thus warn against expecting simple responses of mountain grasshopper communities to climate warming.

oral presentation

Conservation and threat status of Austrian Orthoptera

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In Europe and in the EU 28 only about the half of all Orthoptera species are listed as of "least concern" in the recently published IUCN Red Lists (Hochkirch et al. 2016). In the last official Austrian Red List (Berg et al. 2005) 57% or a total of 72 (out of then 126) extant species recorded during the 20th century have been considered threatened. Moreover, a disturbingly high proportion (26.2%) of all species have been classified as "Endangered" (23 species) or even as "Critically Endangered" (10 species), and these numbers are much higher than the European or EU28 figures (15.8% and 17.1% respectively). However, the cited Austrian threat assessment mainly is based on data from the 20th century. In the past two decades the data basis for assessing the threat status of Austrian Orthoptera has exceedingly improved, due to joint efforts of Austrian orthopterologists organised in an "Austrian Orthoptera Working Group". This group now can dispose over more than 315,000 records of the 139 extant species whereby about 70%. of these data have been collected since 2000. The poster summarizes and analyses this extensive data stock from a conservation view point. Different indicators can be used to assess the pressures and threats that Austrian Orthoptera are exposed to. For instance, for the last few decades species, guild and habitat specific range expansions and contractions can be analyzed by calculating regional extinction rates at a grid cell level, and abundance shifts can be assessed by comparing the pro-

portion of single species records relative to records of all species in different periods. The poster also exemplifies the distribution, population and threat status of selected species, especially for those which occur in Austria with a substantial proportion of their global to Central European populations.

oral presentation

The Orthoptera fauna of Austria – an overview

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Austria is located at the heart of Central Europe. As consequence the country has part in several biogeographical regions which show pronounced differences in their landscape character and climate. Overall Austria is a predominantly mountainous country, two thirds of its surface being covered by the Eastern Alps which run west to east through the country. The dominance of steep altitudinal gradients and the high variability of environmental conditions over short horizontal distances in the Alps must be regarded as the most important factors shaping distributional patterns and species diversity of Orthoptera in Austria. Although just about 28% of the Austrian landscape is moderately hilly or flat, these regions in the alpine forelands are inhabited by the most diverse, mostly thermophilic lowland fauna with species diversity being highest in the lowest parts (below 200 m a.s.l.) which are part of the Pannonian steppe plain around lake Neusiedl. The species diversity of Austria is also fostered by the direct connection to the Mediterranean and the Balkan fauna regions via Styria and Carinthia. These favourable settings of Austria are mirrored in the diversity of its Orthoptera fauna. Compared to the neighbouring countries and on a Central European scale, Austria is very species rich in harbouring about 90% of the species recorded in Central Europe. However, these numbers are also reflecting the good exploration level which has been reached by joint efforts of Austrian orthopterologists organised in an "Austrian Orthoptera Working Group". This group now can dispose over a huge stock of more than 315,000 records of the 139 extant species. Records mostly are of recent origin (~95% since 1990), and our data thus allow to draw a representative and actual picture of regional and altitudinal distribution patterns and differences of species diversity as well as of the threat status of selected species.

poster

Military training areas are refuges of endangered orthopterans

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During the period 2008–2010, extensive research of orthopteran diversity was carried out in a set of 42 former military training areas (MTAs) covering 0.05% of the area of the Czech Republic. The results revealed surprisingly high species diversity when more than 60% of the orthopteran species living in the country were found with a high representation of endangered species depending on either disturbed ground, or early succession stages. For some species, MTAs represent the only one or one of a small number of their localities in the Czech Republic. Military activities generate frequent and irregular disturbance of different type and intensity followed by succession, resulting in mosaics of ecological conditions which support both high species diversity and the presence of habitat specialists. The conservation value of former MTAs is increasingly threatened by abandonment and overgrowing with shrubs. Conservation should support either alternative disturbance regimes (military history clubs, off-road and other vehicles, etc.), or other sustainable management approaches creating a small-grain habitat mosaic.

poster

Habitat requirements and conservation management of Keeled Plump Bush-Cricket (*Isophya costata*): first results from a pilot study in Slovakia

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One of the main problems in conservation work on Orthoptera species is the limited availability of ecological data about the species at risk. Keeled Plump Bush-cricket *Isophya costata* is an endemic species of the Pannonian Basin with low dispersal abilities. In Europe is the Keeled Plump Bush-cricket listed in the Appendix II and IV of the Habitats Directive. According to IUCN Red List of Threatened Species *I. costata* is listed as Least Concern (LC) with the declining population trend. The range of this species is relatively small, fragmented and restricted to the Central and Eastern Europe. Occurrence of *I costata* was recorded in Austria, Hungary, Serbia, Romania. In Slov-

akia, the occurrence of *I. costata* was discovered for the first time in June 2017, in south-western part of the country. Although *I. costata* belongs to bush-crickets with broader range of habitat types, in Slovakia are habitat requirements of this species still unknown and seem to be limited to specific conditions, especially in terms of vegetation structure. The main goal of this study is to provide the first results about habitat requirements and conservation management of this species in alluvial meadows of Devínske jazero site in south-western corner of Slovakia. In the pilot study, we focused our attention on the micro-habitat preferences of *I. costata* to assess key factors influencing its local distribution, namely in terms of vegetation structure and microclimatic conditions. Indeed, we implemented the first conservation measures suggesting that the delaying of the first mowing and leaving uncut refuge of an appropriate habitat will have a positive future effect on population density of this species.

poster

Spermatophore characteristics in three closely related species of the genus *Isophya* (Orthoptera: Phaneropterinae: Barbitistini)

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During the copulation, the male bush-crickets transfer a costly spermatophore (spermatophylax+ampulla-containing ejaculate) which is important the nutritional sources to the females. The functions of the spermatophylax and the ampulla have been addressed in many studies. Although the studies conducted have underlined that the costs and benefits of mating male and female bush-crickets vary depending on species, they have reached an agreement on the existence of some common evolutionary phases. The present study aimed to examine the characteristics of spermatophore in three endemic *Isophya* species (*Isophya zernovi* Miram, 1938, *I. autumnalis* Karabağ, 1962, and *I. bicarinata* Karabağ, 1957) distributing at high altitudes of the mountains in northeastern part of Turkey. The species belong to *I. zernovi* species group together with *I. karadenizensis* in terms of similar morphology of the pronotum and male cerci and subgenital plate. The main hypothesis has been put forward to explain whether the similar allocation of spermatophore and sperm within the same species-group. All bush-crickets used in the experiment were virgin. Males and females differed in body weight for the species. While the males of *I. zernovi* differed in spermatophore, spermatophylax and ampulla weight, the absolute sperm number of male *I. bicarinata* was lower than *I. zernovi* and *I. autumnalis*. Interestingly, there were no differences the relative spermatophylax and ampulla in proportion to spermatophore weight between the species. There were significant differences in the relative spermatophore components between *I. autumnalis* and *I. zernovi* in terms of body weight. Although there was

a strong relationship between body mass and spermatophore weight in *I. autumnalis* and *I. zernovi*, however, contrary to prediction, no relationship has been found in *I. bicarinata*. The relationships of the spermatophore and its components with body weight have also discussed in this study. Our results suggest that the spermatophore investment of the male bush-crickets within the same species-group vary between species. This study was financially supported by the TÜBİTAK (The Scientific and Technological Research Council of Turkey, Project No: 117Z068).

poster

The Orthoptera of Castro Verde Special Protection Area (southern Portugal): new data and conservation value

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With the increasing awareness of the need for Orthoptera conservation, greater efforts must be gathered to implement specific monitoring schemes. Despite recent surveys, little is known about Portuguese Orthoptera populations. This study was performed in 2014 and 2015 mainly in Castro Verde Special Protection Area (SPA), southern Portugal, and is the first Orthoptera inventory conducted in the area. A total of 35 Orthoptera species was recorded, with two new species reported for Portugal. We provide species' habitat occurrences within the protected area and use information on the conservation status and the Iberian distribution of each documented species to discuss the importance of Castro Verde SPA for Orthoptera conservation. Our results suggest that landscape heterogeneity was one of the drivers of orthopteran diversity observed in the Castro Verde SPA, as it provided opportunities for the persistence of species with different habitat affinities. The data presented sheds new light on Castro Verde SPA biodiversity and emphasizes the inclusion of this area in the conservation of Orthoptera diversity, particularly in the protection of threatened endemic species.

poster

Assessing the value of hedgehog-heath for Orthoptera

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In the past 40 years, several large-scale studies have collected data on the orthopterofauna present in the main mountain ranges of Andalusia and Murcia regions (South East Spain). They have also assessed the relationship between different alpine vegetation types and individual Orthoptera species. The results from these works have generally highlighted the importance of hedgehog-heaths as a habitat for Orthoptera. Hedgehog-heath is a typical vegetation of the mountains of the Iberian Peninsula. It is characterized by about 15 Fabaceae and Brassicaceae woody species that have coevolved into spiny cushioned-like shrubs, such as the Blue hedgehog broom *Erinacea anthyllis* Link or the Spiny Alyssum *Hormathophylla spinosa* (L.). These species occur at high elevations, typically over 1,000 m a.s.l. In areas where the density of trees commonly declines due to historical deforestation, grazing and climatic limitation, the shrub coverage increases enough to create a habitat locally known as "piornales", the hedgehog heath. Although the habitat was assessed as Least Concern in 2015, some observations indicate a strong degradation in heavily grazed mountain ranges such as Sierra de Segura and Sierra Gorda de Loja (by sheep) or Sierra de Baza (by red deer). Here our objective is to provide a general assessment of the importance of hedgehog-heath for Orthoptera species that occur at high altitudes in South East Iberian mountain ranges. In order to do that we compiled a total of 16 published works in which the presence of Orthoptera species was assessed in Andalusia and Murcia and unpublished abundance data from Sierra de Segura. We explored whether the reported abundance and diversity of Orthoptera species was higher in the hedgehog-heaths than in nearby habitats (i.e. alpine dry grasslands). Preliminary results support the importance of the habitat for maintaining the abundance and diversity of Orthoptera communities. We also found that hedgehog-heath species are highly relevant for endemic Orthoptera such as *Omocestus femoralis* Bolívar, 1908 in Sierra de Segura. Thus, we stress the necessity to pay more attention to the conservation of this habitat and its invertebrates.

poster

Grasshoppers from the Dinarides

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The participants are invited to a virtual excursion into the fascinating landscapes of the Dinarides from the Istrian Peninsula in the north to the Pashtrik Mountain in the south, and from the Mediterranean Adriatic coasts at the sea level up to the snow-cupped peaks of the Prokletije Mountains. We present some interesting, typical and little known members of the grasshopper fauna inhabiting this region, which were documented during our several field trips in the last few years.

oral presentation

Notes on Orthoptera fauna of Bosnia and Herzegovina

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Bosnia and Herzegovina is among the orthopterologically well studied countries in the Balkans. Research on the grasshopper fauna started in the 19th century and became the most intensive during the work of Sonja Mikšić (1926–1987). It is therefore surprising that our collecting activity between 2013 and 2017 and a visit in the National Museum of Bosnia and Herzegovina (NMBH) in Sarajevo could contribute with a significant amount of new data to the knowledge of the Orthoptera fauna of the country. We could gain the first reliable data of 12 species from the territory of the country (*Cyrtaspis scutata*, *Barbitistes constrictus*, *Leptophyes intermedia*, *Poecilimon brunneri*, *P. pseudornatus*, *Pachytrachis tumidus*, *Gryllotalpa gryllotalpa*, *G. stepposa*, *Tetrix tuerki*, *Odontopodisma albanica*, *Arcyptera microptera* and *Xya pfaendleri*). Based on the study on the Orthoptera collection stored in the NMBH we omit the following taxa from the fauna of Bosnia and Herzegovina: Isophya modesta, *Chorthippus apicalis*, *Ch. montanus*, *Ch. pullus* and *Zubovskia* sp. Significant knowledge was gathered on the distribution, ecology and acoustical behaviour of some Dinaric endemisms. *Pachytrachis bosniacus* was known only from its type locality since its description in 1979. This species seems to have a very small area restricted to the Cincar and adjacent mountains, living on subalpine bushy grasslands between 1300 and 1800 m. The similarly narrow area of the Critically Endangered *Pyrgomorphula serbica* extends also to Bosnia. It has a large population in the Varda Mountains in sparse black pine forests growing mostly on serpentine rocks. In Bosnia and Herzegovina, *Rammeihippus*

dinaricus was found in Čvrsnica and Vran Mountains besides of its type locality (Kamešnica Mts.). This tiny grasshopper has an uncommonly complex courtship song and behaviour. Our taxonomic research is currently targeting the *Poecilimon elegans* species group as well as some interesting taxa in the *Pachytrachis*, *Metrioptera* and *Stenobothrus* genera.

poster

Urbanization effects on diversity and traits of dry grassland Orthoptera

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Urbanization is a globally increasing phenomenon. Cities are often regarded as hostile environments for many organisms. However, there is also growing evidence that cities can host a high diversity and provide suitable habitats for rare species. Urbanization goes along with increasing amount of impervious surfaces (streets, buildings etc.) and can increase isolation of semi-natural habitat patches (urban green spaces). Moreover, urbanization can affect local habitat conditions by for example increasing temperature, noise pollution or the number of neophytes. We analyzed how urban matrix and local habitat parameters influence diversity and traits of Orthoptera in dry grasslands in Berlin, Germany. Our results showed that the diversity of Orthoptera decreased with increasing urbanization (expressed as % impervious surface in 500 m radius). The total individual numbers (without the dominant species *Chorthippus mollis*) and individual numbers of three single species were negatively affected by urbanization, too. However, one species (*Oedipoda caerulescens*) was positively affected by urbanization. Besides urbanization, local vegetation parameters were imported drivers of Orthoptera individual numbers. Regarding traits, urbanization affected the proportion of mobile species in the communities: in highly urbanized sites (>45% impervious surfaces) only species capable of flying occurred. Calculation of fluctuating wing asymmetry for the dominant species *C. mollis* (as a measure of stress), showed an increased asymmetry with increasing urbanization and number of neophytes. Importantly, we found no effects of connectivity and the number of neophytes on Orthoptera diversity and traits. Our results suggest that urbanization can negatively affect the diversity of Orthoptera. Moreover, urbanization can act as an environmental filter sorting species towards higher mobility and pose a kind of stress for species indicated by increased wing asymmetry. Our results also imply that management activities like increasing connectivity among grassland or the eradication of neophytes seem to be less relevant in supporting Orthoptera diversity in cities.

oral presentation

Distribution of endemic Ensifera species in Anatolia

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Endemism of the Ensifera species of Turkey was evaluated. Our data and related literature about the Ensifera of Turkey were combined for analysis. Of the 440 Ensifera species recorded from Turkey 247 (56.1%) are endemic to Turkey. These endemic species were grouped into four different clusters according to their distribution in phytogeographic provinces: Irano-Anatolia (IA), Mediterranean (MD), Euxin (EU) and Mesopotamia (MP). The similarity of provinces based on shared Ensiferan endemic species was evaluated with statistically analyses. Results of the analyses suggest that IA is most similar to MD and that IA+MD is more similar to MP than EU. The maximum diversity of species was observed in MD with 121 species, followed by IA with 84 species, and EU with 48 species. The minimum diversity was found for MP with 7 species. The two provinces with the greatest endemic species diversity are also the areas with the highest number of summits (approximately 500 different elevations points higher than 1,000 m). These results indicate the Anatolian fauna, and specifically, the high diversity appears to be related to the highly variable topography of the region.

poster

Song diversity in the Anatolian predatory bush-cricket species of the genus *Saga* (Orthoptera: Saginae)

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The genus Saga Charpentier, 1825 represents a group of obligatory carnivorous bush-crickets containing 15 species, eight of them occur in Anatolia and six of them are endemic to Anatolia. Most of them (except the parthenogenetic and tetraploid Saga pedo) are bisexual and diploid species. Saga species are mostly with large body size, live in spare and isolated populations, thus it is hard to find these bush-crickets in the field. Up to now, they were only mentioned in the general faunistic studies except one study which was about song description of the two species of the genus (S. rhodiensis and S.

cappadocica). In this study we collected Anatolian species of the genus and studied male song characters of the species (S. beieri, S. cappadocica, S. longicaudata, S. ephippigera ephippigera, S. ephippigera syriaca, S. rhodiensis, S. natoliae and S. puella). Our results show that each species of the genus have species-specific male calling songs. We evaluated the taxonomic status of the S. ephippigera ephippigera and S. ephippigera syriaca using the calling song and distributional pattern, thus it was understood that these two subspecies were classified as separate species.

poster

Initial steps of the active conservation of the large banded grasshopper (*Arcyptera fusca*) in Hungary

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In Hungary, the existence of most of the mountain meadows, created in forested landscapes for hay production, exclusively depend on maintaining management. In the last half century, the need for hay has dramatically decreased in the mountain areas of the country. Here, the abandonment of anthropogenic mountain meadows is generally followed by fast reforestation. The physiognomy and species composition of the vegetation may change very fast, resulting in a considerable change in the insect community as well. Several Orthoptera species can be found among the losers of this process. One of them is the large banded grasshopper in Hungary. It has a wide distribution from Western Europe to Eastern Asia, but in Europe, where it inhabits mostly mountain and alpine meadows, it shows population decrease in several countries. In Hungary, its populations formerly occurred in the Buda Hills, Visegrád, Börzsöny, Zemplén, Bükk and Aggtelek Mountains, but has recent data only in the last two regions. Therefore, a regional conservation project has started in the Bükk National Park, to save this spectacular species together with its disappearing habitat. As a first step, in an intensive field survey in 2017, its presence on the Bükk Plateau was confirmed only in two of its six former localities. In mid-June 2018, a group of ca. 40 specimens (large nymphs and adult specimens) have been translocated from the larger remaining local population into a neighbouring, seemingly suitable meadow of diverse relief. Here, mowing and litter removal have been previously restarted, first in small patches, in order to create a diverse microhabitat mosaic at a small scale. The newly established population will be monitored, alongside restarting extensive mowing of further abandoned meadows, which will hopefully help to extend the suitable habitats of the large banded grasshopper and other endangered grassland species as well.

oral presentation

How to gain insight into the world of an invisible grasshopper?

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Species conservation is only possible with sufficient ecological ground knowledge. But often population dynamics, specific habitat requirements or ecological interactions of threatened species are unknown, which is especially the case for cryptic species that are difficult to detect. Such an example is the Crau Plain Grasshopper, *Prionotropis rhodanica*, which is endemic to the Crau, a Mediterranean stone steppe in southern France. The species declined strongly during the last two decades, but the reasons are largely unknown. To obtain better information about its current population status and about the threats, a broad range of field studies has been implemented since 2015 within the framework of an IUCN conservation strategy. Based on the results on population dynamics, grazing effects and predation pressure, habitat management can be adapted adequately and the gained knowledge promotes reintroduction planning.

oral presentation

Surveying one of Britain's rarest crickets: the Scaly cricket, *Pseudomogoplistes vicentae*

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The Scaly cricket, or Atlantic beach cricket, is classified as Vulnerable globally. In the UK, it is known to occur in only 3 populations, where it lives in coastal shingle. An unusually severe storm surge hit the UK in winter 2013/14, completely inundating known scaly cricket habitat. The aims of the present study were to establish new baseline data for future monitoring of the UK's Scaly cricket populations and to compare the relative size and extent of each population prior to, and following, the storm surges of 2013/14. All three populations (Chesil Beach, Branscombe and Marloes sands) were surveyed in summer 2016. Baited pitfall traps (with dried cat biscuits) were left overnight. This was combined with 15 min hand searches at the Marloes site. At each site, traps were placed at the same grid locations as previous surveys. At Branscombe and at Chesil, the number of scaly crickets per trap was significantly lower than in the pre-2013 surveys (i.e. before the storm surge). At Marloes, both the

number per trap and number in timed searches were not significantly different than in the pre-2013 survey. However, loss of shingle habitat and a decline in scaly crickets was evident in the Western half of the beach. Caution is needed in interpreting these results because they only represent separate snap-shots in time of populations that may naturally fluctuate from year to year. This study does, however, highlight the need for on-going monitoring of these populations.

poster

Seventh year of extensive mapping of orthopterans in the Czech Republic

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Although orthopterological research in the Czech Republic has a tradition of more than 150 years, culminating in the publication of the current check-list (Holuša et al. 2013) and monograph (Kočárek et al. 2013), there is still no evaluation of the current distribution of orthopterans in the form of a distributional (grid map) atlas. At present, extensive mapping of orthopterans throughout the whole of the Czech Republic is being carried out, which will lead to the publication of an atlas. Mapping is realized as organized events of orthopterists targeted on systematic mapping of compact units (counties, large protected areas). The unit used is a standardized square map of the grid mapping (ca. 11.2x12 km), in which the habitat-based diversified pre-selected sites (4-5 localities per square) are mapped once a year. Data from museum collections, the general public and photographers undergoing revisions are also being used. The acquired data are stored in a database and processed in a GIS platform. At the end of 2017, the database contained 48,000 recent and historical records of 98 orthopteran species. Atlas publication is scheduled for 2020-2022.

oral presentation

Species protection of the Orthopteran insects in the Czech Republic

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The red list of threatened species of Orthoptera of the Czech Republic published in 2017 contains 40 species of grass-hoppers (22 species), bush-crickets (11), true crickets (3), ground-hoppers (3) and pygmy mole cricket (1). However, 7 species were classified as Regionally Extinct (RE), which means that only 33 species really present in the Czech Republic are threatened. The species were classified into the categories (CR, EN, VU and NT) with accordance with IUCN criteria. Altogether 7 species were classified as Critically Endangered (CR): 3 species of bush-crickets, 3 species of grass-hoppers and 1 species of ground-hopper. Despite these facts, only two species of the Orthopterans are protected by the Czech national law at the moment: *Saga pedo* as critically endangered and *Stenobothrus eurasius* as strongly endangered species. In response, we prepared proposal to supplement the mentioned list of specially protected animals with other 15 species of Orthopterans. This was possible only on the basis of the mentioned revision of the red list. Of course, not all of 33 species listed in the red list could be implemented in a revised list of specially protected animals. Protecting a number of endangered species that are, for non-specialists, difficult to identify in the field (e.g. *Leptophyes boscii* or *Tetrix ceperoi*), will have to be secured in different ways. As a very advantageous way we consider the protection of their habitats. On the other hand, some species of Orthopterans, habitat specialists like *Aiolopus thalassinus* or *Euchorthippus pulvinatus* may serve as so-called "umbrella species" for protection of other endangered species of insect inhabiting their habitats. For all 17 proposed species, the so-called "species cards" containing biology, ecology, and distribution data, current distribution in the Czech Republic, the threats, reasons for inclusion in the list and nature conservation proposals were processed.

oral presentation

Effects of grazing on the Orthoptera assemblages of lowland floodplain meadows at the Morava river (Lower Austria)

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Grazing was a traditional land-use in the lowlands of eastern Austria but has been almost completely abandoned during the second half of the 20th century. In the course of nature-conservation projects since the 1990s several grazing-initiatives were started in the alluvium of the Morava-river in Lower Austria, focusing on the Cnidion-floodplain meadows. In 2015 the WWF Österreich started a whole-year grazing-project on 70 ha of floodplain forest and meadows near the "stork-town" Marchegg with Konik-horses and cattle. The effects of grazing are monitored, using habitat-types, vascular plants, birds and Orthoptera as indicators. Species composition and abundance of Orthoptera were studied on 59 sample-plots in the years 2014 (before grazing) to 2017, with continuously increasing intensity of pasturing. The species richness recorded per year rose from 26 (2014) to 33 (2016, 2017) species, in total 16 Ensifera, 21 Caelifera species and *Mantis religiosa* were recorded on the study plots. Recorded individuals rose also from 2,502 (2014) to 3,185 and 3,066 (2016, 2017). Dominant species are *Mecostethus parapleurus*, followed by *Chorthippus albomarginatus* and *Pseudochorthippus parallelus*. Mean species-number per study-plot increased from 5.5 (2014, no grazing) and 5.3 (2015, localized grazing) to 7.0 and 7.2 species (2015–2016, grazing over most of the area). Also, the recorded individuals per plot increased from 42 to 52. The largest increase was documented in plots not mown for longer time before pasturing. The plots with the highest number of species and individuals, respectively, are situated in pastures with medium intensity of grazing while declining numbers were found in areas with intensive grazing following mowing in the same year. The results suggest, that grazing of previously mown or abandoned meadows increases species-richness and abundance of Orthoptera, even of species dependent on fallow habitats like *Conocephalus dorsalis*. But the positive effect can tip if grazing-pressure increases over a certain level.

oral presentation

Recent range-expansions of Orthoptera-species in Austria

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Fieldwork and data collection for several new books on Orthoptera in Austria leading to the publication of "Die Heuschrecken Österreichs" in 2017 generated a large amount of information on the distribution but also on range-shifts in time. To evaluate changes in the distribution of the 139 species in Austria, we focused on data from 1,255 grid squares of the field mapping (with an area of 35 km² each), that were visited in both periods 1990 to 2003 and 2004 to 2017 and at least 6 species were found in each period. During these 28 years 6 species were discovered in the second period, that were simply overlooked in the first one, 1 species was introduced (*Eupholidoptera schmidtii*) and for 25 species new technologies (especially the Bat-Detektor) and better identification (mainly in the Genus *Isophya*, *Tetrix*, *Miramella*) led to a "fake" increase in distribution. Four more species went extinct before 1990. For the remaining 103 species we compared changes in grid occupancy, correlating with a change in distribution. A total of 21 species showed a marked range-expansion from the first to the second period, with an increase in grid-occupancy from 21% (*Gryllus campestris*) to 557 % (*Platycleis affinis*), while *Aiolopus strepens* became new for Austria. The mean direction of the range-expansions is mainly west to west-southwest, following the northern edge of the Alps, while only few species show a "migration" heading north (*Ruspolia nitidula*, *A. strepens*, *Chorthippus oschei*). The preferred habitats of the expanding species group them into two guilds: 7 species prefer shrub and dense herbaceous vegetation, 5 species focus on (wet) meadows and 1 lives in moist alpine habitats. With 5 species preferring steppe-habitats and 2 on open ground the xerothermic group is smaller than the first group. In the same time 31 species showed a marked range-contraction.

oral presentation

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