12. Tagung | 12° Convegno

FR 16.09.2022 | **VEN 16.09.2022**

Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige

NATURMUSEUM SÜDTIROL
MUSEO SCIENZE NATURALI ALTO ADIGE
MUSEUM NATÖRA SÜDTIROL
BIODIVERSITY CENTER

Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige
Zoological and botanical research in South Tyrol

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September 2022 | Settembre 2022 | September 2022

Hinweise | Istruzioni | Instructions

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PROVINZIA AUTONOMA DE BULSAN SÜDTIROL

12. Zoologische und botanische Forschung in Südtirol
12° Ricerca zoologica e botanica in Alto Adige
12th Zoological and botanical research in South Tyrol

Tagungsprogramm | **Programma del convegno** | **Conference program**

Freitag / Venerdì / Friday 16.09.2022

Tagungsort / Luogo del convegno / Conference place: Kolpinghaus, Adolph-Kolping-Str. 3, Bozen / Bolzano

8:00	Anmeldung / Registrazione /Registration
8:30	Eröffnung der Tagung / Inaugurazione del convegno / Conference opening
Session chair: Hannes Schuler, Faculty of Science and Technology, Free University of Bozen-Bolzano (I)	
8:40	**L'eterogeneità degli habitat favorisce la diversità degli uccelli nei paesaggi altoatesini: risultati del Monitoraggio della Biodiversità Alto Adige** Matteo Anderle[1,2,3]*, Mattia Brambilla[3], Andreas Hilpold[1], Chiara Paniccia[1], Erich Tasser[1], Ulrike Tappeiner[1,2] & Julia Seeber[1,2] [1]Eurac Research, Bolzano (I); [2]Università di Innsbruck (A); [3]Università degli Studi di Milano (I) *corresponding author
9:00	**Control and growth of extracellular ice in plants** Maria Ralser[1], Matthias Stegner[1], Ilse Kranner[1], Notburga Gierlinger[2] & Gilbert Neuner[1] [1]University of Innsbruck (A); [2]Institute of Biophysics, University of Natural Resources and Life Sciences (BOKU), Vienna (A)
9:20	**Diversification dynamics in the alpine bushcricket genus *Anonconotus* Camerano, 1878** Philipp Kirschner[1,2] & Petra Kranebitter[1] [1]Museum of Nature South Tyrol, Bolzano (I); [2]University of Innsbruck (A)
9:40	**Esplorare la diversità dei pipistrelli in una regione alpina - risultati del monitoraggio biodiversità Alto Adige** Chiara Paniccia[1], Eva Ladurner[2], Alex Bellè[1], Florian Reichegger[3], Erich Tasser[1], Ulrike Tappeiner[1,4] & Andreas Hilpold[1] [1]Eurac Research, Bolzano (I); [2]Museo di Scienze Naturali dell'Alto Adige, Bolzano (I); [3]Università di Vienna (A); [4]Università di Innsbruck (A)
10:00	**Connettività di popolazione in uccelli alpini d'alta quota minacciati dai cambiamenti climatici** Francesco Ceresa[1], Mattia Brambilla[2], Laura Kvist[3], Severino Vitulano[4], Michele Pes[1,5], Laura Tomasi[1], Paolo Pedrini[5], Matteo Anderle[6], Andreas Hilpold[6] & Petra Kranebitter[1] [1]Museo di Scienze Naturali dell'Alto Adige, Bolzano (I); [2]Università di Milano (I); [3]Università di Oulu (FIN); [4]Studio Pteryx, Basiano (I); [5]MUSE – Museo delle Scienze, Trento (I); [6]Eurac Research, Bolzano (I)
10:20	**Biodiversity and systematics of jumping plant-lice of the subfamily Liviinae (Hemiptera: Psylloidea: Liviidae)** Liliya Serbina[1,2], Igor Malenovský[2], Lenka Petráková[2], Dalva L. Queiroz[3], Diana Percy[4], Hannes Schuler[1] & Daniel Burckhardt[5] [1]Free University of Bozen-Bolzano (I); [2]Masaryk University, Brno (CZ); [3]Embrapa Florestas, Colombo (BRA); [4]University of British Columbia, Vancouver (CA); [5]Naturhistorisches Museum Basel (CH)
10:40-11:10	***Kaffeepause /Pausa caffè / Coffee break***

Session chair: Elia Guariento, Institute for Alpine Environment, Eurac Research, Bolzano (I)	
11:10	**Wirksamkeitskontrollen des Fischschutzes an den Wasserkraftwerken der Alperia Gruppe** MATTIA PERGHER[1] & RUBEN TUTZER[2] [1]Alperia Greenpower GmbH, Bozen (I); [2]Universität Innsbruck (A)
11:30	**Vergleich von Arthropoden- und Parasitoiden-Gemeinschaften zwischen landwirtschaftlich genutzten und naturnahen Standorten, mit besonderem Augenmerk auf Pentatomoidea (Heteroptera) und deren Parasitoiden (Hymenoptera)** LISA OBWEGS[1], ELIA GUARIENTO[1], ULRIKE TAPPEINER[1,2], MARTINA FALAGIARDA[3] & ANDREAS HILPOLD[1] [1]Eurac Research, Bozen (I); [2]Universität Innsbruck (A); [3]Versuchszentrum Laimburg, Pfatten (I)
11:50	**Behavioral differences of the European spruce bark beetle, *Ips typographus*, linked to spruce and pine plant volatiles** CINTHIA SIEDER[1], RICCARDO FAVARO[1,2], ALESSANDRO ANDRIOLLO[3] & SERGIO ANGELI[1] [1]Free University of Bozen-Bolzano; [2]University of Innsbruck (A); [3]Ufficio Pianificazione forestale, Provincia autonoma di Bolzano - Alto Adige (I)
12:10	**Nuovi dati distributivi per la forma sotterranea di *Arvicola italicus* in Alto Adige** DINO SCARAVELLI[1] & ELISABETH LUNGER[2] [1]Dipartimento di Scienze Biologiche, Geologiche e Ambientali University of Bologna (I);[2]Prati, Val di Vizze (I)
12:30	**Il post Vaia: la sopravvivenza di *Myricaria germanica* in un ambiente antropizzato** BRUNO MICHIELON Venezia (I)
12:50-14:00	***Mittagspause / Pausa pranzo / Lunch break***
Session chair: Sanja Baric, Faculty of Science and Technology, Free University of Bozen-Bolzano (I)	
14:00	**Strong contrast between the butterfly communities of extensive grasslands, intensively used farmland and urban areas – results from the Biodiversity Monitoring South Tyrol** ELIA GUARIENTO[1,2]*, JOHANNES RÜDISSER[2], KONRAD FIEDLER[3], CHIARA PANICCIA[1], SIMON STIFTER[1], ULRIKE TAPPEINER[1,2], JULIA SEEBER[1,2] & ANDREAS HILPOLD[1] [1]Eurac Research, Bolzano (I); [2]University of Innsbruck (A); [3]University of Vienna (A) *corresponding author
14:20	**Invasion und Tilgung des Teezweigbohrers in den Gärten von Schloss Trauttmansdorff** HANNES SCHULER[1], STEFAN SCHWEMBACHER[2], ALESSANDRO ANDRIOLO[3] & ANDREA BATTISTI[4] [1]Freie Universität Bozen (I); [2]Pflanzenschutzdienst, Autonome Provinz Bozen – Südtirol (I); [3]Amt für Forstplanung, Autonome Provinz Bozen–Südtirol (I); [4]Universität Padua (I)
14:40	**Molecular gut analyses to assess the feeding behavior of the brown marmorated stink bug *Halyomorpha halys* in South Tyrol** MAJA FLUCH[1]*, ERIKA CORRETTO[1], STEFANIE FISCHNALLER[2] & HANNES SCHULER[1,3] [1]Faculty of Science and Technology, Free University of Bozen-Bolzano (I); [2]Laimburg Research Centre, Vadena/Pfatten (I); [3]Competence Centre for Plant Health, Free University of Bozen-Bolzano (I) *corresponding author
15:00	**Der Einfluss aktiver und passiver thermischer Isolierung von Bienenbeuten auf die Honigbienengesundheit und -widerstandskraft gegen *Varroa destructor*** THORSTEN SCHWERTE[1], STEFANIE JÄGER[1], PETER LINSER[2] & HANSPETER HELM[3] [1]Institut für Zoologie, Universität Innsbruck (A); [2]Fa. Apishold.at (A); [3]Physikalisches Institut, Universität Freiburg (D)

15:20	**Chemical composition and repellence activities of essential oils of African basil (*Ocimum gratissimum*), holy basil (*Ocimum tenuiflorum*) and common lantana (*Lantana camara*) against the *Tribolium casteneum* (Herbst) (Coleoptera: Tenebrionidae** BHANU YADAV[1], JOHN ABRAHAM[2]*, RICCARDO FAVARO[1] & SERGIO ANGELI[1]* [1]Faculty of Science and Technology, Free University of Bozen-Bolzano (I); [2]University of Cape Coast, Department of Conservation Biology and Entomology, Cape Coast (Ghana) *corresponding authors
15:40	**Vom Wissen zum Handeln: Monitoring von Fledermaus-Quartieren als Basis für angewandten Artenschutz** EVA LADURNER[1], CHRISTIAN DRESCHER[1] & GIULIA LIGAZZOLO[2] [1]Naturmuseum Südtirol, Bozen (I); [2]Amt für Natur, Autonome Provinz Bozen – Südtirol (I)
16:00-16:20	***Kaffeepause /Pausa caffè / Coffee break***
Session chair: Edith Bucher, Nature Office, Autonomous Province of Bolzano – South Tyrol, Bolzano (I)	
16:20	**Die Gesellschaften alpiner Bodenmakroinvertebraten entlang Höhengradienten im oberen Vinschgau (Südtirol, Italien)** MICHAEL STEINWANDTER[1], JULIAN VON SPINN[1,2] & JULIA SEEBER[1,2] [1]Eurac Research, Bozen (I); [2]Universität Innsbruck (A)
16:40	**Diversität epigäischer Spinnen entlang von drei Höhengradienten (1.500-3.000 m) im oberen Vinschgau (Südtirol)** JULIAN VON SPINN[1], MICHAEL STEINWANDTER[2] & JULIA SEEBER[1,2] [1]Universität Innsbruck (A); [2]Eurac Research, Bozen (I)
17:00	**Genotypisierung der Edelkastanienbäume in Südtirol** FEDERICO SCAIATTOLINI & SANJA BARIC* Freie Universität Bozen (I) *presenting author
17:20	**Biodiversità dei macroinvertebrati bentonici nei siti fluviali campionati durante il primo anno del progetto Biodiversity Monitoring South Tyrol** FRANCESCA VALLEFUOCO[1], MAGDALENA VANEK[1], ROBERTA BOTTARIN[1], ANDREAS HILPOLD[1], THOMAS MARSONER[1], ULRIKE TAPPEINER[1,2] & ALBERTO SCOTTI[1] [1]Eurac Research, Bolzano (I); [2]University of Innsbruck (A)
17:40-19:00	**Posterpräsentation mit Umtrunk / presentazione dei poster con rinfresco /poster presentation with drinks**
19:00	Ende der Tagung / Fine del convegno / End of the conference

Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige
Zoological and botanical research in South Tyrol

Vorträge – Kurzfassungen | **Relazioni – riassunti** | **Presentations – abstracts**

L'eterogeneità degli habitat favorisce la diversità degli uccelli nei paesaggi altoatesini: risultati del Monitoraggio della Biodiversità Alto Adige

MATTEO ANDERLE[1,2,3]*, MATTIA BRAMBILLA[3], ANDREAS HILPOLD[1], CHIARA PANICCIA[1], ERICH TASSER[1], ULRIKE TAPPEINER[1,2] & JULIA SEEBER[1,2]
[1]Istituto per l'Ambiente Alpino, Eurac Research, Bolzano (I); [2]Department of Ecology, University of Innsbruck (A); [3] Dipartimento di Scienze e Politiche Ambientali, Università degli Studi di Milano (I)
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La comprensione delle cause della perdita di biodiversità è una priorità degli ultimi anni. Un importante fattore di promozione della biodiversità è l'eterogeneità dell'habitat, cruciale per molti gruppi. Gli uccelli sono sensibili ai cambiamenti ambientali e particolarmente vulnerabili alla perdita di eterogeneità dell'habitat. La comprensione dei fattori trainanti per uccelli è necessaria per identificare gli impatti del cambiamento di uso del suolo e future strategie di conservazione. Dal 2019, nell'ambito del Monitoraggio della Biodiversità Alto Adige, rileviamo le comunità di uccelli nei principali habitat dell'Alto Adige. Indaghiamo le diversità degli uccelli a diverse scale lungo gradienti di intensità di uso del suolo (LULC) e di altitudine. Abbiamo calcolato diversi indici per analizzare la relazione tra uccelli ed eterogeneità dell'habitat in diversi tipi di habitat. Abbiamo esplorato come le variabili ambientali influenzino i tratti degli uccelli. I risultati hanno dimostrato che l'eterogeneità dell'habitat è essenziale per la presenza di comunità ricche e diversificate, in particolare per gli uccelli delle zone agricole. Analizzando l'altezza delle piante, la produttività primaria e la copertura dei diversi strati, abbiamo dimostrato che diverse caratteristiche dell'habitat a livello di paesaggio influenzano gli uccelli. In Alto Adige, le zone umide, gli habitat aperti, i mosaici agricoli, gli elementi ecotonali agricoli, e le foreste continue sono risultati particolarmente importanti. Per la conservazione degli uccelli in Alto Adige, si dovrebbero sostenere le pratiche di pianificazione che promuovono piccoli campi, elementi strutturali e un mosaico di diversi tipi di LULC, preservando le foreste omogenee. Inoltre, pascoli, prati estensivi e zone umide sono fondamentali per la conservazione. Queste strategie potrebbero contribuire a mitigare gli impatti del cambiamento globale sulla diversità degli uccelli in Alto Adige e in regioni alpine simili.

Habitat heterogeneity promotes bird diversity in South Tyrolean landscapes: results from the Biodiversity Monitoring South Tyrol.

Understanding the drivers of biodiversity loss has been a priority over the last years. One important factor promoting biodiversity is habitat heterogeneity, which has been reported as crucial for many groups. Birds are sensitive to environmental changes, including being particularly vulnerable to loss of habitat heterogeneity. Understanding the effects of the drivers on birds is necessary to identify the impacts of land use changes, and to derive future conservation strategies. Since 2019, within the Biodiversity Monitoring South Tyrol, we have been surveying bird communities in the main habitats of South Tyrol. We investigate bird diversities at different scales along gradients of land use/land cover (LULC) intensity and elevation. Remote sensing data are particularly suited to quantify habitat heterogeneity over relatively large extents. We computed different indices to analyse the relationship between birds and habitat heterogeneity along different habitat types. We also explored how environmental variables influence bird traits. Results showed that habitat heterogeneity is essential in shaping rich and diverse communities, and it is particularly important for farmland birds. By comparing the effects of canopy height, primary productivity, cover of different layers, we showed that different habitat characteristics at the landscape level affect birds. In South Tyrol, wetlands, open habitats, agricultural mosaics of small habitat patches, ecotonal elements in agricultural settings, continuous forests, appeared to be particularly relevant. To conserve birds in South Tyrol, planning practices promoting small fields, structural elements, and a mosaic of different LULC types should be supported, while preserving

continuous forests at the same time. Additionally, pastures, extensive meadows, and wetlands are key to conservation. These strategies might contribute to mitigating the impacts of global change on bird diversity in South Tyrol and in similar Alpine regions.

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Connettività di popolazione in uccelli alpini d'alta quota minacciati dai cambiamenti climatici

FRANCESCO CERESA[1], MATTIA BRAMBILLA[2], LAURA KVIST[3], SEVERINO VITULANO[4], MICHELE PES[1,5], LAURA TOMASI[1], PAOLO PEDRINI[5], MATTEO ANDERLE[6], ANDREAS HILPOLD[6] & PETRA KRANEBITTER[1]
[1]Museo di Scienze Naturali dell'Alto Adige, Bolzano (I); [2]Università di Milano (I); [3]Università di Oulu (FIN); [4]Studio Pteryx, Basiano (I); [5]MUSE – Museo delle Scienze, Trento (I); [6]Istituto per l'Ambiente Alpino, Eurac Research, Bolzano (I)

Gli uccelli legati alle zone d'alta quota sono attualmente minacciati dai cambiamenti climatici e da modifiche del loro habitat indotte dall'uomo, che causano la riduzione e la frammentazione dei loro areali di distribuzione. In questo contesto sfavorevole, è necessaria un'elevata capacità di dispersione per consentire lo scambio di individui tra aree riproduttive sempre più isolate, e quindi un flusso genico sufficiente. Tuttavia, le attuali conoscenze sulla capacità di dispersione degli uccelli d'alta quota sono estremamente scarse e questo limita la nostra capacità di prevedere la distribuzione futura e i trend di popolazione. Abbiamo quindi studiato la connettività di popolazione in due specialisti d'alta quota, lo spioncello *Anthus spinoletta* e il fringuello alpino *Montifringilla nivalis* in un'ampia area delle Alpi centro-orientali, combinando la modellizzazione della resistenza del paesaggio e la genomica di popolazione. I nostri obiettivi erano valutare i livelli di flusso genico nell'area di studio e verificare se le caratteristiche del paesaggio influenzano la dispersione. Per entrambe le specie, le superfici di resistenza del paesaggio suggeriscono che i fondivalle e le aree boschive oppongono un'elevata resistenza alla dispersione. Per lo spioncello, i dati genomici hanno confermato che la dispersione è influenzata dalle caratteristiche del paesaggio, e che la specie disperde più facilmente attraverso habitat idoneo; le stesse analisi verranno eseguite anche per il fringuello alpino una volta completato il campionamento del DNA. Gli effetti della resistenza del paesaggio sulla dispersione potrebbero essere più forti in un probabile scenario futuro di popolazioni più ridotte di uccelli d'alta quota. I risultati confermano l'importanza di evitare ulteriori perdite e degrado dell'habitat di queste specie, evitando la costruzione di nuove infrastrutture, riducendo il disturbo antropico e implementando un'adeguata gestione dei pascoli alpini.

Population connectivity in high-elevation Alpine birds threatened by climate change

Birds living in high-elevation mountain areas are currently threatened by climate change and human-induced habitat modifications, which cause the reduction and fragmentation of their distribution ranges. In this unfavourable context, high dispersal ability is needed to allow the interchange of individuals among increasingly isolated breeding areas, and therefore sufficient gene flow. However, the current knowledge about the dispersal ability of high-altitude birds is extremely scarce, and this limits our ability to predict future distribution changes and population trends. We investigated population connectivity in two high-elevation specialists, the Water Pipit *Anthus spinoletta* and the White-winged Snowfinch *Montifringilla nivalis*, across a wide area in the central-eastern European Alps, by combining landscape resistance modelling and population genomics. We aimed to assess the gene flow levels within the study area and verify if landscape characteristics influence dispersal in these species. For both species, landscape resistance surfaces suggested that valley floors and woodlands oppose high resistance to dispersal. In the Water Pipit, genomic data confirmed that dispersal is influenced by landscape characteristics, and that this species preferably disperses across suitable habitat; the same analyses will be performed also for the Snowfinch after completing DNA sampling. The effects of landscape resistance to dispersal may be stronger in a likely future scenario of lower population size and more restricted range of high-elevation birds. These results support the importance of avoiding further habitat loss and degradation in high-elevation mountains, avoiding building new infrastructures, reducing human disturbance and adequately managing the alpine pastures.

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Molecular gut analyses to assess the feeding behavior of the brown marmorated stink bug *Halyomorpha halys* in South Tyrol

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Invasive species are a serious threat to global agricultural production. A recent example of a destructive invasive pest is the brown marmorated stink bug *Halyomorpha halys.* It is native to Northeastern Asia and was introduced to various countries in North America and Europe where it reached Italy in 2012 and South Tyrol in 2016. By feeding on more than 300 different host plants it can cause considerable damage in various crop species. Although its host plants are well known, the exact feeding behavior of this pest species in South Tyrol has not been described yet. Therefore, this study aims to investigate the feeding behavior of *H. halys* on a molecular basis. To reach this goal, individuals were collected in 2021 and 2022 across the year in different localities in South Tyrol. DNA is extracted from the gut of adult *H. halys* individuals and used for a PCR targeting different plant-specific molecular markers. The PCR products are sequenced on the Nanopore Flongle device. The resulting sequences will provide information about the plant species consumed by each individual in the days before the collection. This method will give novel insights about the feeding behavior of *H. halys* in South Tyrol and with it to improve the adopted control measures, also outside the agricultural areas.

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Strong contrast between the butterfly communities of extensive grasslands, intensively used farmland and urban areas – results from the Biodiversity Monitoring South Tyrol

ELIA GUARIENTO[1,2]*, JOHANNES RÜDISSER[2], KONRAD FIEDLER[3], CHIARA PANICCIA[1], SIMON STIFTER[1], ULRIKE TAPPEINER[1,2], JULIA SEEBER[1,2] & ANDREAS HILPOLD[1]
[1]Institute for Alpine Environment, Eurac Research, Bolzano (I); [2]Department of Ecology, University of Innsbruck (A); [3]Department of Botany and Biodiversity Research, University of Vienna (A)
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The severe biodiversity decline in European agricultural landscapes demands a specific evaluation of the various land-use practices. Many butterflies, as an important ecological indicator and pollinator taxon, require in Europe human interventions to sustain their populations in cultivated landscapes. However, land-use changes and management intensification are currently responsible for their decline. In this study we compared 93 butterfly communities recorded from seven contrasting land-use types in the Alpine region of South Tyrol. The study was conducted in the framework of the Biodiversity Monitoring South Tyrol (BMS).
We recorded a high species diversity in high nature-conservation value (HNV) grasslands (extensive meadows and pastures). These were all extensive grassland sites, subsidized by the province ("Landschaftspflegeprämien") and encompass habitats listed in the EU Habitats Directive. All other land-use types showed significantly lower conservation value, with decreasing scores in (semi-)intensive meadows, vineyards, arable land, settlements and apple orchards. Moreover, functional traits uncovered a general trend: extensive grasslands supported communities of more specialized and sessile species, whilst all other land-use types harbored communities characterized by mobile generalists. Community composition was driven by the land-use type and explained by land-use intensity, habitat openness and elevation related variables.
We found supporting evidence for the effectiveness of regional Agri-Environmental Measures (AEMs) for butterfly conservation in European cultural landscapes and for the European conservation schemes to focus at least partly on the preservation of HNV grasslands with extensive management. Furthermore, we clearly show the poor ecological state of butterfly communities in more disturbed land-use types (including urban areas) and propose adopting measures to improve butterflies' conservation status in these environments.

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Diversification dynamics in the alpine bushcricket genus *Anonconotus* Camerano, 1878

PHILIPP KIRSCHNER[1,2] & PETRA KRANEBITTER[1]
[1]Museum of Nature South Tyrol, Bolzano (I); [2]Department of Ecology, University of Innsbruck (A)

The genus *Anonconotus* Camerano, 1878 contains ten species that are all endemic to the Alps and the Apennines. All *Anonconotus* species are flightless and exclusively occur in alpine meadows and subalpine shrubland above the treeline. For a long time, the large diversity within the genus has not been acknowledged, largely due to their phenotypic plasticity and their hard to delimit distribution ranges. While some *Anonconotus* species occupy isolated and very small ranges such as only a single valley, others occur in comparably large areas such as almost the entire Western Alps. All in all, this suggests a dynamic spatiotemporal history for the whole genus that must have been heavily influenced by recurring Pleistocene glaciations. Given the limited dispersal capacity of *Anonconotus*, their strict preference for habitats that underwent dramatic climate induced contractions and shifts, and their coercive mating strategy that potentially favored cross-species hybridization, *Anonconotus* bush crickets are an intriguing model to study speciation of alpine species in the light of Pleistocene climatic oscillations. To explore this intriguing system, we sampled individuals from multiple populations of all extant *Anonconotus* species and sequenced parts of their genomes by ddRADseq. By applying phylogenomic analyses, we first evaluated the validity of the morphology based species hypotheses and tried to obtain estimates on the age of all *Anonconotus* species. We further analysed gene flow within and among species, and explored if the resulting patterns are in line with suggested sexual incompatibilities, or major geographic barriers. In a final step, past demographic changes were analysed by using both explorative and explicit phylogeographic analyses.

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Vom Wissen zum Handeln: Monitoring von Fledermaus-Quartieren als Basis für angewandten Artenschutz

EVA LADURNER[1], CHRISTIAN DRESCHER[1] & GIULIA LIGAZZOLO[2]
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Seit 2003 erfolgt in Südtirol ein standardisiertes Monitoring zu Gebäude-bewohnenden Fledermaus-Arten. Aufgrund spezifischer ökologischer Ansprüche ist das Angebot an Winter- und Sommerquartieren begrenzt, der Schutz und die Verbesserung bestehender Quartiere haben daher Priorität im Fledermausschutz. Das Monitoring ermöglicht neben der Beobachtung von Populationstrends ein zeitnahes Erkennen von Problemen in den Quartieren, sodass durch maßgeschneiderte Verbesserungen die Kolonien gezielt unterstützt werden können.

In den vergangenen Jahren wurden mit Unterstützung der Abteilung Natur, Landschaft und Raumentwicklung der Autonomen Provinz Bozen-Südtirol diverse Maßnahmen zur Optimierung von Fledermausquartieren realisiert. Einige Beispiele: Eingebaute Zwischenböden in Kirchendachböden verhindern die Verschmutzung der darunter liegenden Räume und erhöhen damit die Akzeptanz der Fledermäuse in der Bevölkerung, wie im Dom von Brixen. Eine spezielle Einflugröhre in der Stöckl-Kirche von Kiens verhindert die Störung der Fledermauskolonie durch eindringende Tauben und Greifvögel. Eine Wärmeplatte am Hangplatz der Fledermäuse sichert geeignete Temperaturen in den für die Jungenaufzucht kritischen Übergangszeiten in St. Leonhard i.P. in einem alten Kraftwerk. Die Sanierung der baufälligen Gebäude des ehemaligen Pulverlagers in Laas erhält die Sommerquartiere für die Fledermäuse auch für die Zukunft.

Ein weiterer zentraler Punkt des Fledermausschutzes ist der Erhalt der Jagdlebensräume. Im Jahr 2017 wurden drei Schutzgebiete Südtirols zusätzlich als Natura 2000-Gebiete ausgewiesen, sie sichern sowohl Quartiere als auch wertvolle Jagdlebensräume für die Fledermäuse. Auch in Zukunft sollte der Quartierschutz mit dem Erhalt attraktiver Jagdgebiete in der Umgebung kombiniert werden. Das Biodiversitätsmonitoring Südtirol der Eurac Research, welches die Fledermausfauna der wichtigsten Südtiroler Lebensräume erfasst, bietet hier optimale Möglichkeiten für zielführende Synergien.

From knowledge to action: Monitoring bat roosts as a basis for applied species conservation

Since 2003, standardized monitoring of several building-dwelling bat species has been carried out in South Tyrol. Due to very specific ecological requirements, the offer of winter and summer roosts is limited. The protection and improvement of existing roosts is therefore a priority for bat conservation. In addition to observing population trends, roost monitoring allows to identify problems in the roosts promptly. In consequence, the colonies can be supported in a targeted manner through tailored improvements. In recent years, with the support of the Department of Nature, Landscape and Spatial Development of the Autonomous Province of Bolzano-South Tyrol, various measures have been implemented to optimize bat roosts. Among others, the installation of intermediate floors in church attics prevents pollution of the rooms below and thus increases the acceptance of bats among the population, as for example in the Cathedral of Brixen. A special entrance tube in the Stöckl church of Kiens prevents disturbance of the bat colony by intruding pigeons and birds of prey. A warming plate at the bats' roosting site in an old power station in Sankt Leonhard i.P. ensures suitable temperatures during the transitional periods, which are critical for young rearing. The renovation of the dilapidated buildings of the former ammunition depot in Laas maintains these important summer roosts for bats for the future.
Another crucial issue for bat protection is the preservation of hunting habitats. In 2017, three already protected areas in South Tyrol were additionally designated as Natura 2000 sites; they include both roosts and valuable hunting habitats. In the future, roost protection should continue to be combined with the conservation of attractive hunting areas in their surroundings. The Biodiversity Monitoring South Tyrol of Eurac Research, which surveys the bat fauna of South Tyrolean habitats, offers optimal conditions for planning such targeted habitat protection measures.

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Il post Vaia: la sopravvivenza di *Myricaria germanica* in un ambiente antropizzato

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La tempesta Vaia, che nel 2018 ha interessato parte dell'Italia del Nord-Est, ha rappresentato anche un'occasione per ripensare il nostro rapporto con i corsi d'acqua. In realtà non è cambiato molto e sono state rifatte le stesse opere fluviali rivelatesi spesso inadeguate durante l'alluvione, ripetendo per lo più vecchi schemi di arginature, briglie e difese spondali. Gli allargamenti dei corsi d'acqua sono stati rari e modesti, al contrario sono stati realizzati significativi restringimenti su cui fare, ad esempio, nuove piste ciclabili o parcheggi.
I fiumi sono fatti di acqua, sedimenti e vegetazione. I sedimenti portati dall'alluvione, sono stati rimossi dai corridoi fluviali, e non risulta sia stato elaborato nessun piano di gestione dei sedimenti a livello di bacino fluviale.
Myricaria germanica, tamerice alpina (Deutsche Tamariske), è una delle specie chiave degli habitat ripariali pionieri europei, rappresentato particolarmente dal "3230: Fiumi alpini con vegetazione riparia legnosa a *Myricaria germanica*". L'allargamento dell'alveo e l'abbondanza di sedimenti, conseguenze di Vaia, potevano rappresentare situazioni favorevoli per la specie, che però non sono state considerate. Nelle aree maggiormente interessate da Vaia, negli anni seguenti, non risulta che *M. germanica* sia mai stata menzionata in alcun documento, comunicazione, relazione, progetto, anche dove gli interventi fluviali sono stati fatti in siti di presenza della specie.
Negli ultimi 25 anni solo la Provincia Autonoma di Bolzano – Alto Adige ha realizzato progetti specifici a favore di *Myricaria germanica*. Oggi, se esistessero ancora dei corsi d'acqua naturali, avremmo avuto rilevanti incrementi numerici e nuove colonizzazioni di *M. germanica*. Invece in corsi d'acqua antropizzati, la realizzazione di lavori fluviali ha causato una distruzione di piante spesso pari ai danni causati da Vaia e ha determinato la scomparsa della specie in alcuni siti.
Nelle estati 2020 e 2021 poi, delle rilevanti piene estive, legate probabilmente alla crisi climatica, hanno provocato enormi problemi di sopravvivenza per le giovani piantine. A distanza di quasi 4 anni da Vaia, *Myricaria germanica* riesce a sopravvivere nonostante tutto, ma al momento non si riscontrano incrementi

numerici, né sembra ci siano nuove colonizzazioni. Occorrerà forse aspettare alcuni anni per avere una visione generale della situazione, ma è grave l'assenza di un monitoraggio di *M. germanica*, a parte quelli realizzati personalmente nell'ultimo decennio nel Triveneto.

The post Vaia: the survival of *Myricaria germanica* in an anthropized environment.

Storm Vaia, which affected part of north-eastern Italy in 2018, was also an opportunity to rethink our relationship with waterways. Actually, not much has changed and the same river works, which often proved inadequate during the flood, were redone, mostly repeating old patterns of embankments, check dams and bank protections. Watercourse widenings have been rare and modest, instead significant narrowings have been made on which to make, for example, new cycle paths or parking spaces.
Rivers are made up of water, sediment and vegetation. Sediment brought by the flood has been removed from the river corridors, and no river basin-wide sediment management plan appears to have been developed.
Myricaria germanica, alpine tamarisk (Deutsche Tamariske), is one of the key species of European pioneer riparian habitats, particularly represented by "3230: Alpine rivers and their ligneous vegetation with *Myricaria germanica*". The widening of the riverbed and the abundance of sediments, consequences of Vaia, could represent favorable situations for the species, but these were not considered. In the areas most affected by Vaia, in the following years, it does not appear that *M. germanica* was ever mentioned in any document, communication, report, project, even where the river works were carried out in sites where the species was present.
In the last 25 years, only the Autonomous Province of Bolzano - South Tyrol has implemented specific projects for *Myricaria germanica*. Today, if natural watercourses still existed, we would have had significant increases in numbers and new colonizations of *M. germanica*. On the other hand, in regulated watercourses, the construction of anthropic river works has caused a distruction of plants often equal to the damage caused by Vaia and has led to the disappearance of the species at some sites.
Then, in the summers of 2020 and 2021 significant summer floods, probably linked to the climate crisis, caused enormous survival problems for the seedlings. Almost four years after Vaia, *Myricaria germanica* manages still to survive, but at the moment there is no increase in numbers, nor does there appear to be any new colonization. We may have to wait a few years to get an overall view of the situation, but the absence of any monitoring of *M. germanica*, apart from those carried out personally over the last decade in the Triveneto Region, is serious.

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Vergleich von Arthropoden- und Parasitoiden-Gemeinschaften zwischen landwirtschaftlich genutzten und naturnahen Standorten, mit besonderem Augenmerk auf Pentatomoidea (Heteroptera) und deren Parasitoiden (Hymenoptera)

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Parasitoide gelten als wirksame natürliche Feinde von landwirtschaftlichen Schädlingen, wie z. B. von Wanzen aus der Überfamilie Pentatomoidea. Diese werden in der Regel durch Eiparasitoide aus der Ordnung Hymenoptera in Schach gehalten. Erst kürzlich wurde *Trissolcus japonicus*, der allochthone Eiparasitoid von *Halyomorpha halys*, in Italien einschließlich Südtirol freigesetzt. Parasitoide kommen in Agrar- und naturnahen Ökosystemen aber auch natürlich vor. Bislang ist jedoch nur wenig darüber bekannt, wie sich die Lebensräume in der Umgebung von Kulturflächen auf die Präsenz von Parasitoiden mit agronomischer Bedeutung auswirken.
In dieser Studie wurden die Gemeinschaften von Parasitoiden und Arthropoden untersucht, wobei der Schwerpunkt auf den Pentatomoidea und deren Parasitoiden lag. Unser Ziel war es, die Gemeinschaften in landwirtschaftlich genutzten Flächen und naturnahen Lebensräumen zu vergleichen. Dabei kamen verschiedene Erhebungsmethoden zum Einsatz: Malaise-Fallen, Farbschalen, Kescher- und Klopfproben, sowie gezielte Handfänge.

Die Ergebnisse zeigten eine Korrelation zwischen Arthropoden und Parasitoiden-Gemeinschaften, sowie zwischen Wanzengemeinschaften und deren Parasitoiden. In landwirtschaftlichen Flächen dominierten potenzielle Schädlingsarten, wie *Nezara viridula*, *Palomena prasina* und *Halyomorpha halys*, während auf naturnahen Standorten eine geringere Dichte dieser Arten zu finden war. Wanzen-Parasitoide waren dagegen in naturnahen Gebieten häufiger anzutreffen. Daraus schließen wir, dass das Vorhandensein von naturnahen Flächen in der Umgebung von Kulturflächen für die biologische Schädlingsbekämpfung in landwirtschaftlich genutzten Gebieten von Vorteil sein könnte.
Schüsselwörter: Pentatomoidea, Parasitoide, biologische Schädlingsbekämpfung, naturnahe Ökosysteme, Agrarökosysteme.

Comparison of arthropods and parasitoid wasp communities between farmland and semi-natural sites, with special attention to Pentatomoidea (Heteroptera) and their parasitoids (Hymenoptera)

Parasitoids are considered efficient natural enemies of agricultural pests, such as pentatomoid bugs. These are controlled in most cases by hymenopteran egg parasitoids. As an example, *Trissolcus japonicus*, the exotic egg parasitoid of *Halyomorpha halys*, was recently released in Italy, including South Tyrol. Parasitoid hymenopterans occur naturally in agroecosystems and semi-natural habitats. To date, however, little is known about the contribution of the habitats surrounding orchards to the establishment of parasitoids of agronomic importance.
In this study, the hymenopteran parasitoid communities were investigated with a focus on parasitoids of pentatomoid bugs. Concomitantly, we assessed the overall arthropod community with a focus on pentatomoid bugs. Our aim was to compare their communities between farmlands and semi-natural habitats, using several survey methodologies, such as Malaise traps, yellow pan traps, beat and sweep netting and visual controls.
Results indicated a general correlation between arthropods and hymenopteran parasitoids communities, as well as between communities of pentatomoid bugs and their specific parasitoids. Farmland communities were dominated by potential pest species such as *Nezara viridula*, *Palomena prasina* and *Halyomorpha halys*, whereas semi-natural sites harbored lower densities of these species. Parasitoids of pentatomoid bugs, on the other hand, tended to be more abundant in semi-natural sites. Therefore, we conclude that the presence of semi-natural habitats in the surroundings of the orchards might result beneficial for the biological control of pest bugs in farmland areas.
Key words: Pentatomoidea, parasitoids, biological control, semi-natural sites, agroecosystems

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Esplorare la diversità dei pipistrelli in una regione alpina - risultati del monitoraggio biodiversità Alto Adige

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I paesaggi alpini sono stati interessati da cambiamenti nell'uso del suolo. Le aree agricole in alta quota sono spesso abbandonate ed intensificate nei fondivalle. Queste tendenze si osservano anche in Alto Adige, con conseguenze sulla biodiversità. I pipistrelli, gruppo altamente specializzato e ricco di specie, sono in grado di reagire rapidamente ai cambiamenti di uso del suolo permettendo di sviluppare e applicare strategie di conservazione e mitigazione efficaci.
In questo studio esploriamo come le comunità di pipistrelli vengono modellate da tipologie di uso di suolo e di paesaggio. Abbiamo raccolto dati acustici utilizzando bat detector dal 2019 al 2021 in 192 siti del Monitoraggio della Biodiversità in Alto Adige coprendo le principali tipologie di uso di suolo e fasce altitudinali. Abbiamo stimato l'attività, la ricchezza e la diversità di specie di pipistrelli
L'attività maggiore è stata osservata nelle foreste ripariali, seguita da zone umide, insediamenti, vigneti e meleti. L'attività totale e di foraggiamento diminuisce all'aumentare dell'altitudine, analogamente al numero di specie. A quote intermedie, i principali fattori che determinano l'abbondanza e la ricchezza di specie sono

la tipologia di habitat e la struttura del paesaggio. Nei modelli, la diversità maggiore si rileva in prossimità di fonti d'acqua, in paesaggi eterogenei e a quote medio-basse.
I risultati mostrano che la diversità dei pipistrelli è supportata da paesaggi eterogenei e altamente strutturati. Le piccole aree protette svolgono un ruolo cruciale per la loro conservazione. Ciò è particolarmente rilevante quando queste aree sono inserite in un paesaggio altamente modificato ed omogeneo, come i fondivalle. Attività future dovrebbero esplorare gli effetti del paesaggio su piccola scala al fine di sviluppare efficaci strategie di conservazione, migliorare le conoscenze sulle singole aree protette e sostenere una pianificazione del paesaggio favorevole ai pipistrelli nelle Alpi

Exploring bat diversity in an alpine region – results from the Biodiversity Monitoring South Tyrol

Alpine landscapes have been affected by land-use changes. While agricultural areas at high elevation and in remote regions have frequently been abandoned, those at the main valley bottoms were intensified. These trends can be observed in South Tyrol with consequences for biodiversity. Exploring animal community responses to human disturbances can provide insights to develop and apply effective conservation strategies. In this context, bats are a highly specialized species-rich group providing quick responses to land-use changes. Here we aim to explore how bat communities were shaped by different combinations of land-use types and landscape patterns. To do this, we collected acoustic data using bat detectors from 2019 to 2021 across 192 sampling sites of the Biodiversity Monitoring South Tyrol covering the main habitat types and elevational range. During the data analysis we estimated bat activity, species richness and taxonomic diversity.
The highest bat activity was observed in riparian forests followed by wetlands, settlements, vineyards, and apple orchards. Total bat and foraging activity decreased with increasing elevation, similarly to species number. At intermediate elevations, the main drivers for bat abundance and richness were habitat type and landscape structure. According to our models, the highest diversity was found close to water sources, in heterogeneous landscapes, and at low and medium elevations.
Our results showed that bat diversity is supported by heterogeneous and highly structured landscapes. Small-protected areas play a crucial role in the conservation of bat diversity. This is particularly relevant in case these areas are embedded in a highly anthropogenic and homogeneous landscape, such as the intensified valley bottoms. Future activities should explore small-scale landscape effects to develop effective conservation strategies for Alpine bats, fill knowledge gaps for single protected areas, and support a bat-friendly landscape planning.

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Wirksamkeitskontrollen des Fischschutzes an den Wasserkraftwerken der Alperia Gruppe

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Für den Betreiber der Wasserkraftwerke stehen die Versorgung mit Energie und die Sicherheit der Bevölkerung im Vordergrund. Gleichzeitig müssen auch Ziele der Nachhaltigkeit gewährleistet werden. Für den Fischschutz werden vorwiegend folgende Maßnahmen umgesetzt: Gewährung der lebensnotwendigen Wassermenge in den Restwasserstrecken, die Wiederherstellung der Wanderkorridore (Fischpässe), das Verhindern des Eintretens der Fische in die Turbineneinläufe (Fischscheuchen), die schonende Weiterleitung der Sedimente im Zuge von Stauseespülungen und die Milderung des produktionsbedingten Hydropeaking.
Gerade beim Einlaufschutz in die Triebwasserwege sind umfangreiche bauliche Anpassungen bei den bestehenden Anlagen notwendig. Diese sind von Anlage zu Anlage unterschiedlich und meist schwierig umsetzbar und oft mit dem Betrieb inkompatibel. Alperia setzt daher auf experimentelle Forschung und das Ausprobieren neuer Konzepte.
Alperia Greenpower überprüft die umgesetzten Maßnahmen zum Fischschutz mittels Monitoring, wobei sich die Verwendung von Unterwasserkameras als sehr zuverlässig herausgestellt hat.
Im gegenständlichen Beitrag werden zwei konkrete Beispiele vorgestellt:

1) An der Wasserfassung Rabenstein des Kraftwerks Sarnthein wurde ein «vertical slot» Fischpass 2018 in Betrieb genommen. Das Kameramonitoring bestätigt erwartungsgemäß die Funktionstüchtigkeit. Zudem erweist sich auch der Fischpass nicht nur als Wanderkorridor, sondern auch als neuer Lebensraum.
2) Am Weißbrunnsee beim Kraftwerk St. Walburg im Ultental wurde erstmals gemeinsam mit der Universität Innsbruck eine Pilotanlage einer neuartigen Fischscheuchanlage ausprobiert. Zusammen mit der Inbetriebnahme des elektrischen Schutzrechens erfolgte ein umfangreiches Monitoring. Dabei konnten Unterschiede im Verhalten der Fische je nach Tageszeit und Betriebsart (Stillstand, Ableiten, Pumpen) beobachtet werden.

Durch die Überprüfung der Wirksamkeit der Maßnahmen ergaben sich auch neue Erkenntnisse über die Gewohnheiten der Fische, wie zum Beispiel die Orientierung der Fische in ihrem Lebensraum, das Erkennen von Futterquellen und das instinktive Meiden von Gefahren.

Effectiveness checks of fish protection at the hydropower plants of the Alperia Group

For the operator of the hydropower plants, the supply of energy and the safety of the population are the primary concerns. At the same time, sustainability goals must also be ensured. In terms of fish protection, the following measures are implemented: Granting the vital amount of water in the residual water courses, restoring migration corridors (fish passes), preventing fish from entering the turbine inlets (fish scares), the gradual transfer of sediments in the course of reservoir flushing and mitigating production-related hydropeaking.
Extensive structural adaptations to the existing plants are necessary, especially for inlet protection in the waterways. These vary from plant to plant and are usually difficult to implement and incompatible with operation. For this reason, Alperia relies on experimental research and the testing of new concepts.
Alperia Greenpower checks the implemented fish protection measures by monitoring, whereby the use of underwater cameras has proven to be very effective.
Two concrete examples are presented in this article:
At the Rabenstein water intake of the Sarnthein power plant, a vertical slot fish pass was put into operation in 2018. As expected, the camera monitoring confirms the functionality. In addition, the fishway proves to be not only a migration corridor, but also a new habitat.
At Lake Weißbrunn near the power plant St. Walburg in the Ulten Valley, a pilot system of a new type of fish scare system was tested for the first time in collaboration with the University of Innsbruck. Together with the installation of the electric protective rake, extensive monitoring was carried out. Differences in the fish behaviour could be observed depending on the time of day and the mode of operation (standstill, discharge, pumping).
While checking the effectiveness of the measures, new insights into the habits of the fish also emerged, such as the orientation of the fish in their habitat, the recognition of food sources and the instinctive avoidance of dangers.

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Control and growth of extracellular ice in plants

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Frost events are a limiting factor for crop performance and plant distribution. Climate change is suspected to have negative impacts on the frost survival of plants. Climate warming will advance regrowth of plants in spring, reduce the amount and duration of snow cover and increase winter temperatures. These changes will lead to a higher probability of frost exposure and untimely frost dehardening and consequently will raise spring frost damages to plants.
To understand the frost survival of plants it is important to have knowledge about the freezing behaviour and the mechanism behind. However, mechanisms concerning ice management and freeze-regulation are largely

unclear and not understood. These mechanisms include biophysical aspects of freezing, such as ice crystal management and ice segregation between plant tissues, the flow of water to ice in the apoplast, stabilization of cellular supercooling and freeze-regulation. Biophysical aspects of freezing are supposed to be important for causal explanation of frost injuries and plant survival after frost events.
During a freeze event, much of the plants water turns to ice. While extracellular ice formation is harmless, ice formation inside the cell is lethal and must be avoided. During the freezing process, the volume of water increases by about 9.05%. Hence, plant water content must be considered critical for frost survival. Findings from different authors show, that the reduction of water content during cold acclimation is a widespread key response in plants. However, in some example plants can outwear freeze events during the growing period when their water content is high, e.g., *Ranunculus glacialis* and other high alpine species, and species that start regrowth early in late winter or spring. To survive frost events, the main challenge for frost tolerant plants is to have enough extracellular capacity for ice accumulation. As far as known by now, such ice accumulation can take place in predetermined places, that can be pre-existing cavities, be created by reversible tissue displacements or by tissue disruption. However, very few studies have so far addressed the question how ice accumulates at predetermined points. Many knowledge gaps exist with respect to the spatio-temporal development of ice masses in plant tissues, mechanistic details such as anchorage for faults and continuing life after cell layer disruption. Additionally, little is known about the control of water flow towards the extracellular ice crystals, and how certain plant tissues remain protected from ice formation.
The aim of this thesis is to improve the understanding about how ice accumulates in plant tissues by studying the structural prerequisites and the general traits of spaces for ice accumulation, the specific influence of plant water content, the freezing behaviour of plants and the control mechanisms of ice growth. The study design is comparatively constructed, both across different plant organs like buds and leaves in a variety of species, and across the seasonality, when plants have different water contents and different cold acclimation states. The investigations will be made with the new recently developed cryo-microscopy in reflected polarized light. To study the molecular compounds of ice crystals and cell walls and cell structures, RAMAN and mass spectroscopy analyses will be made.
The study is financed by the Austrian Science Fund and part of the FWF project 34844-B “Predetermined spaces of ice accumulation in plant tissues”.

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Genotypisierung der Edelkastanienbäume in Südtirol

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Die Edelkastanie oder Esskastanie (*Castanea sativa* Mill.) ist nach dem Apfel und der Weinrebe die dritthäufigste Dauerkultur in Südtirol. Die Kastanienhaine bieten den Landwirten nicht nur ein zusätzliches Einkommen, sondern erbringen auch wichtige Ökosystemdienstleistungen. Obwohl das Interesse am Kastanienanbau zunimmt, fehlen Daten über die genetische Vielfalt der Edelkastanienbäume in dieser Region. Ziel der vorliegenden Studie war daher die Genotypisierung von Kastanienbäumen. Dafür wurden in ganz Südtirol Blattproben gesammelt und mittels Mikrosatelliten-DNA-Analyse untersucht. In der Stichprobe von 115 überwiegend alten Bäumen wurden insgesamt 86 unterschiedliche Genotypen gefunden. Der höchste Grad an genetischer Variabilität wurde in den Bezirken Eisacktal und Vinschgau festgestellt. Die Bäume konnten zwei Genotypengruppen zugeordnet werden, dem variablen Kastaniencluster und dem homogeneren Marroni-Cluster. Zudem wurden einige Bäume als Hybriden zwischen den beiden Gruppen identifiziert. Die Kombination der genotypischen Daten mit Altersschätzungen anhand des Stammumfangs ermöglichte es, Erkenntnisse über die zeitliche und räumliche genetische Vielfalt von *C. sativa* in Südtirol zu gewinnen. Die hier vorgestellten Ergebnisse können als Grundlage für die Entwicklung von Erhaltungsstrategien für diese gefährdete Baumart angesehen werden.

Genotyping of sweet chestnut trees in South Tyrol

Sweet chestnut or European chestnut (*Castanea sativa* Mill.) occurs to be the third frequent permanent culture in South Tyrol after apple and grapevine. In addition to offering an additional income to farmers, chestnut stands provide vital ecosystem services. Although there has been an increasing interest for chestnut tree cultivation, data about the genetic diversity of chestnut trees are lacking in this region. Therefore, the present study aimed to perform a genotyping of chestnut trees collected all over South Tyrol based on microsatellite DNA analysis. A total of 115 mainly ancient trees were analysed and 86 distinct genotypes were found. The highest degrees of genetic variability were present in the geographical districts of Eisacktal-Valle Isarco and Vinschgau-Val Venosta. Furthermore, the trees were assigned to two groups of genotypes, the highly diverse chestnut cluster and the rather homogeneous Marroni cluster, whereas some trees were revealed to represent intermediate genotypes resulting from admixture between the two groups. The combination of genotypic data with estimates of tree age based on stem circumferences allowed gaining insights into the temporal and spatial genetic diversity of *C. sativa* in South Tyrol. The here presented data can be considered an important resource for the development of conservation strategies for this vulnerable tree species.

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Nuovi dati distributivi per la forma sotterranea di *Arvicola italicus* in Alto Adige

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Arvicola italicus ha forme fossorie e acquatiche la cui sistematica è oggetto di discussioni da molto tempo e la cui distribuzione e ecologia sono ancora da indagare. La presenza delle forme fossorie in Alto Adige è conosciuta da precedenti indagini per la Val Passiria. Con questa nota si riporta la presenza della specie in un'ampia zona della parte settentrionale dell'Alto Adige grazie a riscontri diretti e informazioni raccolte dai contadini ed allevatori della zona. Gli esemplari sono stati riscontrati in Val di Vizze dove è presente in tutta la parte occidentale e nel fondovalle verso est. Anche in Val Pusteria sono stati rilevate abbondanti presenze nei prati di fondovalle. In tutta l'area di Vipiteno sono stati raccolti dati di presenza della specie che viene controllata proprio per i danni provocati. Questa arvicola crea danni alle colture ed in particolare ai frutteti con rosura delle radici e del colletto oltre che nei prati per la formazione dei cumuli della terra di scavo e problemi allo sfalcio. Danni sono riportati da tempo e vi sono osservazioni dirette a partire dal 1986 nel comune di Varna (Bressanone). Alcuni danni sono poi attribuibili ad altri arvicolidi e non è possibile generalizzare senza osservazioni specialistiche. Un dato di interesse è il ritrovamento di resti della specie in una fatta di Volpe raccolta a 2200 m appena sopra il Passo di Monte Giovo. Oltre a rappresentare l'ideale punto di congiunzione tra queste due parti dell'areale ora conosciuto si riporta come tra i più alti dati di ritrovamento della specie, anche se il predatore è capace di ampissimi spostamenti e variazioni di altezza nei suoi ampi home range. La presenza di queste diffuse popolazioni è di grande interesse biogeografico e ecologico, oltre che da indagare per il loro importante ruolo nella trasmissione parassitaria anche zoonotica.

New distribution data for the subterranean form of *Arvicola italicus* in South Tyrol

Arvicola italicus has fossorial and aquatic forms whose systematics have been in discussions for a long time and whose distribution and ecology are still to be investigated. The presence of fossorial forms in South Tyrol is known from previous surveys for Val Passiria. This note reports the presence of the species in a large area of the north-eastern part of South Tyrol thanks to direct observations and information collected by farmers and breeders in the area. Specimens were found in Val di Vizze where it is present throughout the western part and in the valley floor towards the east. Also, in Val Pusteria abundant presences have been found in the meadows of the valley floor. Throughout the Vipiteno area, data have been collected on the presence of the species, which is being monitored specifically for damage caused. This vole damages different crops and in particular orchards with redness of the roots as well as in the meadows due to the formation of molehills with

related problems with mowing. Damages have been reported for some time and there are direct observations starting from 1986 in the municipality of Varna (Bressanone). Some damage is then attributable to other arvicolides and it is not possible to generalize without specialist observations. Interesting was the discovery of remains of the species in a fox scat collected at 2200 m just above the Passo di Monte Giovo. Representing the ideal junction point between these two parts of the now known range, it is reported as one of the highest finding data of the species, even if the predator is capable of very large displacements and variations in height in its wide home ranges. The presence of these widespread populations is of great biogeographical and ecological interest, as well as to be investigated for their important role in parasitic and zoonotic transmission.

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Invasion und Tilgung des Teezweigbohrers in den Gärten von Schloss Trauttmansdorff

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Ambrosia-Käfer des Artenkomplexes *Euwallacea fornicatus* sind aufkommende Baumschädlinge mit einem breiten Wirtsspektrum, einschließlich wichtiger landwirtschaftlicher Nutzpflanzen. Diese in Südostasien beheimatete Art wurde in verschiedene Länder eingeschleppt, wo sie vielen Baumarten erheblichen Schaden zufügt. In Europa gilt der Teezweigbohrer als Quarantäneschädling. Hier berichten wir über die ersten Ausbrüche von *E. fornicatus* s.l. in Europa. Die ersten Individuen wurden 2017 in einem Palmenhaus eines botanischen Gartens in Poznan (Polen) gefunden, während 2020 ein Ausbruch im Tropenhaus der Gärten von Schloss Trauttmansdorff in Meran festgestellt wurde. 2021 wurden zwei weitere Ausbrüche in zwei Gewächshäusern in Deutschland, in Erfurt und Berlin, festgestellt. Bei den letztgenannten Fällen konnte die Invasion auf einen Händler exotischer Pflanzen in den Niederlanden zurückgeführt werden, bei dem mehrere befallene Pflanzen festgestellt wurden. Molekulare Analysen zeigen, dass Individuen aus Polen und Italien genetisch identisch sind, aber einer anderen mitochondrialen Gruppe angehören als Individuen in Deutschland, die mit den meisten Individuen aus zwei Gewächshäusern in den Niederlanden identisch sind. Darüber hinaus fanden wir in den beiden Gewächshäusern in den Niederlanden Käfer, die zu einem anderen Haplotypen von *E. fornicatus* gehören, und zwei Haplotypen von *E. perbrevis*, einer Art im *E. fornicatus*-Komplex, die zuvor in Europa nicht beschrieben wurde. Wir geben neue Einblicke in die Invasionsgeschichte von *E. fornicatus* und die Ausrottungsmaßnahmen in Europa und warnen vor der Gefahr der Einschleppung von exotischen Schädlingen durch tropische Pflanzen.

Invasion and eradication of the tea shot hole borer *Euwallacea fornicatus* in the Gardens of Trauttmansdorff Castle (Merano)

Ambrosia beetles of the *Euwallacea fornicatus* species complex are emerging tree pests with a wide range of hosts, including important agricultural crops. This species, native to Southeast Asia, has been introduced to various countries where it causes significant damage to many species of trees. In Europe, the tea shot borer is considered a quarantine pest. Here we report the first outbreaks of *E. fornicatus* s.l. in Europe. The first individuals were found in 2017 in a palm house of a botanical garden in Poznan (Poland), while in 2020 an outbreak was detected in the tropical house of the Gardens of Trauttmansdorff Castle in Merano. In 2021, two more outbreaks were detected in two greenhouses in Germany, in Erfurt and Berlin. In the latter cases, the invasion could be traced back to an exotic plant dealer in the Netherlands where several infested plants were detected in two greenhouses. Molecular analyzes show that individuals from Poland and Italy are genetically identical but belong to a different mitochondrial group than individuals in Germany, who are identical to most individuals from two greenhouses in the Netherlands. In addition, in the Netherlands we found beetles belonging to a different haplotype of *E. fornicatus* and two haplotypes of *E. perbrevis*, a species in the *E. fornicatus* complex not previously described in Europe. We provide new insights into the invasion history of *E. fornicatus* and the eradication measures in Europe. Our case study will highlight the risk of introducing exotic pests through tropical plants.

Der Einfluss aktiver und passiver thermischer Isolierung von Bienenbeuten auf die Honigbienengesundheit und -widerstandskraft gegen *Varroa destructor*

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Die westliche Honigbiene (*Apis mellifera*) wird seit mehreren tausend Jahren in Europa von Menschen genutzt. Die ursprüngliche Behausung dieser Art sind Baumhöhlen. Der Mensch hat zu seinem Komfort verschiedene Bienenbeuten entwickelt, die jedoch mikroklimatisch in Abhängigkeit des geographischen Klimas stark variieren und nicht immer optimal sind. Im Winter verlassen Honigbienen ihren Stock einige Monate lang nicht und rücken eng zu einer Wintertraube zusammen. Bei Temperaturen unter 10 °C erzeugen die Bienen aktiv Wärme, die es ermöglicht, dass das Volk einen harten Winter überstehen kann. Dieser Aufwand kostet die Bienen signifikante Teile Ihrer Kohlehydratvorräte und häufig kommt es dabei vor, dass diese Reserven nicht ausreichen. Es besteht die Gefahr, dass die Bienenvölker sehr geschwächt werden oder sogar gänzlich verhungern. Diese Gefahr erhöht sich im Frühjahr bei Kälteeinbrüchen. Die Varroamilbe profitiert möglicherweise von einem derart geschwächten Bienenvolk und belastet die Bienen-Gesundheit verstärkt. In unserem Projekt soll ein durch Photovoltaik gestütztes System etabliert werden, dass unabhängig von der geographischen Lage optimale mikroklimatische Bedingungen ermöglicht und die Energiebilanz der Bienen verbessert. Darüber hinaus soll die Zahl der Varroamilben durch eine bioinspirierte Falle reduziert werden. Ein keramisches Heizelement wird verwendet, welches unmittelbar oberhalb der Bienenbeute platziert ist und durch einen Latentwärmespeicher stabilisierte Wärme dosiert an die Bienen abgibt. Weiterhin werden verschiedene Passiv-Isolierungen getestet und durch Erfassung und Auswertung physikalischer und biologischer Parameter evaluiert.
Ziel des Projektes ist es durch modulare aktive und passive Komponenten eine mikroklimatisch optimierte Bienenbeute verschiedener Bauformen und für verschiedene geografische Lagen zu erhalten. Durch die bioinspirierte Varroa-Lockstofffalle soll die Kontrolle der Milben erleichtert werden.

The influence of active and passive thermal insulation of hives on honey bee health and resistance to *Varroa destructor*

The western honey bee (*Apis mellifera*) has been used by humans in Europe for several thousand years. The original dwellings of this species are tree hollows. For their comfort, humans have developed various bee hives, which, however, vary greatly microclimatically depending on the geographical climate and are not always optimal. In winter, honey bees do not leave their hive for several months and move closely together to form a winter cluster. When temperatures drop below 10°C, the bees actively generate heat that allows the colony to survive a harsh winter. This effort costs the bees significant portions of their carbohydrate reserves, and it often happens that these reserves are insufficient. There is a danger that the bee colonies will be very weakened or even starve completely. This danger increases in the spring during cold spells. The Varroa mite may benefit from such a weakened colony and increase the burden on bee health.
In our project, we aim to establish a photovoltaic-supported system that allows optimal microclimatic conditions regardless of geographic location and improves the energy balance of the bees. In addition, the number of varroa mites will be reduced by a bio-inspired trap. A ceramic heating element is used, which is placed directly above the bee hive and delivers stabilized heat to the bees in a dosed manner by means of a latent heat accumulator. Furthermore, different passive insulations are tested and evaluated by recording and evaluating physical and biological parameters.
The aim of the project is to obtain a microclimatically optimized bee hive of different designs and for different geographical locations by using modular active and passive components. Bio-inspired Varroa attractant traps will facilitate mite control.

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Biodiversity and systematics of jumping plant-lice of the subfamily Liviinae (Hemiptera: Psylloidea: Liviidae)

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Psyllids constitute a mostly tropical group of Sternorrhyncha unlike the related, predominantly north temperate aphids. Psyllids are characterised by narrow host ranges at species and often higher taxonomic level. The Neotropics house arguably the most diverse and, at the same time, the least studied psyllid fauna. Recent targeted field work in Brazil supports this claim. Currently, only two species of Liviinae, referred to *Diclidophlebia*, have been reported from Brazil, while over 60 undescribed species are represented in the recent collections. *Diclidophlebia* s.l. is pantropical comprising 35 described species. For analysing the host plant patterns of the Brazilian species, phylogenetic analyses were performed using seven mitochondrial and nuclear gene regions (COI, cytB, 12S rRNA, 16S rRNA, 28S rRNA, Wg, H3) as well as 61 morphological characters of adults and immatures. Both molecular and morphological analyses support the monophyly of *Diclidophlebia* + *Paurocephala* (both as traditionally conceived) but suggest that neither of them is monophyletic. Within *Diclidophlebia* s.l. four monophyletic groups and one paraphyletic assemblage can be recognised which are given generic rank. The Brazilian species belong to two new genera. Genus 1 consists of four species associated with *Luehea* spp. (Malvaceae). Genus 2 comprises around 60 species of which a majority is associated with Melastomataceae and Annonaceae. The remaining species develop on Asteraceae, Cannabaceae and Myristicaceae. Within Melastomataceae, *Miconia* hosts the largest number of psyllid species (21 spp.). Four species develop on Asteraceae forming a monophyletic group near the base of the tree, and a unique species is associated with Cannabaceae. None of the other host families is restricted to a monophyletic species group, suggesting repeated colonisations by psyllids rather than cospeciation with the psyllids. This is a general pattern known also from other groups of jumping plant-lice.

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Behavioral differences of the European spruce bark beetle, *Ips typographus*, linked to spruce and pine plant volatiles

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The European spruce bark beetle *Ips typographus* (Coleoptera: Curculionidae) is one of the most widespread pest forest insect in South Tyrol. The species gained large popularity after the "Vaia" windstorm, which caused a massive damage to the mountain ecosystem of northern Italian forests in October 2018. In South Tyrol the most damaged area was Val d'Ega, but all over Italy ca. 42.000 ha were destroyed tearing down a large number of standing trees, particularly spruce. After Vaia the massive presence of fresh storm-felled trees as well as new marginal trees strongly increased *I. typographus* populations in several hot spots further expanding the negative effects of this windstorm. Recently, foresters of South Tyrol noticed a difference attraction of the adults of *I. typographus* on the wood logs, depending on which composition of tree species was present inside the stack. It is well-known that *I. typographus* is attracted by the spruce plant volatiles, but a reduced attraction was observed in case a few logs of the Scots pine, Pinus sylvestris, were present inside the spruce wood stacks. The main goal of this research was to quantify the potential reduction of *I. typographus* colonization in mix wood stacks settled in Mauls and identify which volatile compounds are potentially involved in this interaction. Different field and laboratory trials have been carried out on the behavior of *I. typographus* in selected forests of South Tyrol. Furthermore, gas-chromatogram experiments were used to identify the volatile compounds released by spruce and Scots pine before and after colonization. Finally, behavioral experiments were used to prove the response of *I. typographus* with spruce and Scots pine essential oil. Our results revealed that the presence of *Pinus sylvestris* has a complete deterrent effect on the

attack of *I. typographus* in case of low population density and retains a strong repellent effect at higher densities (73% and 65% fewer holes, $p<0.001$).

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Diversität epigäischer Spinnen entlang von drei Höhengradienten (1.500-3.000 m) im oberen Vinschgau (Südtirol)

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Arachniden und insbesondere Spinnen sind ein integraler Bestandteil alpiner Lebensgemeinschaften und können einen Großteil der epigäischen Makrofauna repräsentieren. Es liegen einige Untersuchungen zur Erhebung und Diversität der Spinnenfauna Südtirols vor, jedoch konzentrierten sich nur wenige auf den westlichen Teil Südtirols (Vinschgau). In dieser Studie beschäftigen wir uns vor allem mit der Spinnenfauna im (sub-)alpinen Weideland entlang von drei Höhengradienten (zwischen 1500 und 3000 m) im oberen Vinschgau, Südtirol, Italien. Ziel dieser Untersuchung war es, (i) die (sub-)alpine Arachniden-Gemeinschaft im oberen Vinschgau besser zu erfassen, (ii) einen Einblick in ihre Diversität auf verschiedenen Höhenstufen zu gewinnen, sowie (iii) den Einfluss von Umweltvariablen auf die Arachniden-Gemeinschaft zu erforschen.
Hierzu wurden auf 12 Untersuchungsflächen (drei je Höhenstufe) je drei Barberfallen exponiert. Die Expositionszeit der Fallen betrug auf den tieferen Standorten (1500 und 2000 m) 3 x 2 Wochen und auf den höheren Standorten (2500 und 3000 m) 2 x 3 Wochen.
Insgesamt konnten während des gesamten Beprobungszeitraums (Vegetationsperiode 2021) 1321 Spinnen aus 12 Familien gefangen werden. Die Spinnen zeigten ihre höchste Aktivität in den Sommermonaten Juni und Juli (im Schnitt 3-4 Tiere pro Falle und Tag). Entlang der Höhengradienten änderten sich die Aktivitätsdichten nicht signifikant, wobei die Standorte auf 2000 und 3000 m die höchsten durchschnittlichen Aktivitäten mit 3.2 Tieren pro Tag zeigten. Trotz der noch nicht fertiggestellten Auswertung der Artenlisten konnten schon einige interessante Funde gemacht werden. Darunter befanden sich zwei sehr seltene Arten aus den Familien Eresidae und Gnaphosidae, sowie zwei Spinnen, bei denen es sich um Erstnachweise für Südtirol bzw. Italien handelt (*Psammitis bonneti* (Thomisidae) und *Cheiracanthium campestre* (Cheirachantiidae)). Diese Funde weisen darauf hin, dass sich der Vinschgau als sehr interessantes Untersuchungsgebiet für arachnologische Erhebungen erweisen könnte.

Diversity of epigeic spiders along three elevation gradients (1500-3000 m) in the upper Vinschgau (South Tyrol)

Arachnids and especially spiders are an integral part of alpine living communities and can represent a large part of the epigean macrofauna. Some studies on the survey and diversity of the spider fauna of South Tyrol are available, but only a few focused on the western part of South Tyrol (Vinschgau). In this study, we are mainly focusing on the spider fauna in (sub-)alpine grasslands, along three elevation gradients (between 1500 and 3000 m) in upper Vinschgau, South Tyrol, Italy. The aim of this study was to (i) better assess the (sub-)alpine arachnid community in upper Vinschgau, (ii) gain insight into its diversity at different elevation levels, and (iii) explore the influence of environmental variables on the arachnid community.
For this purpose, three pitfall traps were exposed on each of the 12 plots (three per elevation level). The exposure time of the traps was 3 x 2 weeks at the lower sites (1500 and 2000 m) and 2 x 3 weeks at the higher sites (2500 and 3000 m).
A total of 1321 spiders from 12 families were captured throughout the sampling period (growing season 2021). The spiders showed their highest activity in the summer months of June and July (on average 3-4 individuals per trap per day). Along the elevation gradients, activity densities did not change significantly, with sites at 2000 and 3000 m showing the highest average activities with 3.2 animals per day. Even though the evaluation of the species lists has not yet been completed, some interesting finds have already been made. Among them were two very rare species from the families Eresidae and Gnaphosidae, as well as two spiders that are first records for South Tyrol and Italy, respectively (*Psammitis bonneti* (Thomisidae) and *Cheiracanthium campestre*

(Cheirachantiidae)). These findings indicate that the Vinschgau Valley could prove to be a very interesting study area for arachnological surveys.

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Die Gesellschaften alpiner Bodenmakroinvertebraten entlang Höhengradienten im oberen Vinschgau (Südtirol, Italien)

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Das Bewusstsein für die Bodenfauna und Studien, die sich damit beschäftigen, nehmen stetig zu, aber immer noch konzentrieren sich wenige auf hochalpine Gebiete. Um diese Wissenslücke zu schließen, haben wir eine umfassende Beprobung bodenbewohnender Makroinvertebraten in alpinem beweidetem Trockenrasen von 1500–3000 m entlang dreier Höhengradienten im LTSER-Gebiet "Val Mazia/Matschertal", Südtirol, Italien durchgeführt. Ziel war es (i) die Zusammensetzung der Bodenfauna-Gemeinschaft für jeden Höhenschritt zu untersuchen und (ii), wie sich diese Gemeinschaften mit der Höhe verändern. Ein besonderer Fokus lag auf den 3000-m-Standorten, für welche Bodenfauna-Daten sehr selten sind.
Auf jedem der 12 Beprobungspunkte (3 für jede 500-m-Stufe) installierten wir 3 Bodenfallen je Beprobungszeitraum: 3x2 Wochen an den tieferen und 2x3 Wochen an den höheren Standorten (in der Summe aktiv für 6 Wochen). Weiters wurden die Vegetation erhoben und Bodentemperaturlogger installiert.
Wir konnten 80 verschiedene Taxa identifizieren (meist auf Familienniveau): dominant waren Coleoptera (26 Familien), Araneae (12) und Myriapoda (7). Auf höherer Taxa-Ebene waren die vier Höhenstufen in den Aktivitätsdichten sehr ähnlich (d.h. nur wenige signifikante Unterschiede), während bei der höchsten taxonomischen Auflösung die vier Höhen gut voneinander getrennt waren. Die Biodiversität nahm mit zunehmender Höhe von durchschnittlich 30,3 (±5,0) Taxa auf 1500 m auf 22,1 (±3,2) auf 3000 m graduell ab. Die hohen Standorte (2500 und 3000 m) hatten immer noch eine hohe Anzahl von Taxa und einzigartigen Gruppen (d.h. flache Abnahme mit zunehmender Höhe).
Hochalpine Landschaften sind noch immer wenig erforscht, aber Erkenntnisse sind dringend erforderlich, da diese Ökosysteme dem Klimawandel stärker ausgesetzt sind als ihre Tiefland-Gegenstücke. In dieser Studie zeigen wir, dass oberflächenlebende Wirbellose auf 3000 m noch sehr aktiv sind und auch einen hohen Anteil an einzigartigen und seltenen Taxa aufweisen. Gruppen wie Diplopoda, die ihre obere Verbreitungsgrenze bei 2500 m erreichen sollten, wurden in reichlicher Zahl gefunden, was auf eine Aufwärtsbewegung hinweist, wie sie bereits für andere Myriapoda gefunden wurde. Abschließend können wir noch einmal die Bedeutung der alpinen Rasen im inneralpinen Trockental Vinschgau bestätigen, das durch traditionelle und extensive Beweidungsbewirtschaftung geformt wurde und eine reiche Bodenfauna beherbergt.

Alpine soil macro-invertebrate communities along high elevation gradients in the upper Vinschgau valley (South Tyrol, Italy)

The awareness for soil fauna and studies dealing with it are constantly increasing, but still few focus on high alpine areas. To fill this knowledge gap, we conducted a comprehensive pitfall trap survey on ground-dwelling macro-invertebrates in alpine grazed dry grassland spanning from 1500–3000 m along three elevation gradients in the LTSER area “Val Mazia/Matschertal”, South Tyrol, Italy. The aim was to investigate (i) the community compositions with each elevation steps, and (ii) how these communities are changing with elevation. A special focus was made on the 3000-m sites where soil fauna data is very rare.
On each of the 12 plots (3 for each 500-m step), we installed 3 pitfall traps per sampling period: 3x2 weeks at the lower and 2x3 weeks at the higher sites (in sum active for 6 weeks). Further, we assessed the vegetation and installed soil temperature loggers.
We were able to identify 80 different taxa mostly at family level: dominant were Coleoptera (26 families), Araneae (12) and Myriapoda (7). At high taxa level, the four elevation steps were very similar in their activity densities (i.e., only few significant differences), while on the highest taxonomic resolution the four elevations were well separated. The biodiversity gradually decreased with increasing elevation from an average of 30.3

(±5.0) taxa at 1500 m to 22.1 (±3.2) at 3000 m. The highest plots (2500 and 3000 m) still had a high number of taxa and unique groups (i.e., flat decrease with increasing elevation).
The high alpine environments are still understudied, but knowledge is urgently needed as these ecosystems are experiencing climate change more rapidly than their lowland counterparts. Here we show that surface-living invertebrates are still very active at 3000 m, also showing a high portion of unique and rare taxa. Groups such as Diplopoda, meant to reach their upper distribution limit at 2500 m, were found in abundant numbers, indicating an occurring upshift as it was found for other Myriapoda. Concluding we can confirm once more the importance of the alpine pasture land of the inner-alpine dry Vinschgau valley that was formed by traditional and extensive grazing management and harbours a rich soil fauna.

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Biodiversità dei macroinvertebrati bentonici nei siti fluviali campionati durante il primo anno del progetto Biodiversity Monitoring South Tyrol

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Gli ecosistemi fluviali ospitano un'elevata biodiversità e preservarla è fondamentale per il funzionamento dei processi biotici ed abiotici e per la conservazione dei servizi ecosistemici. Tuttavia, tali ecosistemi sono tra i più minacciati in ambiente montano a causa dei cambiamenti nell'uso del suolo e della perdita e deterioramento degli habitat.
In questo studio riportiamo i risultati della prima stagione di campionamento dei macroinvertebrati bentonici nell'ambito del progetto "Biodiversity Monitoring South Tyrol".
Nell'arco del primo anno di progetto sono stati campionati 48 torrenti della provincia dell'Alto Adige raccogliendo i macroinvertebrati bentonici per ogni habitat presente in fiume e misurando i parametri chimici delle acque. Inoltre, sono stati esaminati i cambiamenti nella composizione e struttura delle comunità di macroinvertebrati tra i siti e i microhabitat. Abbiamo confrontato la diversità e la ricchezza di specie tra i microhabitat di tre diverse categorie di torrenti (ossia i torrenti montani silicei di elevata portata, i canali di fondovalle ed i torrenti montani carbonatici di media portata) per approfondire la comprensione della relazione tra macroinvertebrati, substrato e variabili idrologiche ed ambientali nei fiumi alpini. Densità più elevate ed un numero maggiore di taxa sono stati riscontrati a quote più basse e in corsi d'acqua con alta velocità e struttura dell'alveo più naturale, mentre la ricchezza e la densità di individui sono risultate più basse a quote più elevate e su superfici artificiali. In generale, abbiamo riscontrato che la disponibilità di diversi tipi di substrato può determinare una maggiore diversità di bentonica. Questo potrebbe essere un aspetto importante per valutare le variazioni di biodiversità durante operazioni di riqualificazione fluviale, in quanto il successo di queste misure potrebbe essere favorito da un'adeguata diversità di microhabitat in termini di distribuzione e composizione del substrato.

Substrate related diversity of stream macroinvertebrate assemblages among sites of the Biodiversity Monitoring South Tyrol

Freshwater ecosystems host a high biodiversity, which is crucial for the functioning of riverine systems and for the preservation of ecosystem services. Especially running water habitats in mountainous regions face threats of ecological deterioration through changes in anthropogenic land use, habitat loss and degradation. In these environments, stream benthic macroinvertebrates are largely used as indicator organisms for assessments of riverine ecosystem health. Here, we summarize and discuss the results of the first sampling season of benthic macroinvertebrates within the Biodiversity Monitoring South Tyrol (BMS). In 48 sites located across the Northern Italian province of South Tyrol, stream benthic macroinvertebrates and abiotic water parameters were collected and measured, changes in macroinvertebrate assemblages and community structure across sites and microhabitats were investigated. We compared species diversity and richness among microhabitats in three different river types (i.e., high discharge silicate montane rivers, valley bottom canals and medium discharge carbonatic montane rivers) to improve the understanding of the relation between macroinvertebrates, substrates and hydrological and environmental variables. Higher abundances and taxa

richness were found at lower elevations and in streams with high velocity and more natural streambed structure, whilst taxa richness and density of individuals were lower at higher elevations and on artificial surfaces. Overall, different substrates hosted distinct assemblages and therefore, increasing the substrate diversity is expected to lead to a higher diversity of macroinvertebrate assemblages. This could be an important aspect for assessing long-term biodiversity variations and for potential actions dealing with ecological restoration. It should be considered that the long-term success of restoration measures could be dependent on a suitable microhabitat diversity in terms of substrate composition and patchiness.

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Chemical composition and repellence activities of essential oils of African basil (*Ocimum gratissimum*), holy basil (*Ocimum tenuiflorum*) and common lantana (*Lantana camara*) against the *Tribolium casteneum* (Herbst) (Coleoptera: Tenebrionidae)

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The red flour beetle, *Tribolium castaneum* (Coleoptera: Tenebrionidae), is one of the most widespread storage-grain pests in the world, causing extensive damage to stored food grains. Synthetic insecticides are strongly discouraged to manage this insect due to their persistent toxicity in food, harmful effects on human health and environment. In previous studies, the insecticidal potential has been demonstrated for several plant-derived compounds. In this research, the essential oils of holy basil (*Ocimum tenuiflorum*), African basil (*Ocimum gratissimum*), and common lantana (*Lantana camara*) were studied as possible bioinsecticides. The essential oils were extracted from dried leaves using hydrodistillation in a Clevenger apparatus. Then, their chemical composition was determined using gas chromatography mass spectrometry (GC-MS) and their repellent effects were evaluated using four-arm olfactometer. GC-MS analysis of these essential oils revealed many volatile compounds which were reported to have insect-repellent properties. Moreover, repellency has increased for all three essential oils with an increase in concentration. In addition, Excess Proportion Index (EPI) was computed to compare the repellent properties of the three essential oils. The results showed that African basil had high repellency followed by common lantana and holy basil. However, common lantana demonstrated a stronger effect than African basil at concentration 10-5. Because of their repellent properties, the essential oils of these three plants might be utilized to manage *T. castaneum*. This paves the way for future research to select, enhance or combine certain volatile compounds to design novel botanical insecticides.

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POSTERS

17:40-19:00 **Posterpräsentation / Presentazione poster / Poster presentation**

Situazione epidemiologica attuale di *Echinococcus multilocularis* in provincia di Bolzano

GIULIA BERTONE, SOFIA SGUBIN, PATRIZIA DANESI, CARLO CITTERIO, FEDERICA OBBER, DEBORA DELLAMARIA, ROBERTO CELVA & TREVISIOL KARIN
Istituto Zooprofilattico delle Venezie, Sezione di Bolzano (I)

Monitoraggio di cicaline (Hemiptera: Auchenorrhyncha) nella coltivazione di piante officinali in Alto Adige

ALESSIA CASTELLAN, STEFANIE FISCHNALLER & MANUEL PRAMSOHLER
Centro di Sperimentazione Laimburg, Vadena (I)

Der Baumschläfer *Dryomys nitedula* im Rätischen Dreieck – Allianz zur Erforschung einer seltenen Kleinsäuger-Art

EVA LADURNER[1], CHRISTINE RESCH[2], STEFAN RESCH[2], REGULA TESTER[3], ADRIAN DIETRICH[4], FEDERICA LAZZERI[1] & ANGELIKA ABDERHALDEN[5]
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Characterizing and modelling forest structure and development in South Tyrol: methods and first results

MARCO MINA[1]*, CHIARA PANICCIA[1], SEBASTIAN MARZINI[1,2], LAURIN HILLEBRAND[1,3], FRANCESCA RIGO[1,4], ULRIKE TAPPEINER[1,5] & ANDREAS HILPOLD[1]
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Soil biodiversity tells the story of the soil itself

RITA NOTO[1]*, MARCO SIGNORINI[2]*, GIULIO GENOVA[3], ALESSIA BANI[4], GEORG NIEDRIST[1,5], ANDREAS HILPOLD[1], ALEX J. DUMBRELL[4], ULRIKE TAPPEINER[1,5], STEFANO CESCO[2], TANJA MIMMO[2,6], LUIGIMARIA BORRUSO[2]
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*equal contribution

Biodiversitätserhebungen in Kräuteranbaubetrieben

LISA OBWEGS[1], LAURA NOCKER[2], ELIA GUARIENTO[1], GEORG VON MÖRL[3], PAOLO FONTANA[4], ULRIKE TAPPEINER[1,5]; ANDREAS HILPOLD[1] & MANUEL PRAMSOHLER[2]
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Il primo gruppo stanziale estivo di nottola gigante *Nyctalus lasiopterus* nelle Alpi orientali italiane rilevato con bat detector

CHIARA PANICCIA[1], PETER ERNST ZINGG[2], ALEX BELLÈ[1], ANDREAS HILPOLD[1], FLORIAN REICHEGGER[1,3], ULRIKE TAPPEINER[1,4] & EVA LADURNER[5]
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Bodenuntersuchungen innerhalb des Biodiversitätsmonitoring Südtirols: Methoden und erste Ergebnisse nach drei Jahren

JULIA PLUNGER[1], JULIA SEEBER[1,2], MICHAEL STEINWANDTER[1], ULRIKE TAPPEINER[1,2] & ANDREAS HILPOLD[1]
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Monitoring of the environmental quality for the presence of pesticides and heavy metals in Val di Sole using honeybees as pollen samplers

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A Citizen Science project about grasslands birds in South Tyrol

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Myotis myotis nella dieta di una coppia di *Falco tinnunculus* in Alto Adige

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Botanical surveys within the Biodiversity Monitoring South Tyrol: overview, methods and results after three years

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Baumgart: Initiative zur Förderung und Erforschung von Streuobstwiesen

JULIA STROBL[1], ELIA GUARIENTO[1], MATTEO ANDERLE[1,2,3], LUKAS EGARTER VIGL[1], LISA OBWEGS[1], CHIARA PANICCIA[1], JULIA PLUNGER[1], ALEXANDER SCHÖNAFINGER[2], ULRIKE TAPPEINER[1,2] & ANDREAS HILPOLD[1]
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Under Pressure: *Vipera berus* e pascoli alpini

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Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige
Zoological and botanical research in South Tyrol

Poster – Kurzfassungen | **Poster – riassunti** | **Poster – abstracts**

Situazione epidemiologica attuale di *Echinococcus multilocularis* in provincia di Bolzano

GIULIA BERTONE, SOFIA SGUBIN, PATRIZIA DANESI, CARLO CITTERIO, FEDERICA OBBER, DEBORA DELLAMARIA, ROBERTO CELVA & KARIN TREVISIOL
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Echinococcus multilocularis è un parassita appartenente alla classe dei Cestodi. In Alto Adige la volpe rossa rappresenta il principale ospite definitivo, mentre varie specie di roditori fungono da ospiti intermedi ed albergano le "forme larvali". L'uomo può diventare accidentalmente ospite intermedio sviluppando l'echinococcosi alveolare, una malattia grave che può essere fatale.
Supportati da progetti di ricerca finanziati dal Ministero della salute (RC IZSVe 03/2011; RC IZSVe 18/2016;), negli anni i ricercatori IZSVe hanno effettuato un'attività di sorveglianza per *E. multilocularis* in tutto il territorio del Nord Est italiano. Sono state analizzate 2872 volpi; 7,55% dei campioni sono risultati positivi per vari cestodi. Solo in provincia di Bolzano è stata però confermata la presenza di *E. multilocularis.* L'ultimo progetto di ricerca finanziato dal Ministero della salute (RC 05/19) si è avvalso della collaborazione di altri enti di ricerca (Centro di referenza nazionale per l'echinococcosi, Istituto Superiore di Sanità, Fondazione Edmund Mach e Università di Pisa), consentendo di attualizzare la situazione epidemiologica in provincia di Bolzano soprattutto nelle aree a maggior rischio.
Un interessante approccio è consistito nell'allargare la ricerca del parassita agli ospiti intermedi (O.I.), ossia i piccoli roditori. Dal 2019 al 2021 grazie ad una fruttuosa collaborazione con il Museo di Scienze Naturali dell'Alto Adige di Bolzano, sono stati raccolti 75 fegati di piccoli roditori, principalmente arvicole e muridi, provenienti da diversi comuni dell'Alto Adige. Tutti i fegati sono stati sottoposti a screening per lesioni parassitarie e ad analisi genetica/biomolecolare: il 13,33% sono risultati positivi ad *E. multilocularis* nella sua forma cistica. A nostra conoscenza, questa è la prima descrizione della prevalenza di *E. multilocularis* nell'O.I. in Italia e contribuisce a chiarire il mantenimento e la diffusione di *E. multilocularis* nella nostra provincia.

Current epidemiological situation of *Echinococcus multilocularis* in the province of Bolzano

Echinococcus multilocularis is a parasite belonging to the class of Cestodes. In South Tyrol, the red fox represents the main definitive host, while various species of rodents act as intermediate hosts and house the "larval forms". Man can only accidentally become an intermediate host, developing alveolar echinococcosis, a serious disease that can be fatal.
Supported by research projects funded by the Ministry of Health (RC IZSVe 03/2011; RC IZSVe 18/2016;), over the years IZSVe researchers have carried out a surveillance activity for *E. multilocularis* throughout the territory of North East Italy. 2872 foxes were analysed; 7.55% of the samples were positive for various cestodes. However, only in the province of Bolzano was the presence of *E. multilocularis* confirmed. The latest research project funded by the Ministry of Health (RC 05/19) has benefited from the collaboration of other research bodies (National Reference Centre for echinococcosis, Italian National Institute of Sanity, Edmund Mach Foundation and University of Pisa) allowing the epidemiological situation in the province of Bolzano to be updated, especially in the areas at greatest risk.
An interesting approach consists of extending the study also to intermediate guests (O.I.), in particular the small rodents of the province of Bolzano. From 2019 to 2021, thanks to a great collaboration with the Museum of Nature South Tyrol in Bolzano, 75 livers of small rodents, mainly voles and murids, from different municipalities of South Tyrol, were collected. All livers were screened for parasitic lesions and subjected to genetic/biomolecular analysis: 13.33% were positive for *E. multilocularis*. To our knowledge, this is the first

description of the prevalence of *E. multilocularis* in the O.I. in Italy and helps to clarify the maintenance and spread of *E. multilocularis* in our province.

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Monitoraggio di cicaline (Hemiptera: Auchenorrhyncha) nella coltivazione di piante officinali in Alto Adige

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Nelle coltivazioni di piante officinali sono presenti diverse specie di cicaline (Hemiptera) che, con il loro apparato boccale pungente succhiante, vanno a sottrarre linfa dai tessuti vegetali, causando danni soprattutto alla famiglia delle Lamiaceae. Poiché non sono note indagini sulla presenza di cicaline nella produzione di piante officinali dell'Alto Adige, nel 2020 è stato effettuato un monitoraggio presso il maso "Gachhof" (620 m s.l.m., Merano, Alto Adige, Italia) e presso un sito sperimentale a Lauregno (1100 m s.l.m., Alto Adige, Italia). I rilievi semi-quantitativi sono stati effettuati con un retino in tre diversi momenti durante il periodo vegetativo sulle seguenti specie vegetali: melissa, menta piperita, salvia, rosmarino, ortica e origano. Gli insetti catturati sono stati morfologicamente identificati in laboratorio. Le catture e lo spettro di specie sulle rispettive piante sono state esaminate per quanto riguarda la dominanza. La dominanza descrive la percentuale con cui una specie è rappresentata sul numero totale di individui catturati. Dei 1.101 adulti catturati, 818 sono stati identificati a livello di specie e assegnati a 10 specie. Di 271 femmine non è stato possibile confermare chiaramente l'appartenenza alla specie, mentre per altri 11 individui è stato possibile risalire solo al genere o alla famiglia. In questo primo anno di indagini sono state registrate otto specie su *Melissa officinalis*. Le specie principali *Eupteryx curtisii, E. atropunctata, Emelyanoviana mollicula* hanno rappresentato il 95,1 % delle catture. Su menta piperita sono state identificate sette specie di cicaline, con *Emelyanoviana mollicula, Eupteryx atropunctata e E. decemnotata* classificate come specie dominanti (82,35 %). Sul rosmarino era presente prevalentemente *Eupteryx decemnotata* e sull'origano le due specie *Emelyanoviana mollicula* ed *Eupteryx atropunctata*. Su salvia e ortica, al momento del campionamento non è stato rilevato quasi nessun individuo.

Monitoring of leafhoppers (Hemiptera: Auchenorrhyncha) in South Tyrolean herb cultivation

Various species of leafhoppers (Hemiptera) occur in herb cultivation and cause damage as sap-sucking insects, especially in the Lamiaceae plant family. As there are no known surveys of the species occurring in South Tyrolean herb production, a monitoring of Auchenorrhyncha was carried out at the "Gachhof" herb farm (620 m a.s.l., Merano, South Tyrol, Italy) and at a field site in Lauregno (1100 m a.s.l, South Tyrol, Italy) in 2020. The semi-quantitative surveys using the sweep netting technique took place at three points during the vegetation period. The following plant species were sampled: lemon balm, peppermint, sage, rosemary, nettle and origano. Field catches were morphologically identified in the lab. The catches and the species spectrum determined from them on the respective herbs investigated were examined regarding dominance. Dominance describes the relative abundance of a species compared to the other species; it represents the percentage with which a species is represented in the total number of individuals caught. Out of 1.101 captured adults, 818 were identified to species level and assigned to 10 species. Of 271 females, the species affiliation could not be clearly confirmed, further 11 individuals could only be addressed on genus or family level. Eight species were recorded on lemon balm in this first survey year. The main species *Eupteryx curtisii, E. atropunctata, Emelyanoviana mollicula* represented 95.1 % of the catches. On peppermint, seven Cicadellidae were identified, with *Emelyanoviana mollicula, Eupteryx atropunctata* and *E. decemnotata* classified as dominant species (82.35 %). On rosemary, *Eupteryx decemnotata* was predominantly present, and on origano the two leafhopper species *Emelyanoviana mollicula* and *Eupteryx. atropunctata*. On sage and nettle, hardly any Auchenorrhyncha-individuals were detected at the time of sampling.

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Der Baumschläfer *Dryomys nitedula* im Rätischen Dreieck – Allianz zur Erforschung einer seltenen Kleinsäuger-Art

EVA LADURNER[1], CHRISTINE RESCH[2], STEFAN RESCH[2], REGULA TESTER[3], ADRIAN DIETRICH[4], FEDERICA LAZZERI[1] & ANGELIKA ABDERHALDEN[5]
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In den Jahren 2020/2021 fanden im Zuge eines Interreg-Projekts im Dreiländereck Schweiz, Österreich und Italien Erhebungen zum Baumschläfer *Dryomys nitedula* statt. Ziel war es, eine Monitoring-Methode für die Erfassung der nachtaktiven, arborikolen und in geringen Dichten lebenden Art zu etablieren.
Im Engadin (CH), im Ötztal (AT) und im Vinschgau (IT) wurden je 2 Probeflächen mit 15 Stationen eingerichtet. Zum Einsatz kamen vier Methoden (Holzkästen, Holzbetonkästen, Spurentunnel, Wildtierkameras), die Geräte wurden in verschiedenen Höhen von 1–6 m an Bäumen angebracht und 5-mal ab Juni 2021 kontrolliert.
Auf 3 der 6 Probeflächen gelangen Nachweise der Zielart. Der Nachweiserfolg lag bei den Wildtierkameras bei 26,1 %, die beiden Kobeltypen und die Spurentunnel erreichten 3,3 %. Der Baumschläfer wurde vom Grauerlen-Bruchwald über Fichtenbestände bis hin zu lichten Lärchenwäldern erfasst. Besetzte Kobel mit Nestern, welche auf eine dauerhafte Nutzung hindeuten, befanden sich an Feuchtstandorten mit Laubholzbeständen. Die Montagehöhe der besetzten Kobel lag dabei meist über 2 m.
Die Studie zeigte, dass Wildtierkameras gut zur Präsenzüberprüfung des Baumschläfers geeignet sind. Vorteile sind der geringe Wartungsaufwand und die langfristige Einsatzdauer. Spurentunnel besitzen bei Optimierung von Tinte, Papier und Köder ebenfalls Potential bei faunistischen Erhebungen zu arborikolen Arten. Ihre Vorteile liegen im geringen Kostenaufwand und der Eignung für Citizen-Science Projekte. Nistkästen erfordern einen höheren Aufwand bei Transport, Montage und Wartung, sind jedoch für Erkenntnisse zu Individuen, Population und Genetik unerlässlich. Sie sollten daher ein fester Bestandteil von Monitoring-Studien sein, eine mindestens 2-jährige Untersuchungsdauer ist dabei anzuraten. Da die einzelnen Methoden unterschiedliche Vor- und Nachteile zeigen, sollte bei künftigen Erhebungen zum Baumschläfer eine auf die Fragestellung abgestimmte Methodenkombination angedacht werden.

The Forest dormouse *Dryomys nitedula* in Terra Raetica – an alliance for the research on a rare small mammal species

In the years 2020/2021, studies on the forest dormouse *Dryomys nitedula* took place as part of an Interreg project in the border triangle between Switzerland, Austria and Italy. The aim was to establish a suitable monitoring method for the recording of *D. nitedula*, an arboreal and nocturnal species that occurs in low densities.
In the Engadine (CH), in the Ötztal (AT) and in the Venosta Valley (IT), 2 sample plots each with 15 survey stations were established. Four survey methods were used (wooden nest boxes, woodcrete nest boxes, tracking tubes, wildlife cameras), the devices were placed at different heights of 1–6 m on trees and checked 5 times in 2021.
Evidence of the forest dormouse was obtained at 3 of the 6 study sites. Detection success was 26.1% for wildlife cameras, and 3.3% for both nest box types and tracking tubes. The species was recorded in a variety of habitat types, from grey alder scrub forest to spruce forests to sparse larch forests. Occupied nest boxes with nests, indicating permanent use, were located in wet habitats with deciduous trees. The assembly height of the occupied boxes was mostly above 2 m.
Overall, the study showed that wildlife cameras are well suited for verifying a forest dormouse occurrence. The main advantages are low maintenance and long-term use. Tracking tubes also have potential in arboreal species faunistic surveys with further optimization of ink, paper, and bait. Their advantages lie in their low cost and suitability for citizen science projects. Nest boxes require more effort to transport, assemble, and maintain, but are essential for deeper insights into individuals, populations, and genetics. They should therefore be an integral part of monitoring studies. In addition, a minimum 2-year study period is advisable. Since the single methods showed different advantages and limitations, a combination of methods adapted to the research question should be considered for future surveys on *D. nitedula*.

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Characterizing and modelling forest structure and development in South Tyrol: methods and first results

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Forests in South Tyrol provide essential functions to human society, among them timber, habitat for biodiversity and protection against natural hazards. In the framework of the long-term project Biodiversity Monitoring South Tyrol (BMS) we analyze several forest habitat types. In a subset of forest sites across the province we collect information in a standardized way following the fieldwork protocol of the Third Italian National Forest Inventory: qualitative attributes related to cover, forest category and management aspects, and quantitative characters such as the structure and composition of the tree species present, as well as dead wood and tree microhabitats – morphological characteristics of trees that constitute habitats for many species. The aim of this project is to quantify the capacity of forest stands to accommodate species-specific biodiversity and to provide protection against natural hazards, and to deliver recommendations to adapt forest management practices. Additionally, the collected data will integrate an European database in the framework of the COST Action Bottoms UP and will also allow us calibrating models of forest dynamics to simulate future forest development under climate change. We herewith present our forest survey methodology and descriptive statistics results about South Tyrol's forest stands. On selected stands, forest dynamics was simulated into the future under different climate change projections with the model ForClim. First results show changes in protective functions against rockfall and avalanches depending on climate and silvicultural scenarios. Further research will identify specific biodiversity indicators and assess changes in habitat provision under climate change and natural disturbances.

Caratterizzazione e modellizzazione della struttura e dello sviluppo delle foreste in Alto Adige: metodi e primi risultati

Le foreste in Alto Adige fornisco servizi ecosistemici che sono essenziali per la società, tra cui prodotti legnosi, habitat per la biodiversità e la protezione dai rischi naturali. Nell'ambito del progetto a lungo termine Monitoraggio della Biodiversità in Alto Adige (BMS) analizziamo diversi tipi di habitat forestali. In diversi siti forestali distribuiti su tutto il territorio provinciale raccogliamo informazioni in modo standardizzato seguendo il protocollo di lavoro sul campo del Terzo Inventario Forestale Nazionale italiano: attributi qualitativi relativi alla copertura, alla categoria forestale e agli aspetti gestionali, e caratteri quantitativi come la struttura e la composizione delle specie arboree presenti, nonché il legno morto e i microhabitat arborei - caratteristiche morfologiche degli alberi che costituiscono habitat per molte specie. L'obiettivo di questo progetto è quantificare la capacità dei popolamenti forestali di ospitare la biodiversità e di fornire protezione contro i rischi naturali, nonché di fornire raccomandazioni per adattare le pratiche di gestione forestale. Inoltre, i dati raccolti andranno a integrare una banca dati europea nell'ambito della COST Action Bottoms UP e ci permetteranno di calibrare modelli di dinamica forestale per simulare lo sviluppo futuro delle foreste in presenza di cambiamenti climatici. Con questo contributo presentiamo la nostra metodologia della campagna di rilievi e i risultati delle statistiche descrittive sui popolamenti forestali dell'Alto Adige. Su alcuni popolamenti abbiamo simulato lo sviluppo futuro del bosco con il modello ForClim, che permette di fare delle proiezioni di dinamica forestale sotto diversi scenari di cambiamento climatico. I primi risultati mostrano cambiamenti nelle funzioni protettive contro la caduta di massi e valanghe a seconda degli scenari climatici e selvicolturali. Ulteriori ricerche si incentreranno sull'identificazione di indicatori specifici di biodiversità e di valutare l'impatto del cambiamento climatico e disturbi naturali sulla provvigione di habitat.

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Soil biodiversity tells the story of the soil itself

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This study investigates the long-term effect of crop conversion from grapevine to apple orchard on chemical and soil microbial and faunal diversity. In South Tyrol, we selected an agricultural field enclosed in less than 1 ha where grapevine was gradually replaced by apple cultivation in 2016, 1970, and 1922. This unique setting allows us to investigate the effect of gradual orchard replacement, avoiding other confounding environmental factors. We collected a total of 45 soil samples (15 replicates at each site). We assessed chemical-physical soil characteristics (i.e., pH, soil texture, soil organic carbon, total nitrogen, heavy metals, and mineral nutrients). We investigated the soil biodiversity via DNA metabarcoding of the bacterial 16S rRNA gene, fungal ITS2 region and fauna COI gene.
Soil chemical composition could discriminate the samples belonging to the three conversion times (ANOVA on PCA components $p<0.01$). These patterns were strongly reflected in the soil microbial and faunal communities' structure. Indeed, the alpha-diversity and the beta-diversity of the investigated communities showed significant changes across the gradient (Kruskal Wallis $p<0.05$, PERMANOVA p-value<0.05). Next, we investigated the ecological interactions. Co-occurrence ecological networks highlighted that despite 307 core OTUs shared by networks, only 4 interactions were stable across the gradient. Also, we detected an increase in the number of fungal OTUs in networks across the gradient. In parallel, the number of keystone taxa and the total share of antagonistic interactions increased. These results suggest permanent ecological signatures in soil, stable even after a century of agricultural history. Also, this study suggests to consistently include soil biodiversity among soil quality indicators, particularly in perennial tree crops, where the agricultural history of the land exerts a strong influence on soil biodiversity.

La biodiversità del suolo racconta la storia del suolo stesso

Questo studio analizza l'effetto a lungo termine della conversione da vite a melo sulla diversità chimica, microbica e faunistica del suolo. In Alto Adige, abbiamo selezionato un campo agricolo di meno di 1 ettaro dove la vite è stata gradualmente sostituita dalla coltivazione del melo nel 2016, 1970 e 1922. Questo contesto unico ci permette di studiare l'effetto della sostituzione graduale del frutteto, evitando altri fattori ambientali di disturbo. In totale sono stati raccolti 45 campioni di suolo (15 repliche per ogni sito). In seguito, sono state eseguite analisi chimico fisiche del suolo (pH, tessitura, carbonio organico, azoto totale, metalli pesanti e nutrienti minerali). La biodiversità del suolo è stata analizzata attraverso l'approccio di *metabaorcoding* del DNA del gene 16S rRNA batterico, della regione ITS2 fungina e del gene COI della fauna.
La composizione chimica del suolo ha permesso di discriminare i campioni appartenenti ai tre tempi di conversione (ANOVA sulle componenti PCA $p<0,01$). Tali risultati sembrano essere in accordo con quello che è stato riscontrato struttura delle comunità microbiche e faunistiche del suolo. Infatti, l'alfa-diversità e la beta-diversità delle comunità analizzate hanno mostrato cambiamenti significativi lungo il gradiente (Kruskal Wallis $p<0,05$, PERMANOVA p-value$<0,05$). In seguito, sono state analizzate le interazioni ecologiche. Le reti ecologiche di co-occorrenza hanno evidenziato che, nonostante le 307 OTU di base condivise dalle reti, solo 4 interazioni erano stabili lungo il gradiente. Inoltre, è stato rilevato un aumento del numero di OTU fungine nelle reti attraverso il gradiente. Parallelamente, sono aumentati il numero di *keystone* taxa e il numero totale di interazioni antagoniste. Questi risultati suggeriscono la presenza di "firme ecologiche" permanenti nel suolo, stabili anche dopo un secolo di utilizzo agricolo. Inoltre, questo studio suggerisce di includere sistematicamente la biodiversità del suolo tra gli indicatori di qualità del suolo, in particolare nelle colture arboree perenni, dove la storia agricola esercita una forte influenza sulla biodiversità del suolo stesso.

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Biodiversitätserhebungen in Kräuteranbaubetrieben

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Der Kräuteranbau stellt eine Nische in der Südtiroler Landwirtschaft dar. Knapp 50 Betriebe bewirtschaften insgesamt etwa 20 ha Anbaufläche. Im Gegensatz zu anderen Ackerkulturen (Getreide, Mais etc.) werden hierbei viele verschiedene Kulturpflanzen auf engstem Raum angebaut. Daraus ergibt sich einerseits ein großes Angebot an Blüten für blütenbesuchende Insekten, andererseits auch eine Vielzahl an Futterpflanzen für phytophage Insektenarten. Letztere können auch ein Problem für die Kulturpflanzen darstellen. Systematisch erhobene Daten zu den vorkommenden Tierarten im Kräuteranbau liegen bis jetzt aber noch keine vor.
In einem gemeinsamen Projekt des Versuchszentrums Laimburg und Eurac Research wurde an drei ausgewählten Standorten die Insektenvielfalt untersucht. An allen drei Standorten kamen Farbschalen zum Einsatz, mit deren Hilfe sowohl Insektengruppen, die in der Vegetation leben, als auch solche, die das Blütenangebot zum Nektar sammeln nutzen, gesammelt werden konnten. An einem Standort wurde zudem das Standard-Erhebungsprogramm des Biodiversitätsmonitorings Südtirol durchgeführt (Tagfalter, Heuschrecken, Fledermäuse, Vögel und Bodenorganismen). Hier kam außerdem eine Malaise-Falle zum Einsatz.
Das gesammelte Material wird derzeit ausgewertet. Mit den Farbschalen wurden insgesamt 15820 Tiere gesammelt. Zu den abundantesten Pflanzenschädlingen zählen die Pflanzenläuse und die Fransenflügler mit 819 bzw. 2047 Individuen. Wildbienen waren mit 244 Individuen aus ca. 55 Arten die abundanteste Gruppe von Bestäubern. Schwebfliegen (N=237) und Honigbienen (N=161) waren auch sehr zahlreich vorhanden. Die weitere Auswertung wird zusätzliche Einsichten über das Artenspektrum von Kräuteranbaubetrieben geben. Die Ergebnisse sind zum Teil auch auf artenreiche Hausgärten (Bauerngärten) übertragbar, da die verschiedenen Kräuter oft traditionell in Hausgärten angebaut werden.
Schüsselwörter: Biodiversität, Kräuteranbau, Bestäuber, phytophage Insekten

Biodiversity surveys in medicinal and aromatic plant fields

Herb cultivation represents a niche in South Tyrolean agriculture. Almost 50 farms manage a total of about 20 ha of cultivated area. As a rule, these are small-structured arable fields. In contrast to other arable crops (cereals, corn, etc.), many different crops are cultivated in a very small area. This results in a large supply of flowers and forage plants for flower-visiting insects and phytophagous species, respectively. However, systematically collected data on the animal species present in herbaceous crops are not yet available.
In a joint project of Laimburg Research Centre and Eurac Research, insect diversity was studied at three selected aromatic plant fields. At all three sites we used colored pan traps (blue, white, yellow) to investigate several insect groups, especially those that live in the vegetation, as well as those that use the flowers in the cultivated areas to collect nectar. At one site we also carried out the standard program of the Biodiversity Monitoring South Tyrol: butterflies, grasshoppers, bats, birds, vascular plants, and soil organisms were surveyed. In addition to the standard BMS program, a Malaise trap was also used at that site.
A total of 15820 individuals were collected with the colored pan traps. Among the most abundant plant pests were aphids and thrips with 819 and 2047 individuals, respectively. Wild bees were the most abundant pollinator group with 244 individuals (about 55 species), respectively. Further pollinators, such as hoverflies (N=237) and honeybees (N=161), were also abundant. The upcoming identification will give us further insights about the species composition of herb fields. The results are also partly transferable to species-rich home gardens (farm gardens), as the different herbs are often traditionally grown in home gardens.
Key words: biodiversity, aromatic plants, pollinators, insect pest

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Il primo gruppo stanziale estivo di nottola gigante *Nyctalus lasiopterus* nelle Alpi orientali italiane rilevato con bat detector

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La nottola gigante *Nyctalus lasiopterus* è una delle specie di pipistrello più rare, protetta dalla Direttiva Habitat (Allegato IV) e classificata come in pericolo critico nella Lista Rossa italiana. La sua distribuzione nella regione mediterranea è nota, mentre le conoscenze nelle zone centrali e occidentali dell'Europa sono scarse. Dati recenti per le Alpi Italiane includono poche segnalazioni raccolte nella provincia di Trento e nella regione del Friuli-Venezia Giulia. Tuttavia, questi dati rappresentano avvistamenti occasionali lungo le rotte migratorie dato che nelle Alpi Italiane non sono ancora state rilevate popolazioni stanziali.
In questo lavoro riportiamo la presenza del primo gruppo stanziale di nottola gigante sul versante meridionale delle Alpi.
Abbiamo installato bat detector in 254 località coprendo i principali tipi di habitat presenti in Alto Adige. Le analisi statistiche mostrano differenze significative nelle metriche dei richiami di *N. lasiopterus* rispetto alla specie simpatrica *Tadarida teniotis*, le quali emettono richiami in un intervallo di ecolocalizzazione simile.
Abbiamo identificato un totale di 42 sequenze di nottola gigante in cinque diverse località (Lana 2016, Terlano 2019 e 2021, Laives 2018, Montagna 2019, Egna 2018). Complessivamente, abbiamo registrato *N. lasiopterus* in 14 notti diverse nel periodo da fine giugno a metà agosto, mentre in giugno in un sito abbiamo registrato, in due occasioni, due individui contemporaneamente.
Nonostante le indagini intensive svolte in tutta la provincia, la specie è stata rilevata solo nella Valle dell'Adige. Le ripetute registrazioni di *N. lasiopterus* in diverse località durante i mesi estivi di diversi anni suggeriscono che questa specie è regolarmente presente, almeno nella stagione estiva.
La conferma della presenza di individui stanziali di nottola gigante è fondamentale per pianificare e attuare locali misure di conservazione e permetterà di aggiornarne lo status nella Lista Rossa italiana.

A first summer resident group of the Greater Noctule Bat *Nyctalus lasiopterus* in the Italian eastern Alps discovered through bat detector

The Greater Noctule Bat *Nyctalus lasiopterus* is one of the rarest bat species protected by the EU Habitats Directive (Annex IV) and classified as Critically Endangered in the Italian Red List. While its distribution in the Mediterranean region is well known, central and western parts of Europe are still scarce of data. Recent occurrences for the Italian Alps include few records collected in the Trento province and in the Friuli Venezia Giulia region. However, these records may represent occasional sightings along migratory routes since resident populations have not yet been recorded.
Here we report the first evidence of *N. lasiopterus* in South Tyrol with the presence of at least one resident group on the southern side of the Alps.
We installed bat detectors at 254 locations covering the main habitat types occurring in South Tyrol. Statistical analyses showed significant differences in call metrics of South Tyrolean *N. lasiopterus* compared to the sympatric *Tadarida teniotis*, both emitting calls in a similar echolocation range.
We identified a total of 42 sequences of *N. lasiopterus* at five different locations (Lana 2016, Terlano 2019 and 2021, Laives 2018, Montagna 2019, Egna 2018). Overall, we recorded *N. lasiopterus* in 14 different nights in the period from late June to mid-August, whereas in June at one site we recorded two individuals twice simultaneously.
Despite intensive surveys in the entire province, the species has only been detected in the Adige Valley. The repeated records of *N. lasiopterus* at different localities during the summer months of several years suggest that this species occurs regularly in the southernmost part of South Tyrol, at least in the summer season.
The confirmation of the presence of a resident Greater Noctule Bat group is crucial for planning and implementing effective local conservation measures. This important information provides the underlying knowledge for accurately updating its conservation status in the Italian Red List.

Bodenuntersuchungen innerhalb des Biodiversitätsmonitoring Südtirols: Methoden und erste Ergebnisse nach drei Jahren

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Der Boden ist ein äußerst vielfältiger Bestandteil der Erde und erfüllt zusammen mit seinen Bewohnern zahlreiche wichtige Funktionen, wie Nährstoffumwandlungen, Kohlenstoffspeicherung und Filterfunktionen. Aufgrund der fortlaufenden Landnutzung und des Klimawandels sind die Böden starken Veränderungen ausgesetzt. Die Bodenerhebungen im Rahmen des Biodiversitätsmonitorings Südtirol (BMS) haben zum Ziel, diese Veränderungen besser zu verstehen und zu quantifizieren, um schließlich Strategien zur Erhaltung der biologischen Vielfalt in Südtirol zu entwickeln.
Für die Bodenuntersuchung beproben wir jedes Jahr alle 64 Standorte innerhalb der ausgewählten BMS-Gebiete, welche ein breites Spektrum von anthropogenen und naturnahen Lebensräumen abdecken. An jedem Standort werden zweimal jährlich zwei Barberfallen aufgestellt, um die oberflächenaktiven Makroinvertebraten zu erfassen, sowie vier Bodenproben entnommen, um die Verteilung und die Gemeinschaftsstruktur der Boden-Makroinvertebraten zu untersuchen. Nach etwa 14 Tagen werden die Fallen geleert und die Tiere in 75 %igem Alkohol aufbewahrt Die Bodenproben werden ins Labor gebracht und durch Hitze nach der Kempson-Methode extrahiert. Zur Analyse der abiotischen Bodeneigenschaften (Bodentextur, pH-Wert usw.) nehmen wir an jedem Standort eine Bodenmischprobe. Außerdem bestimmen wir die Bodenart mit der Pürckhauer-Methode.
Erste Ergebnisse zeigen große Unterschiede zwischen den untersuchten Lebensraumtypen in Bezug auf Vielfalt, Abundanz und Zusammensetzung der Gemeinschaft. So weisen beispielsweise Grünlandlebensräume je nach Bewirtschaftungsintensität eine deutlich unterschiedliche Zusammensetzung der Lebensgemeinschaften auf.
Das Poster gibt einen Überblick über die Bodenuntersuchung innerhalb des BMS und stellt erste Ergebnisse nach 3 Jahren der Probenahme vor.

Soil survey within the Biodiversity Monitoring South Tyrol: methods and first results after 3 years of sampling

Soil is a highly diverse component of the Earth's biosphere, and together with its inhabitants it fulfils numerous important functions such as nutrient cycling, carbon sequestration and water purification. Due to the ongoing land-use and climate changes, also soils undergo severe alterations. The soil survey within the Biodiversity Monitoring South Tyrol (BMS) aims at improving our understanding of how such changes influence soil characteristics and soil animal communities, which will help to develop strategies for preserving soil biodiversity in South Tyrol.
For the soil survey, we sampled all 64 BMS sites per year, covering a large range of both man-made and near-natural habitats. We installed two pitfall traps on each site twice a year to assess ground-dwelling macro-invertebrates and took four soil core samples on each site to investigate the distribution and community structure of soil dwelling macro-invertebrates. After about 14 days the pitfall traps were emptied, and individuals were stored in 75% alcohol. Soil core samples were taken to the laboratory and extracted by heat in a modified Kempson apparatus. For analyzing abiotic soil properties (soil texture, pH, organic matter content, macro-nutrients) we took additional soil samples at each site, and we also identified the soil type using the Pürckhauer method.
First results show large differences between the surveyed habitat types in diversity, abundance and community composition. For example, grassland habitats show a clearly different community composition depending on the management intensity. The poster gives an overview of the soil survey within the BMS and shows first results after 3 years of sampling.

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Monitoring of the environmental quality for the presence of pesticides and heavy metals in Val di Sole using honeybees as pollen samplers

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Thanks to the ability of *Apis mellifera* (L.) to undertake the role of ecological detector, apiary products are being used to study environmental health. This research assesses, for the first time in such detail, the dispersion of pesticides and heavy metals along the 50 km of Val di Sole and its two laterals. This territory is cultivated with apple-orchards only in the lower-altitude eastern part, while for hay production in the rest. On pollen-load samples collected in 22 and 20 apiaries in May and July respectively, multi-residual analyses and palynology have been performed. Results show wholesome situations for pesticides in the western monitored areas, whereas others are more critical, also presenting hazard for bees. Phosmet and Fluazinam are the most spread molecules, also showing drift-effect wider than 10 km. EU-banned substances, veterinary products and Glyphosate have been detected. Lead shows high concentration in a specific area. Palynological results allowed more detailed considerations.

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A Citizen Science project about grasslands birds in South Tyrol

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Bird species that depend on grasslands are particularly endangered, mainly due to intensification and/or abandonment of agriculture in recent decades. Conservational efforts are necessary to preserve these species. In 2020, representatives of Eurac Research, Museum of Nature, and Nature Office launched a working group dedicated to grassland birds. One aim of this group was the implementation of a standardized grassland bird monitoring in South Tyrol, which started in spring 2022. As an important complement to this monitoring, in 2021 the working group started a citizen science project, in which volunteer bird watchers are invited to report observations of grassland birds in hitherto non-monitored areas of the province. For this survey, the volunteers visit at least twice a year a specific research area, which is close to their homes or is otherwise easily accessible to them. At the sites, they count for 10 minutes all the birds they see and hear within a radius of 100 m. The survey period is between May and July, i.e., during the breeding season. Additional information such as weather conditions and a few management and structural variables (e. g., presence of trees and shrubs) are also noted. The collected data are afterwards controlled and analyzed by scientists of Eurac Research and will finally flow into the database of the Museum of Nature South Tyrol. Especially for uncommon species, these citizen science data could effectively complement the standardized surveys and therefore contribute to better focus the conservation measures. Apart from the scientific and conservational value, the project also aims at connecting amateur ornithologists and to raise awareness about grassland birds.

Ein Citizen Science Projekt über Feld- und Wiesenvögel in Südtirol

Auf Grünland angewiesene Vogelarten sind besonders gefährdet, vor allem aufgrund der Intensivierung und/oder der Aufgabe der Landwirtschaft in den letzten Jahrzehnten. Um diese Arten zu erhalten, sind besondere Schutzmaßnahmen erforderlich. Im Jahr 2020 gründeten Vertreter von Eurac Research, Naturmuseum und Amt für Natur eine Arbeitsgruppe, die sich mit Vogelarten der Graslandschaften befasst. Ein Ziel dieser Gruppe war die Durchführung eines standardisierten Wiesenbrütermonitorings in Südtirol, das im Frühjahr 2022 begann. Als wichtige Ergänzung dazu begann im Jahr 2021 ein Citizen Science Projekt, bei dem freiwillige Vogelbeobachter das Vorkommen von Wiesenvögeln in bisher nicht untersuchten Gebieten des Landes erheben. Für diese Erhebung suchen die Freiwilligen mindestens zweimal im Jahr ein bestimmtes Untersuchungsgebiet auf, das sich in der Nähe ihres Wohnorts befindet oder für sie anderweitig leicht

erreichbar ist. Dort zählen sie 10 Minuten lang alle Vögel, die sie in einem Umkreis von 100 m sehen und hören. Der Erhebungszeitraum liegt zwischen Mai und Juli, also während der Brutzeit. Außerdem werden zusätzliche Informationen, wie die Wetterverhältnisse und einige Landschaftsstrukturen (z. B. das Vorkommen von Bäumen und Sträuchern), erfasst. Die gesammelten Daten werden anschließend von WissenschaftlerInnen von Eurac Research kontrolliert und analysiert und fließen schließlich in die Datenbank des Naturmuseums Südtirol ein. Gerade bei seltenen Arten können diese Citizen Science Daten die standardisierten Erhebungen wirkungsvoll ergänzen und so dazu beitragen, die Schutzmaßnahmen besser zu koordinieren. Neben dem wissenschaftlichen und naturschutzfachlichen Wert zielt das Projekt auch darauf ab, passionierte Ornithologen zu vernetzen und das Bewusstsein für Wiesenvögel zu schärfen.

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Myotis myotis nella dieta di una coppia di *Falco tinnunculus* in Alto Adige

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Il Gheppio *Falco tinnunculus* è un predatore generalista di invertebrati e piccole prede vertebrate che ha rivelato uno spettro trofico molto ampio nelle diverse parti del suo grande areale. Vi sono diversi dati pubblicati anche di predazione su chirotteri. Nella chiesa di villa di Egna sono stati raccolti resti di alimentazione della coppia residente a partire dal 2017. L'alimentazione comprende diversi gruppi di invertebrati dove dominano scarabeidi, ortotteri, diversi gruppi di coleotteri oltre che arvicolidi (prevalentemente *Microtus arvalis*), *Apomedus sylvaticus* e uccelli quali *Turdus merula, Erithacus rubecula, Carduelis carduelis, Serinus serinus* tra gli altri.
Questa coppia, inoltre, preda attivamente i *Myotis myotis* presenti come colonia riproduttiva nel sottotetto della chiesa. Entrando dalle finestre presenti, i falchi si spingono all'interno fino alle aree di semioscurità e poi predato giovani e adulti dei chirotteri presenti. Gli oltre 40 resti di *Myotis* raccolti mostrano una precisa tecnica di alimentazione dove il falco mangia tutte le diverse parti del chirottero tralasciando solo le ossa del braccio e dell'ala oltre che le parti distali del rostro, costituite dai soli denti e basi ossee. La pressione verso la colonia da parte di questa coppia di falchi è costante e considerevole anche se non pare avere una importanza significativa sulle ampie variazioni numeriche che la colonia appare avere in questi anni.

Myotis myotis in the diet of a pair of *Falco tinnunculus* in South Tyrol

The Kestrel *Falco tinnunculus* is a generalist predator of invertebrates and small vertebrate prey which has revealed a very broad trophic spectrum in the different parts of its large range. There are also several published data of predation on bats. In the church of Villa di Egna, the feeding remains of the kestrel resident couple have been collected starting from 2017. The feeding remains include different groups of invertebrates dominated by Scarabeids, Orthopterans, different groups of beetles as well as arvicolides (mainly *Microtus arvalis*), *Apomedus sylvaticus,* and birds such as *Turdus merula, Erithacus rubecula, Carduelis carduelis, Serinus serinus* among others.
This pair also actively preys on the *Myotis myotis* present as a breeding colony in the attic of the church. Entering through the windows present, the hawks go inside up to the semi-dark areas and then prey on young and adult bats present. The more than 40 remains of *Myotis* collected show a precise feeding technique where the hawk eats all the different parts of the bat, leaving out only the bones of the arm and wing as well as the distal parts of the rostrum, consisting only of the teeth and bone bases. The pressure towards the colony by this pair of kestrels is constant and considerable even if it does not seem to have a significant importance on the large numerical variations that the colony appears to have in recent years.

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Botanical surveys within the Biodiversity Monitoring South Tyrol: overview, methods and results after three years

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Vascular plants are represented in South Tyrol with almost 3000 species. They are found in practically every type of habitat in the country except in the nival zone and in the large water bodies. Habitats themselves are primarily characterized by their plants cover. Knowing what the vegetation of a site consists of is therefore substantial for any kind of terrestrial biodiversity monitoring.
As part of the Biodiversity Monitoring South Tyrol project, a total of 320 sites are monitored in 5 years, divided into 10 different habitat types and their subcategories. The botanical surveys follow the EDGG protocol (Eurasian Dry Grassland Group) and encompass a surface of 100 m² in terrestrial sites and of 1000 m² in forest areas. Wetlands and settlements are monitored through transects. Bryophytes and lichens are surveyed within four subplots (excluding epiphytic species); the subsequent identification is carried out by experts in the lab.
The poster provides an overview of the project and shows some preliminary results of 195 sites surveyed in the first three years. Specifically, some analyses regarding the floristic richness per habitat and a first comparative analysis between differently managed sites (e.g., intensive and extensive grasslands or conventional and organic orchards) are presented. Additionally, the botanical data are used to characterize the habitats as a basis for the analysis of other taxonomic groups (e.g., butterflies and grasshoppers).
After completion of the last two monitoring years, we will have a clearer understanding of the conservational quality of our main habitat types and of how plant diversity is distributed within the province. The final dataset will be useful for any type of environmental analysis and it will provide an important contribution to any kind of biodiversity research. Finally, the monitoring plots allow us to understand how plant diversity will change in the future.

Indagini botaniche nell'ambito del Monitoraggio della Biodiversità in Alto Adige: panoramica, metodi e risultati dopo tre anni

L'Alto Adige vanta una flora vascolare di quasi 3000 specie, distribuite in ogni habitat ad eccezione delle zone nivali e dei grandi corpi idrici. La caratterizzazione degli habitat avviene in prima linea sulla base della copertura vegetale: nell'ambito del progetto Biodiversity Monitoring South Tyrol vengono quindi sottoposti a indagine un totale di 320 siti in 5 anni, afferenti a 10 diverse tipologie di habitat a loro volta suddivise in sottocategorie. I rilevamenti seguono il protocollo EDGG (Eurasian Dry Grassland Group) e sono effettuati su un'area di 100 m² per i siti terrestri e di 1000 m² per i siti forestali. Nelle aree umide e nei centri abitati si conducono invece campionamenti con metodo a transetto, transetti aggiuntivi sono eseguiti anche per i coltivi. La componente criptofitica viene monitorata in quattro subplot escludendo la parte epifitica; l'identificazione delle specie avviene poi in laboratorio ad opera di esperti. Il poster offre una panoramica del progetto e mostra i risultati preliminari dei primi tre anni, ossia i dati raccolti per la parte botanica in 195 siti. Nello specifico vengono proposte alcune elaborazioni riguardo la diversità floristica per habitat. Si ha poi una prima analisi comparativa tra siti appartenenti ad una stessa categoria laddove insista una diversa gestione ad opera dell'uomo, come nella praticoltura intensiva/estensiva o all'interno del settore frutticolo. Sembra inoltre importante menzionare come il censimento floristico possa essere utilizzato per analizzare anche dati raccolti per altri gruppi tassonomici, come è avvenuto ad esempio per i lepidotteri. Con il completamento degli ultimi 2 anni di monitoraggio si andrà sicuramente a specificare ricchezza e stato di salute degli habitat, rendendo disponibile una serie di dati significativa, utile a qualsiasi tipo di analisi ambientale e di progettazione territoriale. Infine, le aree di monitoraggio permetteranno di capire come evolverà la diversità vegetale in futuro.

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Baumgart: Initiative zur Förderung und Erforschung von Streuobstwiesen

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Streuobstwiesen verschwinden europaweit zusehends. Gründe dafür sind meist die Intensivierung der Landwirtschaft oder ihre Auflassung.
Auch hierzulande werden diese für die Artenvielfalt und landschaftlich wertvollen Elemente immer seltener. Um dem entgegenzuwirken, haben acht Institutionen – Roter Hahn (Südtiroler Bauernbund), Bioland, Sortengarten, Heimatpflegeverband, Obstbaumuseum, Amt für Natur, Dachverband für Natur- und Umweltschutz und Eurac Research – 2021 die Initiative Baumgart gegründet. Baumgart will für die Wichtigkeit der Streuobstwiesen als traditionelles Kulturelement, wertvoller Lebensraum und Lieferant besonderer Produkte mit ökonomischem Potenzial sensibilisieren. Um dies zu erreichen, wurden bisher ein Fotowettbewerb, ein Kurs und Vorträge organisiert, Interviews gegeben und Zeitungsartikel veröffentlicht. Derzeit läuft eine Meisterschaft, bei der die schönste Streuobstwiese Südtirols gekürt werden soll. Weiters sind ein Streuobstwiesenfest und ein Workshop geplant. Ein Teil der Initiative befasst sich, unter Federführung von Eurac Research, auch wissenschaftlich mit diesem Lebensraum: 2021 hat das Team des Biodiversitätsmonitorings Südtirol Streuobstwiesen als Speziallebensraum untersucht. Die Ergebnisse zeigen deutlich, wie wertvoll dieser Lebensraum aus naturkundlicher Sicht ist: Im Vergleich zu anderen Lebensräumen liegen Streuobstwiesen in Bezug auf den Artenreichtum bei Vögeln, Tagfaltern, Heuschrecken und Gefäßpflanzen im Spitzenfeld. Zudem wurden in den untersuchten Flächen zahlreiche seltene und gefährdete Arten gesichtet. Im Rahmen einer Masterarbeit wurde außerdem die Entwicklung von Streuobstwiesen über die letzten 70 Jahre evaluiert. Die Initiative erreicht durch ihre Aktivitäten eine rege Teilnehmerzahl (z.B. 61 Teilnehmende an der Wiesenmeisterschaft) und hat eine große Resonanz. Weitere Aktivitäten sind in Planung. Ein Hauptaugenmerk für die Zukunft liegt auf der internationalen Zusammenarbeit, sowohl auf regionaler als auch europäischer Ebene.

Baumgart: Initiative for the promotion and research of orchard meadows

Orchard meadows are visibly disappearing throughout Europe. The reasons for this trend are usually the intensification of agriculture, or the abandonment.
In South Tyrol, too, these traditional orchards, which are valuable for biodiversity and landscape, are becoming increasingly rare. To counteract this trend, eight institutions – Roter Hahn (Südtiroler Bauernbund), Bioland, Sortengarten, Heimatpflegeverband, Obstbaumuseum, Amt für Natur, Dachverband für Natur- und Umweltschutz and Eurac Research – founded the Baumgart Initiative in 2021. Baumgart's aim is to raise awareness for the importance of orchard meadows as a traditional cultural element, valuable habitat, and supplier of special products with economic potential. To achieve this, a photo competition, a course, and lectures have thus far been organized, interviews given, and newspaper articles published. A competition is currently taking place, in which the most beautiful orchard meadow in South Tyrol is to be chosen. Furthermore, a festival of orchard meadows and a workshop are planned. Part of the initiative, under the leadership of Eurac Research, also deals scientifically with this habitat: in 2021, the team of the Biodiversity Monitoring South Tyrol studied orchard meadows as a special habitat. The results clearly show how valuable this habitat is from a natural science perspective: compared to other habitats, orchard meadows rank among the top in terms of species richness for birds, butterflies, grasshoppers and vascular plants, and numerous rare and endangered species were sighted in the investigated areas. In addition, the development of orchard meadows over the last 70 years was evaluated as part of a master's thesis. The initiative reaches a lively number of participants through its activities (e.g.,60 participants in the competition) and has a great response. Additional activities are being planned. A focus for the future is also on international cooperation, both at regional and European level.

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Under Pressure: *Vipera berus* e pascoli alpini

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Per uno studio circa *Vipera berus* in ambiente alpino, la si è cercata nei dintorni di Malga Cercen Alta (2147 m slm), in un'area molto sfruttata per il pascolo. Qui sono stati posizionati 44 rifugi artificiali (RA), ciascuno dei quali è stato ispezionato 10 volte.
Inoltre, per valutare l'abbondanza di prede, sono state posizionate 63 trappole per micromammiferi, usate per un totale di 252 notti trappola. Per confrontare aree soggette ad attività umane e non, lo stesso tipo di ricerca è stato applicato in aree simili ma non pascolate: una sotto Malga Cercen Alta, al confine tra la fascia forestale e quella delle praterie alpine (1850 m slm) e un'altra sul versante destro della Val di Sole, presso Malga Pozze (2200 m slm). Nel primo sito abbiamo utilizzato lo stesso set di trappole di Malga Cercen Alta (126 notti trappola), mentre nel secondo ne abbiamo posizionate 61 (122 notti trappola).
I contatti con *V. berus* nell'area di Malga Cercen Alta sono stati 16 (individui), nonostante il notevole sforzo di campionamento profuso (10 sessioni di 3 ore condotte da 2 operatori). Le ricerche erpetologiche nell'area di Malga Pozze sono invece ancora in corso (ad oggi contattati 4 individui, in 2 sessioni di ricerca da 90' operate da un unico addetto, senza l'ausilio di rifugi artificiali).
Questi dati collimano con quelli raccolti sui micromammiferi, le cui catture di nell'area sovrapascolata hanno mostrato un indice di cattura (catture/notti trappola) di 0.008, con due sole specie censite. Le zone non pascolate hanno invece restituito valori più elevati: con indici di cattura di 0.056 per l'area di Malga Pozze e di 0.172 per quella posta sotto Malga Cercen Alta. Anche a livello di diversità di specie, queste 2 aree si sono mostrate più ricche.
La scarsa presenza di vipere registrata appare quindi condizionata dal pascolo e da una notevole pressione di calpestio e modifica dei prati da parte del bestiame, poiché queste azioni riducono diversità e biomassa delle prede.

Under Pressure: *Vipera berus* and alpine pastures

For a study about *Vipera berus* in alpine environment, it has been looked for around Malga Ceren Alta (2147m asl) in an area heavily used for grazing. 44 artificial cover objects (ACOs) have been placed here as shelters, each one of them has been inspected 10 times.
Moreover, 63 traps for small mammals have been placed, used for 252 trap nights, in order to evaluate the abundance of prey. To compare areas where human activity is present and areas where it is not, the same type of research has been adopted in areas not used for grazing, but with similar characteristics: one below Malga Ceren Alta, on the boundary between the forest strip and the pastures (1859 m asl) and another one on the right side of Val di Sole, at Malga Pozze (2200m asl). In the first site we used the same traps' set as at Malga Ceren Alta (126 trap nights), whereas in the second site we placed 61 (122 trap nights).
Despite the remarkable effort (10 sessions of 3 hours each, led by 2 operators), we had 16 contacts (9 individuals) with *V. berus* in the area of Malga Ceren Alta. Herpetological research in the area of Malga Pozze is still ongoing (until now we have had 4 contacts, in 2 sessions of research that lasted 90 minutes each, led by one operator, without ACOs).
These data fit the ones about small mammals, whose captures in the overgrazed area showed a Capture Index (captures/ trap nights) of 0.008, with only two species recorded. The non-grazed areas brought higher values: a Capture Index of 0.056 for the area of Malga Pozze and 0.172 for the one on the forest/pasture boundary. Moreover, in terms of species richness these two areas are richer.
The low presence of vipers registered seems to be influenced by grazing, by a relevant pressure of treading and by the modifications of the grassland made by the cattle, because all these actions reduce diversity and biomass of prey.

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Zoologische und botanische Forschung in Südtirol
Ricerca zoologica e botanica in Alto Adige
Zoological and botanical research in South Tyrol

Exkursion	**Escursione**	**Excursion**

Datum: Samstag, 17. September 2022

Ziel: Pfunders (Pustertal, Zillertaler Alpen, Pfunderer Berge)

Exkursionsroute: Pfunders, Parkplatz in Dun – Duner Klamm – Weitenbergtal – Weitenbergalm

Start: 8:30 Uhr vom Naturmuseum (Hof an der Ostseite des Museums, Zufahrt Andreas-Hofer-Str.)
Transfer mit Privatfahrzeugen (Mitfahrgelegenheit)

Rückkehr: ca. 17:00 Uhr in Bozen

Weitere organisatorische Details, z. B. Zustiegsmöglichkeiten außerhalb von Bozen, Mittagessen usw., werden direkt bei der Tagung besprochen.

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Data: sabato 17 settembre 2022

Destinazione: Fundres (Val Pusteria, Alpi della Zillertal, Monti di Fundres)

Percorso escursionistico: Val di Fundres, parcheggio Dun – Gola di Dun – Valle Weitenberg – Malga Weitenberg

Partenza: ore 8:30 dal Museo di Scienze Naturali (cortile lato est del Museo, accesso da via Andreas Hofer), Trasferimento con veicoli privati (possibilità di passaggio).

Rientro: alle ore 17:00 circa a Bolzano

Ulteriori dettagli organizzativi, p. e. possibilità di trasferimento fuori Bolzano, pranzo etc., saranno discussi direttamente al convegno.

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