



83rd International Scientific
Conference of the
University of Latvia 2025



FACULTY OF
MEDICINE AND
LIFE SCIENCES



**83rd International Scientific
Conference of the
University of Latvia 2025**

BIOLOGY SECTION
**Zoology and Animal
Ecology**

Abstract book

29 January 2025
Nature House University of Latvia
Riga, Latvia



“Zoology and Animal Ecology”

83rd International Scientific Conference of the University of Latvia

Biology section

Abstract book

Faculty of Medicine and Life Sciences, Department of Ecology

University of Latvia, House of Nature

29 January 2025

Riga, Latvia

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Biology section / Bioloģijas sekcija

Zoology and animal ecology sub-section / Zooloģijas un dzīvnieku ekoloģijas apakšsekcija

Programm / Programma

29th of January 2025 / 2025. gada 29. janvāris

Chair / Vadītājs: Asoc. prof., Ainārs Auniņš		
10.00–10.05	Asoc. prof., Ainārs Auniņš <i>Faculty of Biology, University of Latvia</i>	Atklāšana Opening
Plenary session / Uzaicinātie ziņojumi		
10.05–10.40	Dr. Oliver Lindecke <i>Institute for Biology and Environmental Sciences, Carl-von-Ossietzky-Universität Oldenburg, Oldenburg, Germany</i>	Unboxing navigation: Pipistrelle bats as a model to investigate migratory orientation behaviour and magnetoreception in wild mammals Izpakojojot navigāciju: <i>Pipistrellus</i> sikspārņi kā modelis, lai pētītu savvaļas zīdītāju migrācijas orientācijas uzvedību un magnetorecepciju
10.40-11.15	Dr. Florent Prunier <i>Asociación de Educación Ambiental El Bosque Animado, Benarrabá, Spain</i> Baudewijn Odé <i>Floron / IUCN Grasshopper SSG, the Netherlands</i>	Training the European Orthoptera Sound System (TEOSS) Eiropas taisnspārņu skaņu atpazīšanas sistēmas apmācība (TEOSS)
11.15-11.30	Coffee break, discussions, posters / Kafijas pauze, diskusijas, stenda referāti	
Oral presentations / Mutiskie ziņojumi		
11.30–11.45	Aivars Cīrulis	Effects of sex-limited experimental evolution on a hermaphrodite Dzimumlimitētas eksperimentālās evolūcijas ietekme uz hermafrodītu
11.45–12.00	Colton Bryce Adams* <i>* presented by Māris Munkevics</i>	Terminally investing yellow mealworm beetle (<i>Tenebrio molitor</i>) males dishonestly signal their body odors to females but not microbiome odors Termināli investējošie miltu melnuļu (<i>Tenebrio molitor</i>) tēviņi spēj piemānīt mātītes ar saviem ķermeņa feromoniem, taču nespēj maldināt ar mikrobioma smaržu palīdzību
12.00-12.15	Jekaterīna Butkeviča	The effect of aspirin on the lifespan of <i>Drosophila melanogaster</i> depends on sex and developmental stage Aspirīna ietekmes uz <i>Drosophila melanogaster</i> dzīvildzi atkarība no attīstības stadijas un dzimuma
12.15-12.30	Anton Basov	Using the method of geometric morphometry to analyse the deformation of the mandible in Harting's vole Ģeometriskās morfometrijas metodes izmantošana Hārtinga strupates apakšžokļu deformācijas analīze

12.30-12.45	Sanita Bogdanova	Preliminary study of European forest reindeer (<i>Rangifer tarandus fennicus</i>) hair structure Provizoriskais pētījums par Eiropas meža ziemeļbriežu (<i>Rangifer tarandus fennicus</i>) matu struktūru
12.45-13.00	Stenda referātu prezentācijas (1 min) / Short poster presentations (1 min)	
	Māra Janaus	Dynamics of Breeding Waterbirds in Three Sites of Daugava River Outflow Ligzdojošo ūdensputnu skaita dinamika trijās Daugavas lejteces vietās kopš 2007.gada
	Alessandro Di Marzio	Plastic in Avian Habitats: Insights from Riga ZOO Nesting Box Study Plastmasa putnu dzīvotnēs: Rīga ZOO putnu būru pētījumā gūtās atziņas
13.00-14.30	Break, discussions, posters / Pārtraukums, diskusijas, stenda referāti	
14.30-14.45	Ronalds Krams* *presented by Māris Munkevics	Migratory European Pied Flycatchers (<i>Ficedula hypoleuca</i>) Offspring Fitness Costs in Pest Insect Outbreak Aaffected Forestmachine learning methods: a brand new approach Migrējošo melno mušķērāju (<i>Ficedula hypoleuca</i>) pēcnācēju pielāgotības traucējumi kaitēkļu kukaiņu uzliesmojuma skartajā mežā
14.45-15.00	Raitis Ritors	Natterjack toad identification and population estimate in nature reserve “Karateri” Smilšu krupja identifikācija un populācijas lieluma aprēķināšana dabas liegumā “Karateri”
15.00-15.15	Jānis Ozols	Present threats to and future of saproxylic beetles in the EU-importance forest habitat types in Latvia Saproksilo vaboļu pašreizējais un nākotnes apdraudējums ES īpaši aizsargājamos meža biotopes Latvijā
15.15-15.30	Aleksandra Koliņa	The diurnal-nocturnal activity of Orthoptera in coastal forests of Riga gulf Taisnspārņu diennakts aktivitāte Rīgas jūras līča piejūras mežos
15.30-15.45	Diāna Berezovska	Characterization of Orthoptera species composition in calcareous fens using passive bioacoustic recorders Taisnspārņu sugu sastāva raksturošana ar pasīvo bioakustikas metodi kalķainos zāļu purvos
15.45-...	Student award announcement, conclusions, discussions Studentu konkursa uzvarētāja paziņošana, noslēguma diskusijas	

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PLENARY SESSION

PLENĀRIE ZIŅOJUMI

UNBOXING NAVIGATION: *PIPISTRELLE* BATS AS A MODEL TO INVESTIGATE MIGRATORY ORIENTATION BEHAVIOUR AND MAGNETORECEPTION IN WILD MAMMALS

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Migratory mammal navigation remains remarkably understudied, especially compared to the extensive research on avian navigation. In this talk, I will focus on *Pipistrellus* bats, a highly promising model organism for investigating magnetoreception in a migratory context. First, I will provide an up-to-date overview of the field of magnetoreception, which has been frequently reshaped over the last six decades by disruptive findings and methodological advances. Second, I will highlight our work at the Pape Ornithological Station of the University of Latvia, where we study the migration, navigation, and magnetoreception of bats in the wild. I will introduce the unique methods we have developed to measure bats' intended migratory flight direction—an approach crucial for species that do not show typical Zugunruhe behaviours, as birds do. Third, I will present one of our key findings demonstrating that migratory bats calibrate their magnetic compass using the solar azimuth at sunset: when exposed to an experimentally shifted magnetic field at sunset, bats exhibited altered orientation after nightfall. Finally, I will discuss the broader implications of this research for conservation in the Anthropocene, emphasizing how insights into sensory ecology can guide strategies for protecting migratory species.

TRAINING THE EUROPEAN ORTHOPTERA SOUND SYSTEM (TEOSS)

Florent Prunier¹, Filippo M. Buzzetti², Vassiliki Kati³, Baudewijn Odé⁴, Marta Villasan⁵, Vincent Kalkman⁶

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Project TEOSS aims to enhance Orthoptera recognition in Europe through sound recordings. This collaborative effort involves, in the period 2024 and 2025, organizations from Spain, Italy, and Greece and focuses on the Mediterranean Basin biodiversity hotspot. TEOSS is part of the TETTRIS consortium, which seeks to transform European taxonomy through training, research and innovations, by developing AI-based sound recognition models for European grasshoppers to enhance biodiversity monitoring and conservation efforts. The project's primary objectives include organizing international workshops and establishing a reference collection of Orthoptera sounds under the umbrella of Xeno Canto online database.

In 2024, two initial workshops were held in Verona, Italy, and Sierra La Demanda, Spain, with over 55 participants from diverse backgrounds. These events provided a unique opportunity for Orthopterists to exchange knowledge and learn new techniques for recording Orthoptera sounds. During the workshops, nearly 100 species were recorded in just a few days, contributing many new tracks to the Xeno Canto platform. Within few days, young students and researchers were able to learn the most basic techniques, so that many of them already started with personal bioacoustic research in their country. These workshops were the first of their kind in both countries, focusing on Orthoptera bioacoustics and documenting little-known endemic species that have yet to be extensively studied. New workshops will be organized in 2025 in Greece and Spain.

By making bioacoustics more accessible to both professional and non-professional naturalists, the project aims to enhance the capacity for species identification and monitoring. This is only achievable with a variety of Orthoptera records, of different quality that will match future users. Any correctly identified Orthoptera sound can contribute to better sound recognition models, hence we invite to participate.

PRESENTATIONS

MUTISKIE ZIŅOJUMI

EFFECTS OF SEX-LIMITED EXPERIMENTAL EVOLUTION ON A HERMAPHRODITE

Aivars Cīrulis^{1,2,3}, Anna K. Nordén¹, Allison M. Churcher⁴, Vignesh Ramnath¹, Martin Majvall¹, Qinyang Li¹, Robin Pranter¹, Steven A. Ramm^{5,6}, Kira S. Zadesenets¹, Jessica K. Abbott¹

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As our understanding of the early stages of sex chromosome evolution is mainly based on theory and comparative evidence, we developed a system that we hoped would make it possible to observe in real time what happens after acquiring a new sex-determining gene. We used a previously established green fluorescent protein (GFP) line of the simultaneous hermaphrodite *Macrostomum lignano*. We used the GFP locus as a dominant sterility mutation inherited in a Mendelian fashion. By allowing the GFP allele to be inherited only through sperm, we created male-limited selection lines (resembling the early stages in XY chromosome evolution), and by allowing the GFP allele to be inherited only through egg cells, we created female-limited selection lines (resembling the early stages in ZW chromosome evolution). We also created control lines where the inheritance pattern was equally mixed. After tens of generations, we investigated how these lines have responded on the genome, transcriptome, and phenotype levels. We sequenced genomes and analysed changes in SNP frequency and structural variant (SV) distribution across the genome. We also sequenced transcriptomes to see how gene regulation has changed. Besides genomic analyses, we examined how mating behaviour and sexual anatomy have changed. We observed that the female-selected lines responded the most at the genomic level. For example, the number of significantly differentially expressed transcripts was largest between the female-selected and control lines. These changes involved the downregulation of testes-biased genes and genes involved biosynthesis of amino acids and carbon metabolism. In addition, we observed the highest number of SVs in the female-selected lines, which could be related to changes in recombination rate. In contrast, the male-selected lines seemed to have responded the most at the phenotypic level since we observed a decrease in the ovary size and body size in the male-selected lines and behavioural changes that may be related to changes in the ejaculate. Both sex-specific selection regimes showed evidence of alterations in the shape of the stylet. Based on these results, we can conclude that our worms have responded to the sex-limited selection in a way that is generally consistent with our expectations from other young sex chromosome systems. The evidence of a decrease in the testes function in the female-selected lines resembles adaptation towards gynodioecy, and the evidence of a reduction of the ovary size in the male-selected lines resembles adaptation towards androdioecy.

**TERMINALLY INVESTING YELLOW MEALWORM BEETLE (*TENEBRIO MOLITOR*)
MALES DISHONESTLY SIGNAL THEIR BODY ODORS TO FEMALES BUT NOT
MICROBIOME ODORS**

Colton Bryce Adams^{1,2,3,4}, Indriķis Krams^{1,2,5}, Giedrius Trakimas^{1,6}, Jorge Contreras Garduño⁷, André Rodrigues De Souza⁸, Janīna Daukšte⁹, Valdis Mizers¹, Ēriks Sļedevskis¹, Vadims Kolbjonoks¹, Sergejs Popovs^{1,2}, Markus J. Rantala¹⁰, Ronalds Krams^{1,2,11}, Tatjana Krama^{1,2,11}

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Male *Tenebrio molitor* enhance sex odor attractiveness when immunocompromised by an artificial implant that activates their immune system. We examined how females evaluate the health status of implanted (treatment) and control males based not only on their sex pheromones, but also on their fecal odors. Odor discs of three groups were collected from treatment and control males: body, fecal, and ‘body and fecal’ scents. We measured male survival and time spent by females investigating discs they were presented with and compared between treatments for the three odor groups. Treatment males perished at a greater rate than controls. Females spent more time on treatment body discs, less time on fecal discs, and had no preference for ‘body and fecal’ discs when compared to control males. We conclude that terminally investing males fake their sex odors to females, yet they cannot fake their microbiome odors, supporting the fermentation hypothesis of chemical communication.

THE EFFECT OF ASPIRIN ON THE LIFESPAN OF DROSOPHILA MELANOGASTER DEPENDS ON SEX AND DEVELOPMENTAL STAGE

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Acetylsalicylic acid, commonly known as aspirin, is a widely used anti-inflammatory agent with analgesic, antipyretic, and antithrombotic properties. However, its adverse effects on the gastrointestinal mucosa are well-documented. Longevity is influenced by many different external and internal factors such as environment, sex, nutrition quality etc., but in recent years the role of the digestive tract in the ageing process has been increasingly highlighted. Recent studies suggest that aspirin may have a positive effect on mitigating age-dependent gut leakage, potentially contributing to prolonged survival. These findings challenge conventional views on the negative consequences of long-term aspirin use.

In this study, *Drosophila melanogaster* fruit flies were reared on an aspirin-supplemented medium. To evaluate the impact of aspirin on survival while minimizing bias related to organism's regenerative capabilities, adult flies were placed to starvation conditions three days post-hatching. To better understand the effects of aspirin on survival through its effects on the digestive system, two groups were established: one consumed aspirin only during the larval stage, while the other received aspirin throughout their lifespan. Within each group, males and females were analysed separately. Survival data recorded and compared with controls.

Results revealed that flies consuming aspirin exclusively during the larval stage exhibited significantly higher survival rates compared to the control group. In contrast, flies fed aspirin throughout their lives experienced a markedly reduced lifespan. Furthermore, survival outcomes within groups differed significantly between sexes: the positive effects of aspirin were observed only in males.

The contrasting effects of aspirin between the intervention regimes could be explained by complete metamorphosis, during which a new imago digestive system completely replaces damaged larval organs. Meanwhile difference in the observed effect suggests that aspirin, instead of increasing life span by affecting a species-specific trait, antagonizes some kind of sex-related cause of the inflammation. The results could be explained by different aggressive behaviour strategies, their frequencies, and the significance of the consequences between sexes.

USING THE METHOD OF GEOMETRIC MORPHOMETRY TO ANALYZE THE PATHOLOGY OF THE MANDIBLE IN HARTING'S VOLE

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As an adaptation to the continuous gnawing and teeth attrition, all rodents acquired hypselodont incisors and mandibles capable of changing shape and proportions in response to diet type. Voles also have hypselodont molars.

Malocclusion and overgrown teeth are typically considered as a functional disorder often resulting in a mandibles misalignment, causing the maxillary teeth to diverge laterally from the mandibular teeth. This may be accompanied by molar alveolus protrusions, hamartoma-like lesions, and mandible deformations. The etiology of these lesions is unclear. Potential causes may include an inappropriate diet, aging, trauma, infection, stress and inheritance.

A colony of Harting's vole *Microtus hartingi* (*Har*) and its subspecies *M. h. ankaraensis* (*Ank*) was maintained for stress-related studies at the University of Latvia. Over six years, tooth overgrowth was observed in approximately 16% of *Har* and 10% of *Ank*. Mandible deformations were rare but always coincided with tooth overgrowth. In the *Ank* population, teeth and mandibles deformations were observed only post-study.

This study aimed to investigate Harting's vole mandible shape deformation patterns using geometric morphometrics (GM). Mandibles were divided into subgroups: normal (N) and deformed (D) for *Har*; deformation initiation (ID) and deformed (D) for *Ank*. Photographs were taken from the labial and lingual sides of both hemimandibles with subsequent GM analysis. GM results showed the same deformation patterns in both populations. The main deformation patterns included enlargement of the mandible corpus, widening of the branches of the coronoid and articular processes, and a reduction in the distances between mandibular processes. A raised molar alveolus, deformation of the incisor alveolus, narrowing of the diastema, and enlargement of the third molar alveolus on the lingual side were observed. However, no significant changes in mandibular morphoecological indices were shown. This suggests mandible deformation is a compensatory mechanism that allows the animal to preserve its feeding ability.

PRELIMINARY STUDY OF EUROPEAN FOREST REINDEER (*RANGIFER TARANDUS FENNICUS*) HAIR STRUCTURE

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Reindeer fur and hair have unique properties and provide these animals with insulation for arctic climate. Morphologically reindeer hair is a little researched subject, particularly with sampling individual hairs based on their visual appearance and their microbiological structure as well as examining hair type variations between subspecies.

European forest reindeer (*Rangifer tarandus fennicus*) hair samples were taken from different parts of the body (neck, shoulders, foreleg, foot) to look at their structure with and without magnification. Participating animals were from Riga ZOO, who were differing in age and sex (5 females, 1 male). The aim was to discover if the hair differed based on their placement and expand on available information about existing limited scientific data. Unmagnified hair appearance was described, and lengths were measured, and magnified samples were analyzed looking into their structure and compared with available sources. Unmagnified hair showed variability in their appearance, with samples from neck mane being the longest (16cm) and coarsest, following with foot hair (8.5cm) being finer in appearance, shoulder hair (5.5cm) varying in diversity and foreleg hairs being the shortest (3.5cm) and most pigmented. Magnified samples brought up the expected differences in scale features (regular mosaic, regular wave, irregular wave with minor variations), medulla structure (filled lattice and fragmented lattice) and hair root variation (wineglass and elongated).

The hair of *Rangifer tarandus fennicus* differed from other reindeer subspecies when reviewing available scientific papers and provided with the insight to the higher variety of hair types and corresponding microscopic structures that have not been described before. The existing research overlapped with the findings, but newly discovered information would further help with understanding reindeer hair, differences between subspecies and their function.

MIGRATORY EUROPEAN PIED FLYCATCHERS (*FICEDULA HYPOLEUCA*) OFFSPRING FITNESS COSTS IN PEST INSECT OUTBREAK AFFECTED FOREST

Ronalds Krams^{1,2,3}, Colton Bryce Adams^{1,2,4,5}, Didzis Elferts⁶, Guntis Brūmelis⁷, Iluta Dauškane⁷, Linda Strode⁷, Agnis Šmits⁶, Giedrius Trakimas^{1,8}, Indriķis Krams^{1,2,7}, Tatjana Krama^{1,2,3}

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When selecting a habitat for breeding and offspring rearing, it is optimal for organisms to select a stable habitat with high amounts of quality resources. However, organisms may inadvertently select a habitat for breeding that would initially appear preferential and healthy but may be detrimental to parent and/or offspring fitness. Such ecological traps may even be the result of human habitat modification and conservation efforts.

In this study, we tested whether migratory European pied flycatcher (*Ficedula hypoleuca*) offspring cavity-nesting in patches of forest affected by outbreaks of the great web-spinning sawfly (*Acantholyda posticalis*) incurred fitness detriments characteristic of ecological traps when compared to flycatchers that nested in patches of unaffected forest.

Outbreaking sawfly larvae overconsume Scots pine (*Pinus sylvestris*) needles and substrate, which decreases resource availability directly and indirectly – through cascading effects – for birds inhabiting the forest. In installing nest boxes to attract breeding pairs and potentially combat the outbreak, we found that flycatchers inhabiting areas of sawfly outbreaks had similar clutch sizes to pairs breeding in healthy forest patches. Contrarily, the fledgling number and body condition were significantly lower for those nesting in the damaged forests. Though larvae serve as the primary food source for nestlings, the forest patches damaged by sawflies also had lower larval biomass from rapid resource decline due to overconsumption. In provisioning nest boxes for migrating flycatcher pairs in forest patches that were subsequently impacted by a pest insect outbreak, an ecological trap arose for those pairs choosing to nest in what appeared to be an unaffected forest at first.

Given the inability of breeding pairs to distinguish habitat quality on initial inspection, we suggest that nest boxes be used with caution in areas with unstable habitat conditions when attracting migratory birds given the trends of their declining global numbers.

NATTERJACK TOAD IDENTIFICATION AND POPULATION ESTIMATE IN NATURE RESERVE “KARATERI”

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The natterjack toad (*Epidalea calamita*) is a species found across Europe, reaching its northernmost range in Estonia. In Latvia, natterjack toads are near the edge of their northern distribution. A regional reassessment of their IUCN conservation status classified the species as Endangered (EN) in Latvia. The primary causes of population fragmentation in the country have been the loss of spawning habitats and human disturbances. Rīga ZOO has established a captive breeding program for natterjack toads, using first-generation breeders sourced from the wild in Latvia. The zoo has conducted several population supplementation actions with captive-bred toads in an effort to preserve the genetic diversity of wild populations and retain genetic lines native to Latvia. However, while the presence of toads at release sites has been monitored, no attempts have been made to track the survival of released individuals. To address this, we have evaluated various identification methods and selected image-based identification using dorsal photographs of toads analyzed with the I3S software. Statistical analysis revealed that dorsal images offer slightly higher identification success rates compared to ventral images. The most recent release of captive-bred toads by Rīga ZOO occurred in 2022, targeting a secluded population in Salacgrīva County. We are currently testing the image identification method on this population, intending to use it as a tool to assess the success of population supplementation efforts and population dynamics.

PRESENT THREATS TO AND FUTURE OF SAPROXYLIC BEETLES IN THE EU-IMPARTANCE FOREST HABITAT TYPES IN LATVIA

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In the last decades, the proportion of old natural forests in Northern Europe has decreased to less than 3% of the total forest area. This led to a major decline of the amount of decaying and dead wood by 90-98%, and saproxylic insect species diversity consequently decreased by one third. One of the major saproxylic insect groups is saproxylic beetles, and many beetle species depend on old-growth natural forests and amount of dead wood. During our project, we have assessed threats to some Latvian saproxylic beetles in accordance with IUCN criteria. Red List category, major threats, area of occupancy, habitats of major importance, and necessary conservation actions have been evaluated. Many saproxylic beetle species are known as indicator species for forest habitat types of the EU-importance. One of the main criteria used for saproxylic beetle survival assessment is their present area of occupancy, which we compared with present area of the EU-importance forest habitats and assessed threats and necessary conservation actions for both. Assessment of the necessary area size of the EU-importance forest habitats has been done by selecting favorable reference areas, results show that necessary area is same size or larger than present forest habitat area. Favorable reference area should provide stable subpopulation for indicator species. By comparing saproxylic beetle species' current areas of occupancy with present and potential forest habitat areas and quality, we were able to select the most important territories in Latvia for saproxylic beetle species and forest habitat conservation. Our aim is to understand if selected forest habitats favorable reference areas would provide stable subpopulations for threatened saproxylic beetle species, presumed those would be high-quality forest territories, and to select most appropriate territories for saproxylic beetle conservation.

The studies were carried under LIFE program projects, funded by Life for Species LIFE19GIE/LV/000857 and Latvia Nature LIFE19 IPE/LV/000010.

THE DIURNAL-NOCTURNAL ACTIVITY OF ORTHOPTERA IN COASTAL FORESTS OF RIGA GULF

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Orthoptera are a known key-group of insects in different grassland habitats, but studies focusing on their importance in forests are limited. Due to their relatively large body mass and population density, they play a potentially important role in the food web in these wooded areas, especially for birds. Additionally, due to the difference in habitat conditions, forests host a unique species community. *Barbitistes constrictus* is an example of typical forest specialist species. They are micropterous, mostly sedentary and crawling around instead of actively jumping or flying. This reduces both the species dispersal abilities and the detection probability of this and other similarly adapted species. This makes bioacoustics possibly the only appropriate method to record the activity and species composition of forest-dwelling orthopterans, as opposed to the methods used for grassland-dwelling species. We aimed to explore the use of these methods for faunal studies of Orthoptera in forests and to broaden the understanding of their activity in this habitat and what factors might affect it.

We set up 10 AudioMoth devices in 3 different locations in Latvia - Lapmežciems, Kaltene and Kolka. The choice of sampling sites was made based on their position near the gulf of Riga, area of pine forests and previous observations of *Barbitistes constrictus*. Each device was mounted on a tree trunk and set to record a minute of audio every hour for 14 days. The devices were set to a sample rate of 192 kHz. The 3 devices set in Lapmežciems were placed on the 22nd of August and taken off on the 4th of September. The rest of the devices were put up on the 29th of August and taken off on the 12th of September. Environmental factors, such as habitat type, local vegetation characteristics, ground cover, anthropogenic pressure etc. were logged to determine the main factors that influence Orthoptera activity in wooded areas. Afterwards, the audio files were analysed mostly using ecoacoustic analysis platform "Arbimon" and software "Audacity". Each recording was listened to and the minimal amount of stridulating individuals at each hour in the given location was logged. Species were determined based on the characteristic frequency and rhythm pattern.

In total, from the 10 devices that were set up, only 8 successfully recorded audio, 2 in Lapmežciems, 3 in Kaltene and 3 in Kolka. A total of 16 different species were found. The highest number of species was recorded in Lapmežciems, with 9 species in total. Most of the stridulation activity usually happened between 12pm and 5am. The most observed species in the recordings was *Pholidoptera griseoaptera*. It was heard in all locations and with the highest average number of individuals at most hours of the night. The preliminary results show that in the forest with the least amount of human activity nearby, the diurnal stridulation activity of Orthoptera was highest, on average having more stridulating individuals per hour than in forests with anthropogenic pressure. Further analysis is in progress to find out the influence of these anthropogenic and natural environmental factors on the activity of Orthoptera in forests.

CHARACTERIZATION OF ORTHOPTERA SPECIES COMPOSITION IN CALCAREOUS FENS USING PASSIVE BIOACOUSTIC RECORDERS

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Bioacoustic methods are becoming increasingly popular in Orthoptera species composition studies. The passive bioacoustic approach is based on recording Orthoptera sounds by placing devices programmed to record sound at specific time intervals. This research method is low cost and well suited to poorly studied areas or habitats where it is difficult to use traditional methods, such as collecting samples with a sweep net or traps. We aimed to assess the use of passive acoustic recorders to characterize Orthoptera species composition in fen habitats.

In this study, six AudioMoth devices were placed in the territory of the "Engure Lake" Nature Park: three in calcareous fens and three in calcareous fens with *Cladium mariscus*. The recordings were made from August 12th to 25th, 2024. The recorders were set to record 1 minute twice an hour (48 recordings per day per device). After the exposition period the AudioMoths were removed and the recordings were loaded in Arbimon cloud. A total of 3360 recordings were obtained from five devices (one device failed to record). Species recognition was conducted in Audacity software, using XenoCanto and Sardet et al. 2021 recordings for reference. Here we present the preliminary results from two AudioMoth devices (a total of 1344 audio files) that were placed in each type of calcareous fens.

Overall, 10 Orthoptera species were identified. All species were observed in both habitats, but their frequency varied. The three most common species in calcareous fens were *Conocephalus dorsalis*, *Metrioptera brachyptera* and *Tettigonia cantans*, whereas in calcareous fens with *Cladium mariscus* were *Conocephalus dorsalis*, *Phaneroptera falcata* and *Tettigonia cantans*. Orthoptera activity was high both during the day and at night, which highlights the necessity to study the most effective time periods for species composition research. Additional research focusing on the observed species using various research methods would be informative in planning ecological studies.

POSTERS

STENDA REFERĀTI

DYNAMICS OF BREEDING WATERBIRDS IN THREE SITES OF DAUGAVA RIVER OUTFLOW

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The degradation of breeding habitats, both in area and quality, has led to declining populations of many waterbird species. To monitor the species composition and breeding success, as well as to improve breeding conditions for waterbirds, systematic monitoring has been conducted since 2007 in the nature-protected areas of Krēmeri and Mīlestības saliņa as well as Žurku Island within the territory of the Freeport of Riga.

The most significant progress has been achieved on Žurku Island, where regular shrub removal has created suitable conditions for various waterbird species. Breeding pairs recorded include Herring Gull *Larus argentatus*: 20–420 nests, Common Tern *Sterna hirundo*: 5–50 nests, Black-headed Gull *Chroicocephalus ridibundus*: 14–1350 pairs (episodi

cally breeding), Eurasian Oystercatcher *Haematopus ostralegus*: one pair (since 2020). The number of Mallards *Anas platyrhynchos* has also increased (up to 34 nests), and Gadwall *Mareca strepera* began breeding in 2019, with up to eight nests recorded in 2022. Breeding success on Žurku Island has been relatively high, likely due to the absence of mammalian predators.

Initial positive changes were observed in the Krēmeri Nature Protected Area after habitat restoration efforts began in 2018, including shrub and reed removal and the creation of coastal meadows. These measures facilitated the return of Black-headed Gull colonies and some wader species. However, the Black-headed Gull colony, which was destroyed by foxes in 2015, failed to recover fully. Attempts to reestablish the colony in 2019–2020 were unsuccessful, likely due to predation. Additionally, overgrowth of shrubs and reeds has severely degraded the meadow habitat. Overall, the restoration efforts in this area have not met their intended goals.

In 2009, several artificial islets and a floating raft were constructed in the central lake of Mīlestības saliņa to attract larids, ducks and waders. Unfortunately, these efforts have been largely unsuccessful, with no gulls or waders colonizing the structures. Possible reasons include destruction of nests by mammalian predators and a lack of surplus individuals in local waterbird populations capable of colonizing the new sites. Although some Mallards have nested on the artificial islets, most attempts were unsuccessful, and the islets have gradually become overgrown with shrubs.

Efforts to improve waterbird breeding success have generally been effective only in locations naturally inaccessible to mammalian predators. In areas where predators such as American minks, foxes, Ussurian raccoon dogs and domestic dogs are present, the measures have not yielded significant results. Without effective predator control, further improvements in waterbird nesting success are unlikely.

PLASTIC IN AVIAN HABITATS: INSIGHTS FROM RIGA ZOO NESTING BOX STUDY

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The amount of anthropogenic elements found in the composition of bird nests increases with urbanization, which has negative repercussions on bird health. Monitoring bird nests allows us to quantify the levels of environmental pollution, which can also affect human beings. Given the magnitude of plastic pollution and its origin, society needs to be involved in the research, to be aware of the situation. We conducted a pilot project to study plastic contamination by monitoring the contents of the nest boxes installed at the zoo, built during the annual bird day event by zoo visitors.

We analyzed mesoplastic and microplastic fragments from 13 nest boxes, using infrared spectroscopy to determine the origin of the detected synthetic material. Polypropylene (PP) and polyethylene (PE) were the most frequently found materials, still not all nests contained plastic material (15% of nests were without plastic material). Greatest weight of plastic versus nets total weight reached 4.3%. Examples of found plastics – blue and white fibers, candy wrapping material, PE bag fragments. Preliminary results relate plastic contamination to the proximity to emission sources (e.g. coffee shops) present in the zoo rather than to the volume of visitors in the area. Monitoring nest could be a valuable citizen science approach for plastic pollution evaluation at certain areas.