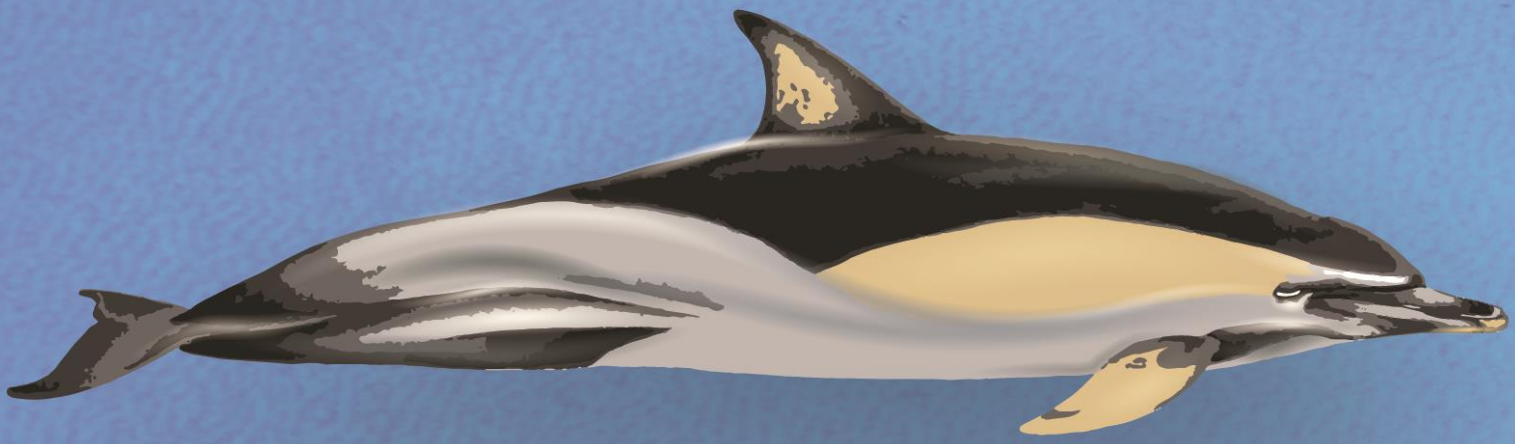

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XX CONGRESS OF THE PORTUGUESE ETHOLOGICAL SOCIETY

ABSTRACT BOOK

SPE 2023 x Vila do Conde x 7-9 Dec

Welcome

The Portuguese Society of Ethology, in collaboration with the BIOPOLIS Association - CIBIO (Research Center in Biodiversity and Genetic Resources, InBIO, Associated Laboratory of the University of Porto), is delighted to extend a warm welcome to the **XX National Congress of Ethology**, that will take place from December 7th to 9th, 2023, at Vila do Conde, Portugal.

Established in 1987, the Portuguese Ethological Society (SPE) is dedicated to promoting the study of animal behavior in Portugal, encompassing its diverse facets. The society's activities include publishing the scientific journal *acta ethologica* (Springer), organizing the annual congress and other scientific meetings, providing support to young researchers through grants and promoting the field of ethology by engaging with the public and students.

BIOPOLIS-CIBIO is a Research Unit in biological sciences engaged in fundamental and applied research on the three primary components of biodiversity: genes, species, and ecosystems. CIBIO-InBIO nurtures an international and multicultural research environment, presently hosting researchers from over 17 countries, organized into 32 research groups.

This landmark edition will feature a diverse program, comprising national and international invited plenary talks, interactive workshops, oral and poster presentations, social events and award ceremony. One of the primary goals of this event is to facilitate dialogue between senior researchers and students. In this vein, we strongly encourage the participation of researchers and postgraduate students from BIOPOLIS - CIBIO/UP, as well as from other national and international groups, fostering the development of collaborative research activities.

We actively encourage young researchers to present their work, and, at each congress, we will bestow awards for the best student posters and oral presentations. The Vítor Almada award, named in honour of the esteemed scientist and Professor Vítor Almada, will be conferred upon the best student talk, offering a financial contribution for the student to partake in an international ethology congress. The Springer Award will recognize the second-best oral talk and the best poster presentation, providing a book voucher from Springer.

We wish everyone a great conference!

Best wishes,

The organising committee SPE 2023

Table of contents

Convening institutions

Sociedade Portuguesa de Etologia

BIOPOLIS

CIBIO (up.pt)

Organising committee

Amalia De la Torre

Ana Leitão

Beatriz Saldanha

Gonçalo Cardoso

Marta Marmelo

Sandra Trigo

Scientific committee

Ana Faria

Ana Rita Ponce

Anna Olsson

Clara Amorim

Inês Catry

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José Ricardo Paula

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Funding partners

Fundação para a Ciência e a Tecnologia

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HOTEL BRAZÃO Vila do Conde

Informations

Venues

Workshops venue (7th December): CIBIO-InBIO's headquarters, located in the Campus de Vairão, just north of Porto. Address: Rua Padre Armando Quintas, nº 7, Vairão, 4485-661 Portugal GPS: N 41º20'48" N 41º19'39" / W 8º40'23"

- For general information and directions visit this link ; If you're using public transport, a convenient shuttle service operates between Mindelo Metro Station and Vairão Campus. Check the schedule here.

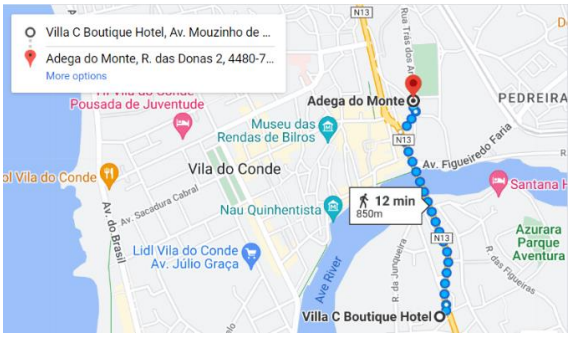
- **IMPORTANT** - Lunch and coffee: Please note that your conference registration does not cover lunch and coffee on the workshop day. Considering there is no canteen at CIBIO and limited nearby options, we recommend planning ahead. Please check out this link for more information.

Conference venue (8th and 9th of December): Villa C Boutique Hotel, Vila do Conde. There is free parking and free wifi in the venue. Address: Av. Mouzinho de Albuquerque, s/n - Estrada Nacional 13, Vila do Conde, 4480-151 Portugal GPS: N 41º20'48" / W 8º44'18"

- Lunch and coffee breaks will be served at Hotel Villa C.

Social events

Social Dinner



A social dinner will be held on the 8th at Adega do Monte restaurant in Vila do Conde, starting at 8:00 PM. Adega do Monte restaurant is conveniently located just a 13-minute walk (850 meters) from the conference venue. For those traveling by car, ample parking is available adjacent to the restaurant.

The social dinner is priced at 20 euros and offers a SET MENU, featuring appetizers, a choice of main course, dessert, beverages, and coffee. Please note that tickets are mandatory for this event and can be purchased at the registration desk until 4:00 PM on the same day.

More information here.

Scientific programme

1st Day: Thursday, 7th December

Venue: CIBIO – Vairão		
	Room _ – CIBIO	CIBIO Auditorium
10h00	Workshop 1 - Visualising your data using R - **Dr. Raquel Ponti** (presential) – 3h	Workshop 2 - An outlook on the scientific publication process (with an eye on behavior) - **Dr. Pedro Dias** (presential) - 3h
14h00	CIBIO Auditorium **Open plenary / CIBIO Seminar - Dr. Pedro Dias**	
	Room B – CIBIO	CIBIO Auditorium or Room _
14h30	Workshop 3- Artificial Intelligence applied to Ecology and Behavioural studies - **Dr. André Ferreira** (online and presential) – 3h	Workshop 4 - Photo-ID: studying cetaceans by their fins - **Dra. Joana Castro** (presential) - 2h

2nd Day: Friday, 8th December

Venue: Villa C Hotel – Vila do Conde	
08h30	Registration
09h20	Opening session - SPE, CIBIO-BIOPOLIS, Organizing Committee
Session 1: Physiology and Health	Chair: José Paula
09h40	**Plenary session - Dr. Miguel Carretero**
10h30	**Bianca Fusani** | Oxytocin modulation of socially driven adult neurogenesis in zebrafish
10h45	**Joaquim Filipe Faria** | Impact of haemogregarine infections in the behaviour of male *Podarcis lizards* from Northern Portugal
11h00	Coffee break
Session 2: Climate change and Behaviour	Chair: Clara Amorim
11h30	**Beatriz Palinhos Pereira** | Disruption of cleaner wrasse cognition and brain morphology under marine heatwaves
11h45	**Patrícia Beltrão** | Multiple effects of weather on collective behavior
12h00	**João Almeida** | Effects of warming on metabolism, risk-assessment and agonistic behaviors in early life stages of gilthead seabream, *Sparus aurata*
12h15	**Mariana Sousa** | How does a catastrophic event influence demography and social associations in a colonial cooperative bird?
12h30	Lunch break
Session 3: Social Behaviour & Welfare	Chair: Manuel Eduardo dos Santos
14h00	**Plenary session - Dra. Marie Charpentier**
14h50	**João Pacheco** | Dealing with strangers: unidirectional redirected aggression from unfamiliar to familiar individuals in common waxbills
15h05	**Shai Markman** | "Hey!": Wild birds use intentional attention-getters to initiate cooperative interactions.
15h20	**Ana Isabel Ferreira** | Parturition behaviour of laboratory mice
15h35	**Maílis da Silva Carrilho** | The influence of caging conditions on the behaviour of captive wild-caught wood mice, *Apodemus sylvaticus*
15h50	Coffee break
16h20	**Poster Session & Social afternoon** - Port of honour
18h20	**Plenary Meeting of the Portuguese Ethological Society**
20h00	**Conference Dinner & Social evening**

3rd Day: Saturday, 9th December

Venue: Villa C Hotel – Vila do Conde		
09h20	Opening remarks	
Session 4: Genes and Brain	Chair: Paulo Gama Mota	
09h40	**Plenary Session - Dr. Rui Oliveira**	
10h30	**Marta Liber** | Artificial selection for sociality changes the brain transcriptome in zebrafish	
10h45	**Pol Sorigue** | Molecular evolution of the genes involved in social behaviour across Lake Tanganyika's cichlids adaptive radiation	
11h00	Coffee break	
Session 5: Cognition and Cooperation	Chair: Manuel Vieira	
11h30	**José Ricardo Paula** | Cleaner fish presence provides a 'safe-haven' from predation	
11h45	**Andrea Frascotti** | Evidence of social learning in a gregarious bird, the Serin	
12h00	**Inês Cacela Rodrigues** | The Colour of Cooperation: Client Preference for Vivid Colours	
12h15	**Raúl Oliveira** | Using supervised machine learning to quantify cleaning behaviour	
12h30	Lunch break	
Session 6: Communication and Sexual behaviour	Chair: Susana Varela	
14h00	**Plenary Session - Dra. Elise Huchard**	
14h50	**Maria Joana Ferreira da Silva** | Sex-biased dispersal patterns of grayfoot baboons (*Papio ursinus griseipes*) in the ecologically diverse Gorongosa National Park	
15h05	**Anne-Maria Fehn** | Talking space - a pilot study on spatial reference among the peoples of the Okavango Delta	
15h20	**Sara Capas Peneda** | Detection of Vocalizations during Parturition in C57BL/6J Breeding Females Using DeepSqueak	
15h35	**Manuel Vieira** | Invasive and native sciaenid fish in the Tagus estuary: Is there an overlap in temporal and spatial patterns of chorusing behaviour?	
15h50	**Eva de la Peña** | The dark ventral patch on male red deer: implications for mate competition	
16h05	Coffee break	
16h30	Session 7 **Closing session**	**Dr. Peter McGregor** | Acta ethologica
16h55		**Dr. José Paula** | Portuguese Ethological Society
17h10	**SPE Awards:** Vítor Almada – SPE representative	
	Springer awards: Springer representative	
	Other awards: AIMM representative	
17h30	Closing session with organising commission and SPE	

Poster session – December 8th

Genes and Brain and Cognition		
1	Susana A. M. Varela	Artificial selection for sociality drives rapid divergences in social cognition, forebrain neuromolecular states and neuronal response to social stimuli in zebrafish
2	Maddalena Ranucci	Cleaner gobies' cognitive abilities are strictly related to their ecology
Methods in Behaviour		
3	Amalia de la Torre Herrera	Automated Monitoring of Pair Bonds in a Gregarious Bird
4	Noelia Ríos	Characterizing the behaviour of bait-attracted *Prionace glauca* using pelagic drift video
5	Noelia Ríos	Assessment of spatial and temporal patterns of nearshore fish communities through passive acoustic monitoring in a Marine Protected Area
6	Marta Marmelo	How to measure mobbing behaviour in a highly social bird?
7	João Soares Carrola	Behaviour assays to evaluate the impacts of psychoactive substances in adult zebrafish
Social Behaviour		
8	Luana Rodrigues	Association patterns of resident bottlenose dolphins in the Sado region
9	Carolina Benvegnú	Does the number of dolphin-watching boats impact the cohesion of common (*Delphinus delphis*) and bottlenose dolphins (*Tursiops truncatus*) in southern Portugal?
10	Maud Czerwinski	Infant non-mother interactions in mantled howler monkeys
Human Impact and Welfare		
11	Iolanda Silva	Let's keep moving! Effects of vessel traffic on common dolphins' behaviour in Tagus estuary, Portugal
12	Gonçalo Brito	Body tactile stimulation and fish welfare: effects on the behavioural response and stress of captive native and invasive freshwater fish species
Evolution		
13	Raquel Ponti	Birds follow the island rule in absence of predator pressure
14	Ruthvik S. Pallagatti	Evolution of plumage and body size in cooperative breeding birds
Animal Communication		
15	Claudia Erber	Whistles production of bottlenose dolphins during specific behavioral contexts in the Algarve region (Portugal).
16	João Saldanha da Gama	Acoustic communication during mating interactions in two-spotted goby, *Pomatoschistus flavescens*

Behavioral Ecology		
17	Nádia Jesus	Vacation in Lisbon? Occurrence and habitat use of *Delphinus delphis* in the Tagus Estuary, Portugal.
~~18~~	~~Ana Mota Cerveira~~	~~Know your food: *Cyrba algerina* (*Araneae, Salticidae*) requires previous experience with prey to respond to its cues~~
19	Marcus Frazão	Feeding behaviour of *Hippotragus niger variani*
20	Mafalda Albuquerque	Sei whale feeding and transiting behaviour in the Azores
21	Marta Luiz	Behavioural trade-offs between native and invasive fish species
Physiology and Behavioural syndromes		
22	Pedro Oliveira	Sex differences in coping with stress in Common waxbills, *Estrilda astrild*
23	Alexandra Tyers	Flexible microbiome and plastic pace-of-life strategy among and within desert adapted species
24	Ondina Isabel Martins Ribeiro	Effects of amphetamine racemic and its enantiomers on zebrafish avoidance behaviour

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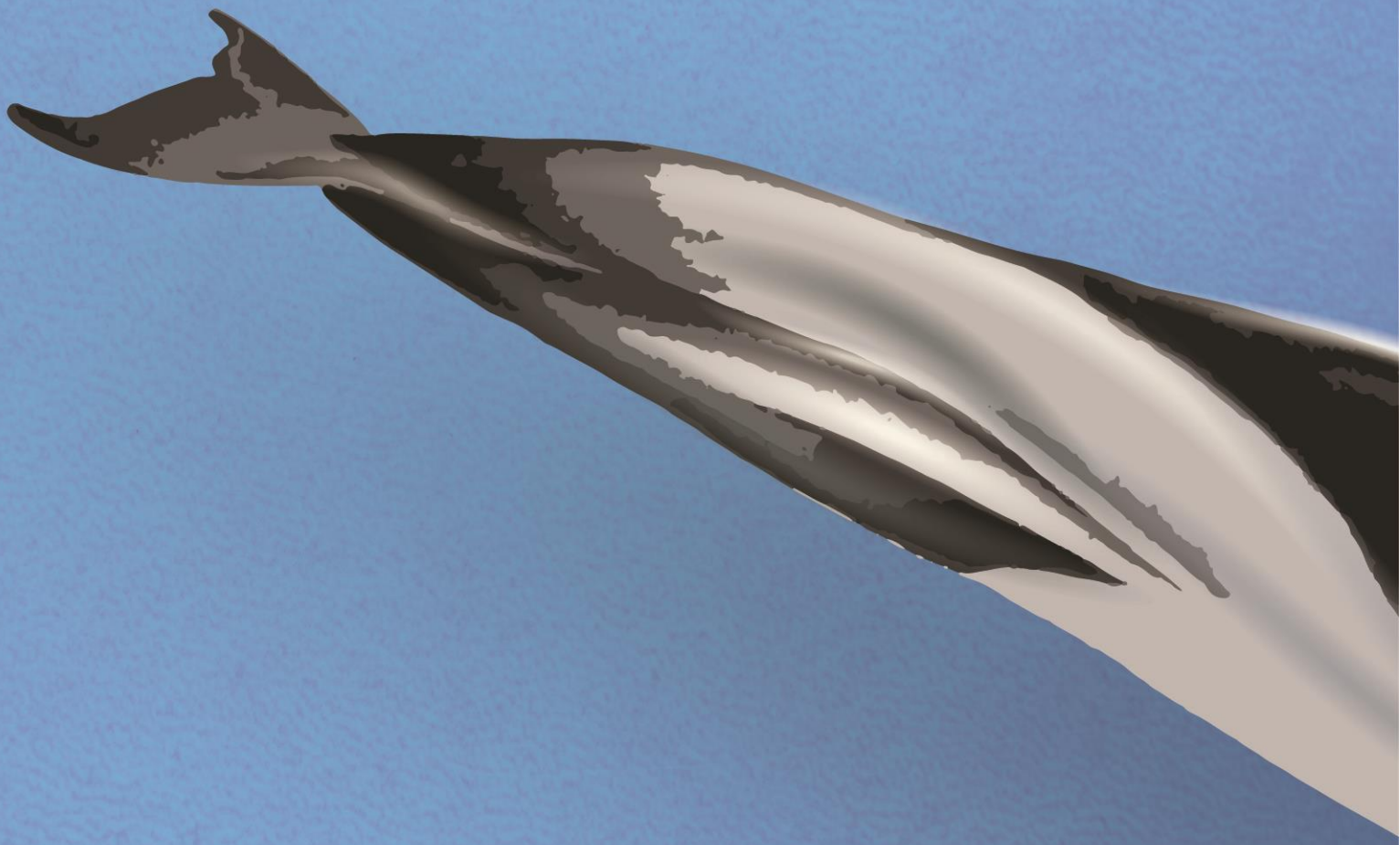

Illustration by Miguel Martins

KEYNOTE SPEAKERS

Plenary session 1

Lizards as model organisms in behaviour: an integrative perspective

Dr. Miguel A. Carretero
Research Centre in Biodiversity and Genetic Resources CIBIO, Portugal

While behaviour constitutes a functional link between animal phenotype and fitness, the environmental context and interplay with other selective forces such morphology, physiology and biotic interactions is crucial to interpret behavioural processes. Being ethological research focused on vertebrates with high degree of homeostasis, the intricate relations between behavioural traits with abiotic environment and non-conspecifics are often neglected or at least simplified. Here, I present the results of a long-term integrative research using lizards as model organisms. This is an ectotherm group occupying an intermediate position in temperate trophic networks.

Most species are sedentary, short living, diurnal, ubiquitous and abundant and easily kept in the lab. Although their trophic needs are low, thermal and hydric environment represent activity constraints. They consume a wide array of invertebrate prey which they identify based on their traits, but also comparing with their previous experiences. They are preyed by multiple predators, aerial and terrestrial, against which they display a number of strategies based on the evaluation of the predation risk versus the disadvantages of refuge use. Lizards are able to recognize conspecifics, determine sex, evaluate partner quality (including parasitisation) and even identify individuals by a combination of visual and chemical signals. Remarkably, they can modify their behavioural responses according to the history of previous interactions, which configures a complex social behaviour. Last but not least, alternative behavioural patterns (personalities) may coexist in the same context. Overall, the perspectives of this on-going research reinforce opinions favourable to integration and diversification of animal models in Ethology.

Plenary session 2

Long-term field studies to understand animal societies: A focus of the complex but exciting relationships between parasites and the social structure of a wild primate

Dra. Marie Charpentier
CNRS, Montpellier, France

The Mandrillus Project aims at studying the socio-ecology of the only habituated population of mandrills (Mandrillus sphinx) worldwide, using daily behavioral observations and long-term data collection. Throughout the years, we have obtained striking results shedding a new light on social relationships in mammals. In particular, we have shown that these social interactions depended on various classic factors, such as dominance relationships, but also on more intriguing determinants such as individual parasite status.

Complex social behaviors but also ranging patterns are strongly influenced by contagious parasites: mandrills do avoid contaminated groupmates and areas suggesting both social and possibly foraging costs to parasitism. Individuals' daily life, particularly the social relationships that individuals form over the course of their lives are thus not random but are rather highly differentiated and respond to biological rules and individual needs.

Plenary session 3

Of fish and flies: evolutionary neurobiology of social behavior in zebrafish and Drosophila

Dr. Rui Oliveira
Instituto Gulbenkian Ciência & ISPA, Portugal

The focus of my research is the study of social behavior from an integrative perspective, that is, by combining the study of proximate causes (gene modules, hormones, neural circuits, cognitive processes) and ultimate effects (evolutionary consequences). For this purpose, we have been using two model organisms in the lab (zebrafish and fruit flies to study the neural circuits and genetics of social behavior), combined with the study of "natural experiments" in non-model organisms on their natural habitats (evolution of social behavior in sympatric African Cichlids; cooperative behavior in Indo-

Pacific cleaner reef fish). In this talk, I will focus on our research on the evolution of the mechanisms underlying sociality. First, using an artificial selection experiment in zebrafish I will show how selection for sociality drives the evolution of social cognition within few generations (F6). Then, I will address to what extent social cognition is domain-specific or of general domain by characterizing the genetic architecture of social and non-social learning in fruit flies. Finally, I'll show data on a new project which aims to study the molecular mechanisms underlying social evolution in Tanganyika cichlids that allows to test repeated evolution of social traits. Together these results show that: (1) social behavior has a motivational and a cognitive module that are phenotypically independent but that can be selected together; (2) that social cognition has a domain-specific genetic architecture; and (3) signs of positive selection can be identified in genes of specific neurochemical signaling pathways across repeated evolution of social traits in closely related species (cichlids).

Plenary session 4

The evolution of power asymmetries between the sexes in primates

Dra. Elise Huchard
CNRS, Montpellier, France

In animal societies, control over resources and reproduction is often biased towards one sex. Such power asymmetries between the sexes are widespread, and largely shape male-female sexual and social relationships. In particular, males often coerce females in reproductive contexts, as well as in other contexts. Yet, the ecological and evolutionary underpinnings of male-female power asymmetries remain poorly understood. In the first part of this talk, I use long-term data from wild chacma baboons and mandrills to show that sexual coercion is common in such species. In a second part, I use comparative data from several mammalian species to show how variation in power asymmetries between the sexes can be quantified. In the last part, I present a broad comparative analysis aimed at understanding why power is biased towards females (versus males) in different populations or species.

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INVITED SEMINARS

Open Lecture

Lack of habituation to anthropogenic noise in primates

Dr. Pedro Dias
Instituto de Neuro-etología, Universidad Veracruzana, México

Learning allows for the coupling of behavioral and physiological responses to perceived stimuli significance. From an optimization perspective, individuals should wan responses toward stimuli that are not biologically relevant, and thus, habituate. Habituation is conditional on several properties of both the individual and stimuli but in general, recurrent exposure and strong stimuli intensity lead to quicker and prolonged habituation. There is evidence of wildlife habituation to anthropogenic stimuli that has been interpreted as both positive (e.g., prevents distraction) and negative (e.g., increases vulnerability to hunting). Here, we focus on the behavioral and physiological responses of wild mantled howler monkeys (Alouatta palliata) to natural and experimental anthropogenic noise as an example of lack of habituation. We argue that even if repeated exposure leads to decreased response likelihood and/or intensity, the complexity of noise stimuli leads precludes true habituation. In this scenario, individuals are expected to incur multiple costs, ranging from psychological stress to disrupted social structure.

Closing session

acta ethologica: SPE's journal. Past, present and future

Dr. Peter McGregor
ISPA - Instituto Universitário, Lisbon
Chief Editor of SPE's journal acta ethologica

Volume 26 of acta ethologica appeared this year. It seems a good time to reflect on the journal. I will present the current measures of journal impact and also other metrics that can indicate relative success as an academic journal. A quarter of a century of issues and a new special issue this year provide a perspective on what has worked and what hasn't. Looking to the future, I will highlight possible issues with the pace and nature of change in academic publishing (including publication ahead of peer review) and the challenges of increasing access to AI (including ChatGPT authorship). I will suggest ways authors can maximise the chance that their manuscripts will be accepted for publication and how to make the revision / publication process more rapid. Questions on all these topics are welcomed and am happy to discuss informally questions ahead of this talk.

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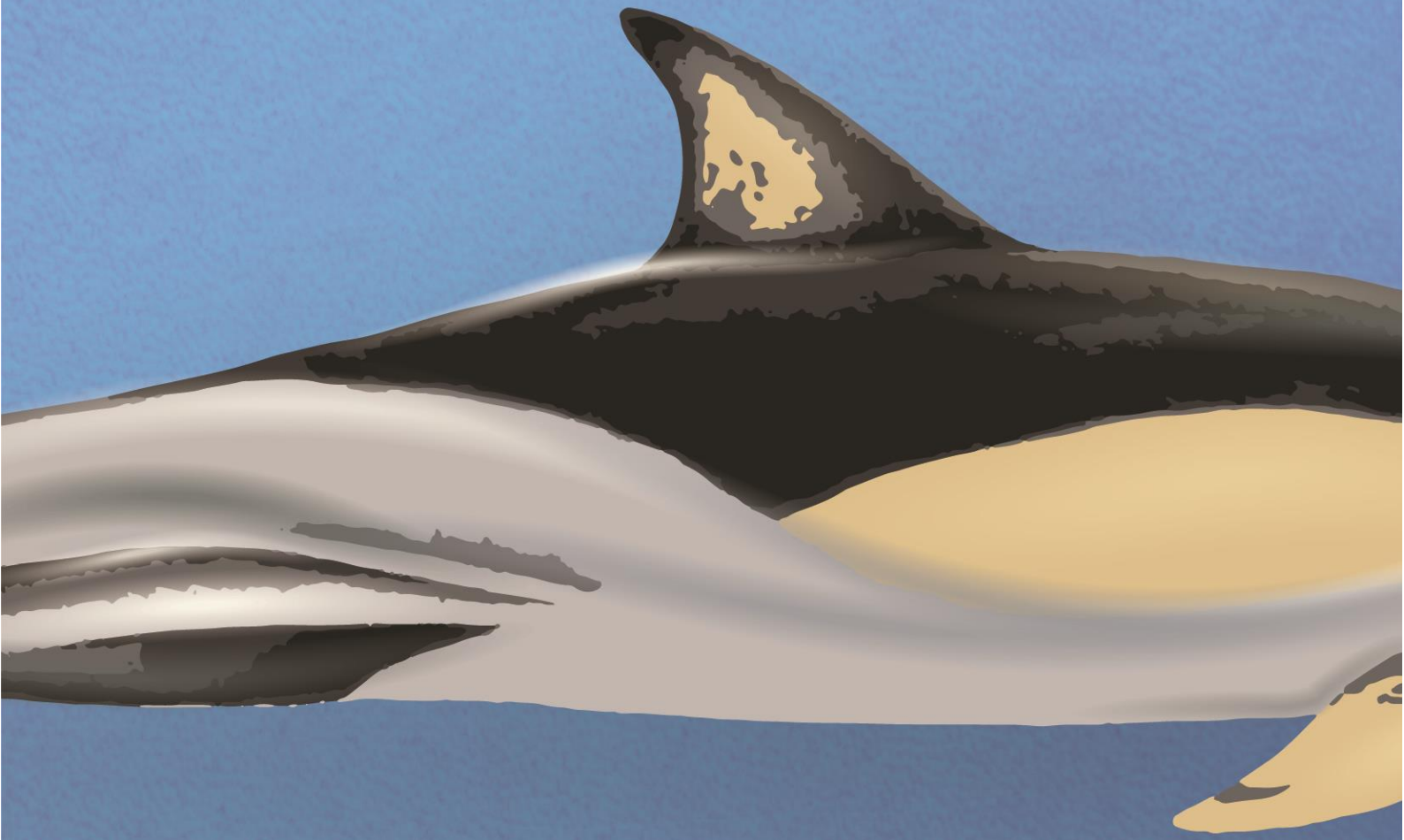

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WORKSHOPS

Workshop 1

Data visualisation using R

Dr. Raquel Ponti

CIBIO & Universidad del País Vasco

The ability to communicate scientific discoveries with appeal, precision, and clarity hinges on the essential skill of visualization. This workshop is designed to delve into the interpretation of data through visual tools, with a particular focus on basic and ggplot2 packages in R environment. Participants will gain insights into most commonly used plots and best practices for effectively presenting their data.

Workshop 2

An outlook on the scientific publication process (with an eye on behavior)

Dr. Pedro Dias

Instituto de Neuro-etología, Universidad Veracruzana

Publishing research articles (RAs) remains the primary method of sharing scientific knowledge. However, this process is particularly challenging for early-career scientists due to factors like inexperience and lack of mentorship. This workshop aids those on the brink of writing or recently finishing their first RA by equipping them with tools for navigating the publication process—from drafting and editing to submission and revision. The workshop consists of three parts: (i) understanding RAs, (ii) introducing a method for drafting, and (iii) post-writing publication steps. The workshop employs group discussions, exercises, and presentations as its primary teaching methods.

Workshop 3

Introduction to Artificial Intelligence applied to Ecology and Behavioural studies

Dr. André Ferreira
University of Zurich

This workshop aims to familiarize participants with the concepts of Artificial Intelligence, with a specific focus on deep learning, and how it can be used to tackle relevant questions in ecology and behavioral studies. Attendees will receive a concise overview of the fundamental principles of deep learning and its broad applications. Additionally, the workshop will briefly guide participants through the process of employing deep learning models, from collecting training datasets to model training and performance evaluation when addressing real-world challenges faced by researchers working with large animal-based datasets.

Workshop 4

Photo-ID: studying cetaceans by their fins

Dra. Joana Castro
AIMM Portugal - Marine Environment Research Association

This workshop provides an introduction to photo-identification, one of the most commonly used methodologies in the study of whales and dolphins. Our primary goal is to offer participants a hands-on approach, giving them the opportunity to process photographs and develop a photo-ID catalog for individual identification.

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ORAL COMMUNICATIONS

Oral communication 1

Oxytocin modulation of socially driven adult neurogenesis in zebrafish

Bianca Fusani[1,2,4], **Magda C. Teles**[1,2], **Rui F. Oliveira**[1,2,3]

1 - IGC Instituto Gulbenkian de Ciência, Oeiras, Portugal; **2** - ISPA Instituto Universitario, Lisboa, Portugal; **3** - Champalimaud Neuroscience Program, Lisboa, Portugal; **4** - ISE Institute of Science and Environment, University of Saint Joseph, Macau

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Adult neurogenesis, the formation of new neurons from precursors cells, is regulated by both intrinsic and extrinsic factors. The social context is a key environmental factor that can modulate positively or negatively the formation of new neurons. Preliminary work from our lab shows that social isolation has a negative impact on cell proliferation in zebrafish, which can be rescued by the exposure to a social stimulus (a mixed-sex shoal). Moreover, in rats, adult neurogenesis can be modulated by the action of oxytocin receptors present in the hippocampus. Here, we used a zebrafish mutant line for the oxytocin receptor, to test if oxytocin mediates the effects of the social environment on adult neurogenesis in brain nuclei belonging to the social decision-making network, a brain network that regulates social behaviour and is influenced by the action of hormones and neuromodulators, like oxytocin. Our results indicate an effect of oxytocin on brain cell proliferation in the dorsal and central zones of the ventral telencephalon (Vd and Vc); in the medial zone of the dorsal telencephalon (Dm); in the parvocellular preoptic nucleus (PPa and PPp); and in the periventricular pretectal nucleus. Thus, this study confirms a key role for oxytocin on the social modulation of adult neurogenesis in vertebrates.

Keywords: oxytocin; social modulation; adult neurogenesis; zebrafish

Oral communication 2

Impact of haemogregarine infections in the behaviour of male *Podarcis* lizards from Northern Portugal

Joaquim Filipe Faria[1,2,3] **D. James Harris**[2,3]

1- Department of Biology, Faculty of Sciences, University of Porto, Portugal; **2**- CIBIO, University of Porto, Portugal; **3**- BIOPOLIS, Campus de Vairão, Portugal

jfpfaria@cibio.up.pt

Modern studies have shown how parasites add extra complexity to species interactions with their ecosystems by the way they affect their host. When it comes to haemogregarine parasites of lizards, however, even intense infections by these parasites appear largely inconsequential –both in health and behaviour–, leaving to wonder if their true effects are still eluding us. In this study, we investigate for effects of haemogregarine infection in the boldness and aggressiveness of male lizards of two sympatric species living in North Portugal – *Podarcis bocagei* and *Podarcis lusitanica*, known hosts of these parasites. While the aggressiveness evaluations through mirror interaction shows no influence of the infection for either species, boldness evaluation through exploratory tests suggests infected *P. lusitanica* behaviour drastically changes when infected, with an increase in their exploratory activity and time spent exposed. These results are rather preliminary, as the sample size was relatively low (17 individuals of *P. lusitanica*, 6 of which infected), however, as intensity of infections was also on the low side (average of 0.2% infected erythrocites on blood smears) it might indicate these parasites have a great effect on the species behavioural pattern, thus underlining the importance for confirming its existence. As such, we intend to perform a follow up investigation focused on this species to analyse further behavioural traits and better assess the effect of haemogregarine infections in *P. lusitanica*.

Keywords: lizard; parasite; host; aggression; boldness

Oral communication 3

Disruption of cleaner wrasse cognition and brain morphology under marine heatwaves

Beatriz Pereira[1], Lígia Cascalheira[1], Rui Rosa[1,2], José Ricardo Paula[1,2,3]

1 - MARE – Marine and Environmental Sciences Centre & ARNET – Aquatic Research Infrastructure Network Associated Laboratory, Laboratório Marítimo da Guia, Faculdade de Ciências, Universidade de Lisboa, Cascais, Portugal; **2** - Departamento de Biologia Animal, Faculdade de Ciências, Universidade de Lisboa, Campo Grande, Lisboa, Portugal; **3** - Hawai'i Institute of Marine Biology, University of Hawai'i at Mānoa, Kāne'ohe, HI 96744, USA

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Heatwaves, exacerbated by global warming, are progressively affecting various ecosystems, with coral reefs among the most susceptible. Within these ecosystems, cleaner fish, specifically cleaner wrasses (*Labroides dimidiatus*), engage in cooperative interactions with client fish by removing ectoparasites, thereby playing an essential role in sustaining client abundance and diversity. In 2016, the northern section of the Great Barrier Reef experienced widespread and intense bleaching due to unparalleled ocean temperatures associated with a marine heatwave. While prior studies have connected changes in fish densities following this marine heatwave to modifications in cleaner fish cognitive sophistication, the immediate impact of heatwave exposure on cleaner fish cognition and brain structure has remained uninvestigated. Here, we exposed cleaner wrasses to a simulated Category 1 marine heatwave for 55 days, mirroring the 2016 Great Barrier Reef incident. Cognitive performance was evaluated through a pattern association task during the heatwave (day 50 to 55) and after a 30-day recovery phase, followed by an analysis of brain density. Our results demonstrate that although heatwave exposure temporarily hindered cognitive performance, these deficits were recoverable. Interestingly, cleaner fish brain morphology underwent significant changes. Specifically, despite cleaners exposed to heatwaves having notably larger brains (brain-body ratio), their telencephalon was substantially smaller (telencephalon-brain ratio), while their brainstem was enlarged (brainstem-brain ratio). These findings indicate that while immediate cognitive effects may be reversible, marine heatwave exposure leads to lasting alterations in brain morphology, particularly in regions associated with cognitive functions and social behaviour. We thus argue that the significant disruptions in cleaners' cognitive sophistication observed months after the 2016 events may not solely be attributed to changes in fish densities but could also be a consequence of neurological impairments linked to brain morphological changes. If so, a mere recovery of fish densities may not necessarily lead to a restoration of cognitive performance, as experiencing marine heatwaves might induce life-long morphological alterations in fish. Our results underscore marine heatwaves' intricate and enduring impact on cleaner fish, emphasising the need for comprehensive strategies to safeguard these vital components of coral reef ecosystems.

Keywords: *Labroides dimidiatus;* global warming; behaviour

Oral communication 4

Multiple effects of weather on collective behaviour

Patrícia Beltrão[1,2], Ana Cristina R. Gomes[1,2,3], Beatriz C. Saldanha[1,2], Fernando P. Lima[1,2,] Gonçalo C. Cardoso[1,2]

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The weather poses challenges for wildlife. Environmental challenges can be responded to at the group level by social animals, but the influence of weather on collective behavior is poorly understood. We investigated how the weather affects behavior in a gregarious species by monitoring, during five years, individual and flock behavior of common waxbills (*Estrilda astrild*) in a semi-natural environment. We found seasonal patterns on collective foraging, aggressiveness and the structure of the social network, usually showing two cycles per year: one peaking in Spring and a smaller one in late Summer. Controlling for seasonality, we found behavioral changes related to increased energy demands in colder and/or cloudier days, such as more frequent and larger foraging groups that resulted in less structured social networks. Weather-related disturbance caused, for example, that on rainy days foraging group journeys became briefer and more synchronous, resulting in stronger associations between individuals and less structured networks, and that on windy days foraging groups were less frequent, larger, and with more within-group aggression. The results show that the weather has more varied effects than anticipated on ecologically-relevant collective behavior. We discuss how such weather-related effects can improve predictions of how social animals will react to environmental changes.

Keywords: climate change; environmental fluctuations; gregarious animals; social behavior; weather disturbances

Oral communication 5

Effects of warming on metabolism, risk-assessment and agonistic behaviors in early life stages of gilthead seabream, *Sparus aurata*

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Since the industrial revolution, the intensification of greenhouse gases emissions has led to rising ocean temperatures, particularly affecting ectotherm species that see their metabolism and behavior changed. Such changes can manifest in alterations in growth parameters, metabolism and behaviour, among other fitness-related measures. The present study aimed to evaluate the effects of temperature increase on metabolism (routine metabolic rate, RMR), boldness (time spent in refuge), routine swimming and aggressiveness (number of chases and bites), in the early stages of Gilthead seabream (*Sparus aurata*), exposed for 11 weeks to the following temperature treatments: 19°C, 22 °C, 24°C (within the species thermal range) and 28°C (reflecting an extreme temperature treatment). Behavioural observations consisted in focal observations, run for 4 min in total, repeated for 4 subjects per treatment, 3 times per week. RMR was measured at the end of the exposure period, using an intermittent-flow system The results suggest that at 24°C and 28°C, individuals are more aggressive and bolder, compared to 19°C and 22°C. Routine swimming progressively increased up to 24°C, by about 15%. While RMR remained unaffected. Overall, the results show that rising temperatures will affect activity, boldness, and agonistic behaviors, with potential consequences on intra and interspecies interactions.

Keywords: Climate change; Routine behaviour; Routine metabolic rates; *Sparus aurata*

Oral communication 6

How does a catastrophic event influence demography and social associations in a colonial cooperative bird?

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Natural disturbances are increasing in frequency and intensity under climate change. These events cause habitat destruction and have profound effects on demography and social associations in animal populations. However, this is poorly documented as few studies have pre-disturbance data, which preclude comparisons with post-fire effects. In September of 2021, 8 out of 14 colonies of sociable weavers, *Philetairus socius*, were destroyed by a vast fire. These weavers are highly cooperative and were being studied as part of a long-term longitudinal study on this species (over 10 years). Detailed data on the demography and social structure of this population was being collected prior to the fire and I described and quantified how the fire affected (i) demographic parameters, (ii) behaviour and (iii) social associations. I expected (i) that colonies that did not burn would increase in size as a result of migration from burnt colonies. (ii) Aggressive interactions were also expected to increase after the fire as resources became scarce. (iii) Finally, I anticipated that immigrants and individuals originally residing at non-burnt colonies would initially associate with birds from their own colonies but would progressively start associating with others as the familiarity between these birds increased. Overall, my results showed a sudden increase in colony size, migration and aggressive interactions in most of the surviving colonies immediately after the fire. Furthermore, the change in the colonies' composition was kept in the long-term. These results indicate that the fire had a profound effect on this population's dynamics and social structure.

Keywords: natural disaster; wildfire; communal roosting; dispersal; sociable weaver

Oral communication 7

Dealing with strangers: unidirectional redirected aggression from unfamiliar to familiar individuals in common waxbills

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It is useful to know the aggressiveness or social dominance of others, for example to avoid harmful fights, but this information is scarce when interacting with strangers. A recent descriptive study with common waxbills (*Estrilda astrild*) in a semi-natural environment found increased aggressiveness when less familiar individuals were present, yet aggressiveness was not directed at them but towards third parties, mostly very subordinate individuals. Such show-off of aggressiveness in the presence of unfamiliar bystanders appears to be a safe way of conveying information on one's social dominance. As an experimental complement to this finding, here we manipulated the social context of waxbills housed in birdcages and performed assays of competition for food. Opposite to expected, aggressiveness was lower when strangers were present, and was directed mostly towards those strangers. We found evidence for redirected aggression: receiving more aggression from unfamiliar birds predicted more aggression towards the familiar birds. The reverse was not true: more aggression from familiar birds did not predict aggression towards the unfamiliar ones. This strategy to deal with unfamiliar individuals differs from that previously observed in a large space (showing-off aggressiveness), perhaps because in small spaces it is difficult to avoid direct interaction with the unfamiliar birds. Both strategies, aggressive show-off and unidirectional redirected aggression, have in common that they appear cautious ways of signalling dominance to unfamiliar individuals, indicating a coherent strategic versatility in dealing with strangers.

Keywords: Sociality; *Estrilda astrild;* Dominance hierarchies; Cautious social strategies; Displaced aggression

Oral communication 8

"Hey!": Wild birds use intentional attention-getters to initiate cooperative interactions

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Communicative acts that function to attract the recipient's attention to the signaller have fundamental roles in initiating cooperative interactions in humans (e.g., calling "hey!"). Mapping the taxonomic distribution of these so-called attention-getters and their underlying cognitive mechanisms is important for understanding the evolutionary building blocks of complex cooperation. While non-human species use attention-getters according to indirect cues for difficulties in signal detection (e.g., low light), selective usage of attention-getters directly according to the attentional state of recipients has not been shown in wild animals. Here, we show that wild birds (Eurasian coots, *Fulica atra*) selectively call toward non-attending chicks to solicit them to approach and take food. These attention-getters fulfill hallmarks of first-order intentional signalling in humans and non-human species as (i) parents did not produce attention-getters when foraging without chicks, (ii) selectively called toward chicks that were not engaged in joint foraging with them, and (iii) persisted calling toward non-cooperative chicks. Our study demonstrates that a basic communicative skill (i.e., attention-getters) to initiate cooperative interactions (i.e., chick-feeding), and its underlying flexible cognitive mechanism (i.e., intentionality), are also found in non-human species such as birds. These results propose to re-examine the complexity of the communicative and cognitive mechanisms that facilitate cooperative interactions in non-human species.

Keywords: alert signals; attention-getters; cooperation; coordination; first-order intentionality

Oral communication 9

Parturition behaviour of laboratory mice

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Mice are the most commonly used species for biomedical research, but their breeding is surprisingly challenging, particularly due to neonatal mortality. As an altricial species, mouse pups rely almost exclusively on maternal care for nourishment and thermoregulation during the first few days post-partum, a critical period for pup survival. Most of neonatal mortality happens during the first 72h post-partum, and may be related to disturbances in maternal care (Weber, 2016, DOI:10.1371/journal.pone.0161238), and congenital malformations (Bolon, 2015, DOI:10.1201/b18160). Maternal behaviour has been demonstrated to vary among distinct environmental and social conditions, but the literature lacks a systematic description of parturition behaviour in the context of laboratory mouse breeding. Therefore, the goal of this study was to thoroughly observe and describe female behaviours prior, during, and soon after parturition of C57BL/6J mice. Data collection occurred at The Francis Crick Institute, there were used 15 females and 6 males, single or pair-housed, generating 31 litters. Video recording were made using CCTV-cameras from 24h before until 72h after parturition. To analyse the videos, we develop an ethogram based on the behaviours observed and the available literature. Preliminary results indicate that nest building (2h prior to parturition), self-oriented behaviours, and pup grooming are the most frequently performed behaviours prior, during, and soon after parturition, respectively. Frequency of stretching, circling, squashing, and arching by the dam increases as the parturition approaches. Knowledge generated can be used to increase mouse welfare, support 3Rs implementation, reduce pre-weaning mortality, refine mouse breeding protocols, and contribute to the development of automated parturition detection tools.

Keywords: Mouse; Parturition; welfare; behaviour

Oral communication 10

The influence of caging conditions on the behaviour of captive wild-caught wood mice, *Apodemus sylvaticus*

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Captivity can affect the behaviour of wild-caught animals kept for experimental purposes, possibly leading to biased and less accurate results. The present study aims to assess the influence of caging conditions on the performance of stereotypic behaviour and risk perception in wild wood mice during the first month of captivity. Our experimental setup involved i) the maintenance of two groups of animals randomly assigned to different caging conditions: more naturalistic caging (i.e., bedding material and enrichment from the site of capture) and standard caging (i.e., corncob bedding with a paper cardboard roll as enrichment); ii) recording videos to evaluate the performance of stereotypic behaviour inside the maintenance cages; and iii) conducting behavioural dark-light tests in an experimental arena to assess risk perception. Both experiments were conducted individually once per week over the four-week period of captivity. Preliminary results show that animals maintained under more natural conditions exhibit fewer stereotypies over the whole captivity period. These animals were also more active and more risk averse than animals kept under standard conditions but only during the first week of captivity. We can thus conclude that i) the use of natural elements increases the welfare of the animals and ii) slow down but do not prevent habituation to captive conditions. Since both welfare and habituation can significantly alter the behaviour of the animals, our study provides general guidelines on how researchers can improve the quality of behavioural data collected when working with wild animals under captive conditions.

Keywords: captivity; wild animals; stereotypic behaviour; risk perception; welfare

Oral communication 11

Artificial selection for sociality changes the brain transcriptome in zebrafish

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It is possible to observe similar behavioral phenotypes like pair bonding or maternal care, across diverse animal species. This leads to the question of whether shared behaviors have a common genetic basis - behavioral toolkit, that is conserved and reused throughout evolution to embed similar behaviors. Studies suggest that behavioral phenotypes are associated with changes in expression of multiple genes across different brain regions, creating regulatory networks at molecular and functional levels. In this work we computationally explore the genes and gene regulatory networks underlying the evolution of sociality. An artificial selection experiment for high and low sociality lines in zebrafish has been ongoing in the lab, using a social preference paradigm (i.e., video of a mixed-sex conspecific shoal vs video of moving circles), and the individual preference to associate with a shoal or the circles was quantified. After 3 generations, the lines selected for sociality started to diverge significantly in social preference from the other lines (circle and control). The transcriptomic profiles of these three lines were analyzed in different brain regions, and the results suggest the presence of differentially expressed genes associated to each selected line. Further, a Weighted Correlation Networks Analysis (WGCNA) has been applied, which allowed us to find clusters of genes specific to each line as well. Considering that a social behavior can be regulated not by a particular gene, but also by a set of molecular pathways, our next step is to search for conserved mechanisms underlying sociality, across neuronal networks, at single-cell resolution.

Keywords: Artificial selection, Zebrafish, Social Behavior, Transcriptomics, WGCNA

Oral communication 12

Molecular evolution of the genes involved in social behaviour across Lake Tanganyika's cichlids adaptive radiation

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Many molecular pathways and genes have been suggested to play a role on social behaviour across vertebrates. However, the mechanisms by which these genes regulate social phenotypes are still far to be unravelled. In this study, we aim to find genetic signatures of evolutionary transitions associated with social recognition. For this purpose, we focus on pair-bonding, a social trait that cannot exist without the former. By using the entire radiation of cichlid species in the Lake Tanganyika, in which repeated evolutionary transitions between social phenotypes occurred, this project aims to study the mutations on the coding regions of the genes potentially involved in social behaviour and use these transitions to find associations with pair-bonding. To this end, the genes of several pathways were extracted from KEGG database, as well as other genes potentially involved in social behaviour. The gene sequences of all the orthologs and their homologues were obtained and positive selection analysis based on dN/dS ratio was performed. To detect associations between social traits and mutations, a comparative correlation analysis for discrete variables across phylogenies was performed. Over 100 genes show signs of gene-wide positive selection, and many of them present faster evolution in pair-bonding species. Ongoing correlation analyses across the phylogeny point to weak genotype-phenotype associations that do not explain alone phenotypic diversity. Future work will address other social phenotypes (group size) and study RNAseq data as another key mechanism that would explain intra- and interspecific variation of social phenotypes.

Keywords: Social behaviour; positive selection; evolution; cichlids

Oral communication 13

Cleaner fish presence provides a 'safe-haven' from predation

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Cleaning mutualisms are ubiquitous interactions where cleaner fish remove and consume ectoparasites from other ('client') fish. Although cleaning stations attract many predatory clients, cleaners benefit from immunity to predation by using tactile stimulation to manipulate piscivorous partners. However, little is known about the behavioral impacts of perceived predation risk by bystanders near cleaning stations, nor its community-level implications. Our study sought to fill this gap by investigating how the proximity to cleaning services, provided by the cleaner wrasse *Labroides dimidiatus*, affects the risk-taking behavior of bystander prey, specifically the damselfish *Pomacentrus moluccensis*. To do so, we measured prey foraging excursion distance from reefs with or without cleaners in response to different levels of predator density and to a transient model predator (coral trout, *Plectropomus* sp.). Proximity to cleaning services was compared within a set of patch reefs around Lizard Island (Australia), of which half had all cleaners experimentally removed for 10 years. Prey fish residing near cleaning stations exhibited less risk-averse behavior than those living far from cleaning stations. Prey also decreased their excursion distance with increasing model predator proximity, but those living on reefs with cleaners generally exhibited less risk-averse behavior via larger excursion distances. Our findings suggest that cleaners indirectly reduce the risk of predation by reducing attack likelihood and that bystanders living within cleaning stations benefit through increased foraging area and, therefore, presumably greater access to food. By creating such 'safe-havens', cleaning mutualisms may play an even greater role in structuring reef communities than previously documented.

Keywords: cooperation; predator-prey interactions; fish; coral reef

Oral communication 14

Evidence of social learning in a gregarious bird, the Serin

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Individual learning is expensive and risky for any animal. When conditions are available, learning from observing others is more efficient and less risky. Thus, a number of social and gregarious species rely on social learning. But, acquiring information from others is challenging, since animals may be uncapable of integrating/understand the information that is being provided. Despite its relevance, the ability to learn from observation has not been tested in many species of birds. It is particularly interesting to consider granivorous gregarious species, that use environmental cues to find food and are not active hunters like insectivorous species.

In this study with the small passerine Serin (*Serinus serinus*) we found that less than half of the birds were capable of learning from a conspecific in a color association foraging task. Differences from learners and non-learners were not influenced by sex, or morphology, but there was a tendency for learners to be younger birds. We performed two personality tests (mirror and novel object test) to determine if differences of personality could explain differences in learning ability. These results will be discussed.

Keywords: Social learning; Animal cognition; Bird

Oral communication 15

The Colour of Cooperation: Client Preference for Vivid Colours

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Vivid colours are common in sexual signalling and can provide information on individual´s quality. Recent studies, state that, even in interspecific relationships, vivid colours can also convey information on the quality of individuals that could be advantageous for receivers to evaluate. The Bluestreak cleaner wrasse (*Labroides dimidiatus*) presents a bright blue colouration which enables clients to identify them, and higher saturations of blue have been linked to service quality. If clients can perceive fine differences in colour saturation when evaluating individual cleaners, and if they use this information to select them, the blue colouration of *L. dimidiatus* may have partly evolved as a signal for the quality of the cleaning service. In this study, the client species threadfin Butterflyfish (*Chaetodon auriga*) was subjected to three differently saturated treatment video-sequences of *L. dimidiatus* (minimum saturation, control, and maximum saturation) to understand if clients could distinguish the saturations presented and if they would actively prefer any of them. The results show that *C. auriga* preferred the video-sequences of the more saturated cleaner when played against lower saturations, providing for the first time, evidence that clients can use the blue colouration of L. *dimidiatus* as a true signal of individual quality. If *C. auriga* can distinguish these saturations it is likely that in the natural environment, they use this condition-dependent signal to make an informed decision and select those who provide a better cleaning service.

Keywords: Interspecific communication; Vivid colours; Saturation; Cleaning mutualisms; Bluestreak cleaner wrasse; Client preference

Oral communication 16

Using supervised machine learning to quantify cleaning behaviour

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In coral reefs, cleaner wrasses, *Labroides dimidiatus*, are known for their cleaning activity. These cleaner fishes inspect client fish to mainly remove and feed on ectoparasites. These cleaners' fish can interact with more than 2,000 clients daily, and some clients look for cleaners to interact around 145 times a day. Cleaning behaviour includes a vast repertoire from cleaning bites, client jolts, tactile stimulation, chasing, advertising dances, punishment and manipulation – all measures of cleaning motivation and interaction quality. The analyses of these interspecific interactions among the fish have usually been made through the manual processing of video recordings. Apart from being very time-consuming, manual processing can be unreliable due to variation across human observers. Automatic posture tracking and behavioural classification are rapidly becoming indispensable to studying animal behaviour accurately. Within this context, we introduce a semi-automated tracking system that utilizes a supervised machine learning pipeline to subsequently conduct analysis for the automatic classification of cleaning behavior events. Our pipeline relies on posture estimation for body part tracking of interacting individuals and we present two approaches for behaviour classification – direct mathematical quantification of behaviour, and random forests. Our approach offers a consistent and reliable alternative to manual video analysis of cleaning behaviour.

Keywords: Cleaner Fish; Behavioural Classification

Oral communication 17

Sex-biased dispersal patterns of grayfoot baboons (*Papio ursinus griseipes*) in the ecologically diverse Gorongosa National Park

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Investigating behavioral flexibility of primate populations, in particular the ones inhabiting areas affected by anthropogenic activities, is important for the advance of behavioural ecology. In primate species, dispersal patterns tend to be similar among close phylogenetic lineages but may vary in response to individual-based responses to localised demographic and environmental alterations. Here, we investigate dispersal patterns of the baboons in the Gorongosa region in Mozambique (*Papio ursinus griseipes*). This is a region hosting very different environmental settings, where baboons recently experienced limited mammalian-based predation, a steep increase in troops' density and anthropogenic habitat disturbance by warfare. All of these have the potential for alterating the male-biased dispersal behaviour displayed by P. ursinus. We used a large genetic dataset of non-invasive DNA samples analyzed for uni- and bi-parentally inherited markers to characterize the distribution of genetic variation across a distance of approximately 150 km and investigated the extent and direction of sex-mediated gene flow. We found high levels of genetic diversity using autosome microsatellite loci data and molecular evidence for historical and "instantaneous" male-biased gene flow. Our study highlights the strong conservation in male-biased dispersal patterns in Papio sp. and suggests that the recent demographic and anthropogenic-related changes experienced by local baboon populations may not have been sufficiently diffused and/or long-lasting to influence related patterns of genetic variation.

Keywords: Male-biased dispersal, Southern Africa, Zambezi River, Warfare, behavioral flexibility

Oral communication 18

Talking space - a pilot study on spatial reference among the peoples of the Okavango Delta

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In recent years, the human conceptualization of space and spatial reference has attracted considerable interest from various disciplines, including cultural anthropology, linguistics and psychology. In this talk, we contribute to the growing corpus of cross-linguistic studies on space conceptualization by focusing on the ecogeographic region defined by Botswana's Okavango Delta. Due to its abundance of wildlife resources, the area has attracted peoples with various subsistence patterns and associated with distinct migratory movements which shaped the history of the African continent. To achieve a coverage of different settlement layers and subsistence patterns, we worked with former hunter-gatherers from the dry savanna surrounding the delta (Buga, Ts'ixa); with hunter-fishermen who originally inhabited the wetlands, also known as "river bushmen" (||Ani); and with peoples following a mixed subsistence pattern relying on fishing and horticulture who are associated with the Iron Age migration of Bantu-speaking peoples into southern Africa (Yeyi). The data was collected through an interactive game in which three-dimensional models involving familiar objects with intrinsic orientations had to be described by a 'director' and recreated by a 'matcher' with the aim to obtain task-oriented verbal descriptions of spatial reference in the speakers' own language. We present preliminary results from an analysis of our audio-visual dataset and discuss implications for the association between spatial orientation, environment, culture and language in the Okavango River Basin of southern Africa.

Keywords: Okavango River Basin; space; language; humans

Oral communication 19

Detection of Vocalizations during Parturition in C57BL/6J Breeding Females Using DeepSqueak

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Mice constitute nearly 50% of all animals used in research in the EU. Maintaining breeding efficiency is crucial for adhering to the 3Rs and reduce the numbers of animals used. Surprisingly, preweaning mortality (PWM) rates can reach up to 30% even in well managed facilities (Morello et al.,2020 doi: 10.1371/journal.pone.0236290). The mechanisms and real impact of this phenomenon are still poorly understood. Implementing an automated parturition detection system could enhance monitoring, leading to better PWM tracking and improved welfare in breeding mice. Vocal communication plays a central role in murine reproduction and mother-offspring communication. Mice are able to vocalize in the audible and ultrasonic range. Nevertheless, the focus of research has primarily been on ultrasonic vocalizations and there is currently a literature gap regarding vocalizations during parturition (Capas-Peneda et al.,2022 doi:10.3389/fnbeh.2022.833168). In this work, we have analysed continuous audio recordings from C57BL/6J breeding females starting 24h before until 24h after parturition. DeepSqueak was used to create two distinct neural networks for the identification of audible (medium duration) and ultrasonic vocalizations. Two different processes were followed. A database of three distinct durations of audible vocalizations - long (≥0.1s), medium ([0.03-0.1s[), and short (<0.03s) – was created. Initially, training images of medium vocalizations were generated for the detection network, which were subsequently employed in network training. The interface then enabled efficient manual classification, ensuring network validation. The results show that development of tailored neural networks in DeepSqueak can effectively streamline the analysis of vocalizations with distinct features, making it possible to simplify and enhance the efficiency of large datasets analysis.

Keywords: laboratory mouse; vocalizations; parturition

Oral communication 20

Invasive and native sciaenid fish in the Tagus estuary: Is there an overlap in temporal and spatial patterns of chorusing behaviour?

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Several fishes communicate with acoustic signals to mediate agonistic and reproductive activities. Passive Acoustic Monitoring can be a valuable tool to monitor activity and distribution of important species such as the native meagre (*Argyrosomus regius*) or the invasive weakfish (*Cynoscion regalis*). The weakfish is an invasive species first reported in Tagus estuary in 2015 and has a similar feeding regime, habitat use, and breeding behaviour than the confamiliar native species. Here we present longterm data to study both species temporal and spatial patterns using 12 acoustic recorders distributed throughout the Tagus estuary. We used hidden Markov models-based machine learning and sound level to analyse the recordings. The invasive species is widespread throughout all the estuary and, like the meagre, produces massive choruses. Both species exhibited a distinct diel pattern, with choruses being most prevalent at dusk. In most sites the native and the invasive sciaenids were detected in simultaneous, with no temporal or spectral partition. Nevertheless, at some locations meagre called alone at the beginning of the season, indicating that this species might prefer colder temperatures. Notably, variations of chorusing activity were matched on every location. The observed breeding behaviour overlap likely leads to high interspecific competition for space and acoustic niche with implications for the meagre. Detrimental effects may increase if weakfish population grows and if it is better adapted to increased water temperature driven by climate change. This study highlights the importance to establish measures to acoustically monitor the breeding season of soniferous fishes, essential for species management.

Keywords: Fish; Bioacoustics; Field study; Spawing

Oral communication 21

The dark ventral patch on male red deer: implications for mate competition

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Sexual signals play a fundamental role in sexual selection and are especially relevant in mate competition in polygynous species. Through these characteristics, individuals show their fighting ability to maximise their reproductive success. During the rutting season, male red deer display a conspicuous dark patch on the ventral area. The main objective of this work was to study the information contained in this trait from an integrative point of view and to advance the understanding of the mechanisms underlying its evolution. The dark ventral patch is a clearly bimodal trait, suggesting the existence of two types of males depending on the trait's expression and, therefore, two behavioural alternatives to face the rut. The patch size is positively related to testosterone secretion and a greater investment in the development of the trait impairs immune function. Therefore, it is a costly trait to produce and maintain. Besides being a visual signal, the hair in this area contains a large number of chemical compounds from the urine that act as a chemical signal. Both character development and associated lipid compound profiles are modulated by the competitive environment in which individuals are. The dark ventral patch appears as a flexible trait during the rut, providing short-term information on the reproductive effort of males and their involvement during intrasexual competition in the present mating season. The investment in this trait is strongly determined by the age structure and sex ratio of the population. This work not only aims to contribute to the understanding of the processes involved in the development of the dark ventral patch but also has important implications for the monitoring and management of wild red deer populations in the Iberian Peninsula.

Keywords: sexual selection; *Cervus elaphus*; sexual trait; rutting season

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Illustration by Miguel Martins

POSTER PRESENTATIONS

Poster 1

Artificial selection for sociality drives rapid divergences in social cognition, forebrain neuromolecular states and neuronal response to social stimuli in zebrafish

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The social intelligence hypothesis posits that group living generates the selective forces that drive the evolution of enhanced cognitive abilities. This hypothesis has generated a large debate and the available evidence supporting it is still scarce. Experimental approaches that explicitly test their assumptions and predictions are necessary. We have conducted an artificial selection experiment for sociality in zebrafish in which individuals have been phenotyped, using video-playbacks, for social preference for a conspecific shoal vs. preference for a non-social stimulus (a video-playback of a "shoal" of four circles animated with non-biological motion). We have used a founder population of Tuebingen wild-type strain from which 4 selection lines were created, each with 2 replicates (200 fish per generation for each replicate): a Shoal line, selected for preference to associate with conspecifics; a Circles line, selected for preference to associate with circles; a No-Preference line, selected for equal preference to associate with shoal and circles; and a Random-cross line, as a non-selected control. At the F3, the Shoal line started to diverge significantly in social preference from the other lines and this divergence has been kept until the current generation. The Shoal line has also better performance in different social cognition tasks but does not excel the other lines in asocial cognition tasks. We also found a parallel divergence in neurogenomic states between the Shoal, Circles and Random lines and significant differences in the pattern of neuronal activation between the Shoal line and the No-Preference control line.

Keywords: Sociality; social cognition; social neuroscience; evolution; zebrafish

Poster 2

Cleaner gobies' cognitive abilities are strictly related to their ecology

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In the mutualistic relationship between the cleaner wrasse *Labroides dimidiatus* and its reef fish clients, conflicts often arise. Such conflicts likely spurred the evolution of cognitive decision-making processes utilised by cleaners during these interactions. Conversely, earlier studies on cleaner gobies, Elacatinus spp., suggested that the lack of conflict in this system led to less complex cognition. However, these might have overlooked essential ecological cues that cleaner gobies rely on in natural settings. In this study, we used plexiglass plates as surrogates to clients and assessed the ability of aquaculture-raised cleaner gobies, *Elacatinus oceanops*, to tackle ephemeral learning tasks with varying cues. We presented both ecologically relevant cues (plate size and colour) and non-relevant ones (presentation side). Additionally, we tested their capacity for reversal learning, an indicator of complex cognitive abilities. Notably, cleaner gobies could only solve the ephemeral learning task when the distinguishing cue was a larger plate size. Given that these gobies tend to prioritise larger predatory clients in nature, our results underscore the pivotal role of ecology in shaping cognitive performance. Furthermore, considering that these gobies were bred in aquaculture settings and never participated in cleaning interactions in their lifetime, our data indicate that their intrinsic cognitive abilities are shaped by evolutionary pressures rooted in their ecological roles. In essence, even in the absence of direct ecological interactions, innate cognitive abilities in cleaner gobies seem to be deeply influenced by evolutionary forces tied to their natural ecological functions.

Keywords: Behaviour; ecology; mutualism

Poster 3

Automated Monitoring of Pair Bonds in a Gregarious Bird

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In socially monogamous species, forming an exclusive and stable relationship with a member of the opposite sex, known as pair bond, is crucial for successful reproduction. Identifying pair bonds in gregarious animals poses difficulties due to the simultaneous presence of other social relationships. We developed a model to automatically identify pair bonds using proximity data obtained by tracking a flock of common waxbills (*Estrilda astrild*) with RFID antennae at a feeding area within an outdoor mesocosm, from 2018 to 2022. During the 2021 breeding season we also placed RFID antennae at some waxbill's nest entrances to identify the pairs using them, information needed to optimize the model. We constructed proximity-based social networks employing various spatial and temporal criteria to identify associations. To identify pairs, within each set of social networks we applied different combinations of two threshold: a minimum strength of association, and a minimum duration of that strength of association. We calculated Type I errors (proportion of true pairs not identified) and Type II errors (proportion of identified pairs that were false pairs) for all combinations of networks and thresholds. We selected the model with lowest Type I and Type II errors which was 0.12 and 0, respectively. We then applied this best model to find pair bonds over all five years of the study, successfully identifying 53 pairs. This methodological study shows how information regarding within-flock proximity can be used as a cost-effective method to infer more detailed social relationships, without the need of observational behavioral studies.

Keywords: Social network Analysis; pair formation; Radio Frequency Identification; Type I error; Type II error

Poster 4

Characterizing the behaviour of bait-attracted *Prionace glauca* using pelagic drift vídeo

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Baited pelagic underwater videos are becoming increasingly common to assess biodiversity and abundance, but they can also be useful to register the behaviour of pelagic species attracted to the bait. In this study, the behaviour of 79 individuals of blue shark (*Prionace glauca*) was registered using drifting pelagic Baited Remote Underwater Video (BRUV) rigs, deployed outside the Professor Luiz Saldanha Marine Park, Portugal. This is a widely distributed species, considered “near threatened” by the IUCN, but little is known about its behaviour. Blue sharks mainly showed recognition activities around the BRUV. Visibility, distance to the shore, bathymetry and temperature influenced behavioural patterns. Juveniles were more frequently sighted closer to the coast (maximum bathymetry 60 m), while adult sightings were associated with offshore deployments over canyons (bathymetry 1200-2000 m). Moreover, juveniles interacted with the BRUV more frequently and for longer than adults. A preliminary analysis of the reaction of blue sharks to passing boats/boat presence suggests that sharks spend a longer time interacting with the BRUV and present a wider variety of behaviour when there are not exposed to noise. We conclude that baited cameras can provide relevant information about behaviour patterns and the effect of boat noise on the behaviour of sharks in the natural environment.

Keywords: Blue shark; Baited Remoted Underwater visual; Behaviour; Boat noise

Poster 5

Assessment of spatial and temporal patterns of nearshore fish communities through passive acoustic monitoring in a Marine Protected Area

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Passive Acoustic Monitoring (PAM) is a cost-effective, non-invasive technique with potential applications for long-term monitoring of biodiversity, species behaviour, habitat health and noise pollution at wide temporal and spatial scales. This study describes an application of Passive acoustic monitoring (PAM) at the Marine Protected Area (MPA) Professor Manuel Saldanha (PMPLS), in Portugal. Three acoustic recorders (with a continuous duty cycle at a sampling rate of 48kHz) were deployed from June 2021 to September 2022 in the three protection zones within the marine park: Buffer Area (BA), Partial Protected Area (PPA), and Full Protected Area (FPA). Recordings were analysed for putative fish sounds and boat sounds. Sounds were classified in different sound types, quantified, and analysed for temporal patterns (seasonal, lunar, and diel). We compared sound type abundance and biodiversity indices (Richness, Shannon, Simpson and Evenness) and other bioacoustics indices (ACI, H, SPL, PSD, TOL) at the different spatiotemporal scales. A purpose-built Baited Remote Underwater Video (BRUV) system was used to potentially identify the source of the different sound types. Results show an increment in fish sound production and higher diversity indices at sunset and night, with no distinct seasonal or lunar patterns. Total abundance and diversity of sounds were higher in BA compared to FPA. There were no significant spatial or temporal differences observed in the number of boats or their duration in the three areas. Boat passage detection highlights PAM as an invaluable tool for monitoring domain usage within MPAs and providing insight that can redirect compliance decisions. These findings also underline the potential of PAM as an innovative tool for monitoring and conservation efforts in the marine environment, serving as a foundation for future acoustic studies in the PMPLS.

Poster 6

How to measure mobbing behaviour in a highly social bird?

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Mobbing behaviour is “an anti-predator behaviour where preyed-upon species approach and harass a predator while displaying conspicuous, stereotyped movements and/or vocalizations” (Carlson, N. V., & Griesser, M. 2022). Mobbing behaviour is widespread in nature, but difficult to quantify, especially at the individual level. Mobbing has individual costs (e.g., death, injury, or trade-off with other activities), so it is important to determine which factors (e.g., sex, age, condition, environmental factors) affect individual investment. Additionally, knowing if individual investment is repeatable will help better understand the evolution of mobbing as a group defence behaviour. The goal of this project is to describe group and induvial mobbing behaviour in the sociable weaver (*Philetairus socius*), a colonial, cooperatively breeding passerine endemic to southern Africa. As mobbing requires a threat, it will be studied by presenting models of Pygmy Falcon, *Polihierax semitorquatus*, and Cape Cobra, *Naja nivea*, predators of the sociable weaver, at the study colonies. Since studying individual variation in mobbing behaviour can be difficult, especially in species that live in large groups, we developed two reproducible experimental designs (one for each predator) that will allow us to describe both group and individual mobbing behaviour. By creating a ‘mobbing arena’ we will be able to control where the group mobs and better measure individual behaviour through a categorical scale of calling, distance to predator, contact, activity, and latency to respond.

Keywords: mobbing; experimental design; sociable weaver

Poster 7

Behaviour assays to evaluate the impacts of psychoactive substances in adult zebrafish

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The toxicity assessment of numerous chemical compounds presents in aquatic ecosystems (via urine excretion), such as psychoactive substances, is essential. However, from an ecotoxicological point of view, fish behaviour has been used to evaluate long-term effects of exposure to psychoactive substances, as well as being demonstrated as a highly sensitive parameter for neurological disorders. In this way, the assessment of fish behaviour, such as locomotor activity, social interaction, and cognitive behaviour, have been used to understand the toxicological impacts of psychoactive substances, as they reflect effects on the defence, sociability, and reproduction of fish, which may have direct impacts on their survival and population dynamics. Zebrafish (*Danio rerio*) have gained huge popularity in neuroscience and behavioural research due to genetic and physiological similarity with mammals, the evolutionary conservation of a subcortical social brain (between teleosts and mammals), translational relevance, well-characterized robust behaviour, the ease of genetic manipulations (via CRISP), high-throughput assays, and relative low costs compared with rodents, easy administration (or remotion) of drugs by direct water immersion. Among the various methodologies for evaluating the effects of psychoactive substances, there may be the evaluation of avoidance behaviour, freezing, erratic swimming, hyperactivity, novel tank, novel object exploration, mirror attack, social preference, and T-maze memory, conspecific preference, shoaling, schooling, aggression, social communication, mating, social learning among others namely with 2D (top of the experimental tank) or 3D tracking movement. New methodologies to studies fish behaviour are developed and huge interested in automated methodologies is rising interest for high-throughput assays and fast assessment using artificial intelligence. The fish behaviour can be very useful to understand better vertebrate responses to chemical stimulus, mainly PAS reducing the use of more complex vertebrates. In other way the complex interactions in the vertebrate brain can only be revealed in vivo.

Keywords: behaviour, psychoactive substances, *Danio rerio*

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Poster 8

Association patterns of resident bottlenose dolphins in the Sado region

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The common bottlenose dolphin, *Tursiops truncatus*, is a relatively well-studied species regarding social behaviour and structure, which can be characterized by the formation of small groups with dynamic and non-random associations. The development of fission-fusion type societies is typical for this species, supported by the presence of short-term preferential associations and casual units while others are long-term and stable. The resident population of bottlenose dolphins of the Sado Estuary currently consists of 28 individuals, 20 adults, 5 juveniles and 3 calves. This is a small and aged population that shows philopatry and reduced contact with non-resident individuals. The most common groups observed in this study were composed of adults-only or adults with calves, with a mean group size of 5.7 individuals. Mean group size was also analysed according to the dominant activity, and it was in fact similar for all activities. The software SOCPROG V. 2.9 was used to analyse the social structure and identify patterns of association. "Short-term preferential associations" prevailed between and within age and sex classes, while long-term associations appear to be preferred among adults, among juveniles, and between some individual adults and some individual juveniles. The mean coefficient of association was 0.15, lower than what was found in previous years. Females in this population did not form bands and males' alliances were not found. The strongest female-calf associations occurred between new mothers and the three newborns, while most males did not associate with calves.

Keywords: *Tursiops truncatus*; social structure; association patterns; dyads; mother-calves

Poster 9

Does the number of dolphin-watching boats impact the cohesion of common (*Delphinus delphis*) and bottlenose dolphins (*Tursiops truncatus*) in southern Portugal?

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This study aimed to investigate the correlation between the number of dolphin-watching boats and the cohesion of common (*Delphinus delphis*) and bottlenose dolphin (*Tursiops truncatus*) pods during mutual encounters. Whale-watching, which includes dolphin-watching, is an eco-tourism activity that has replaced many whale-hunting practices and has generated over $2.5 billion and 19,000 jobs globally. The growth of this industry has raised concerns about the negative impacts of whale-watching boats on wild dolphins, including noise pollution, physical harm, and behavioural changes. Regulations exist, but compliance is often lacking. This study analysed data from the “Associação para a Investigação do Meio Marinho” (AIMM), from the southern coast of mainland Portugal from June to August in 2020, 2021, and 2022. A chi-square test of independence was used to determine if there is a significant association between the number of boats and the cohesion level of both species of dolphins. The results suggest that a higher number of boats around a pod does not significantly affect the pod's cohesion level, which could be problematic, as the law on cetacean observation focuses on limiting the number of boats around a pod. Other factors like acoustic behaviour, pod activity, and individual sensitivity can influence their reaction to these boats. This means that even when only one boat approaches a pod, it can already be disturbing, while maybe five do not spark an evasive reaction. Behaviour experts on board should be mandatory, as they are crucial to ensure a safe and respectful observation.

Keywords: dolphins, dolphin-watching, boat impact, cetaceans

Poster 10

Infant non-mother interactions in mantled howler monkeys

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Interactions between infants and non-mothers (INMI) are common among social primates. Although INMI are important for the socialization of infants and may be part of alloparental care strategies, handling by non-mothers is potentially risky for infants, and thus INMI should be under strong selection. Here, we describe INMI in mantled howler monkeys (*Alouatta palliata*). We studied nine mother-infant dyads for 19 months (830 observation hours) in Los Tuxtlas (México) and recorded all occurrences of INMI and their context. INMI were infrequent (0.087 interactions/hour) and involved infants from 3 days to 12 months of age. The majority (82%) of INMI corresponded to infants approaching a non-mother, during which they exchanged interactions in only 16% of the cases. INMI were usually preceded by proximity between the handler and the mother-infant dyad (mean ± SD of 10.5 ± 17 min); and after the interaction they also remained in proximity (8.2 ± 13.1 min). On 13 occasions infants were taken from their mothers, usually (77%) by a lactating female. These "taken" interactions involved either the non-mother distancing itself from the mother while carrying the infant or restraining it so that it could not leave. All infants that were taken from their mothers were <3 months-old. These observations indicate that in this species INMI are rare but occur throughout infancy. Non-mothers are mostly interested in handling infants when they are very young. INMI involving taking infants from their mothers may be a by-product of strong selection favoring responsiveness to infants during lactation.

Keywords: Howler monkeys; social interactions; infants

Poster 11

Let's keep moving! Effects of vessel traffic on common dolphins' behaviour in Tagus estuary, Portugal

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The impact of vessels on dolphins' populations has been extensively reported in the scientific literature. In the Tagus estuary (Portugal), commercial and recreational vessels are frequent throughout the year. Sightings of common dolphins, *Delphinus delphis*, in the estuary have been reported for over two centuries and, appear to have increased during the last years. Currently, the main drivers of these dolphins' visits are yet to be understood. This study provides the first insight into the interaction between common dolphins and vessels. To understand the possible effects of vessel traffic on the dolphins' behaviour, land-based observations were conducted from a high vantage point (VTS tower, in Algés). During daylight period (8am – 4pm), between March 2022 to March 2023, continuous scans of the study area were performed by 2-3 observers, using binoculars and a telescope. Dolphins' behavioural patterns and reaction to vessels (positive, neutral, and negative) were assessed using focal-scanning method. Although the reaction to vessels was mostly neutral, dolphins' activity budgets changed when in proximity to vessels: common dolphins spent less time surface feeding and travelling, while the time spent foraging and socializing increased. Furthermore, Markov chains' behavioural transition probabilities revealed that dolphins were more likely to transition to a travelling state when vessels were nearby. This study is the first step towards understanding a potential impact source in this area, in a scenario of growing touristic pressure due to the increase in dolphin sightings.

Keywords: common dolphins; vessel traffic; behavioural budgets; Tagus estuary; Markov chains

Poster 12

Body tactile stimulation and fish welfare: effects on the behavioural response and stress of captive native and invasive freshwater fish species

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Body tactile stimulation has been demonstrated to influence the stress relief in both human and other animals, for this reason it may be used to improve animal health (Gauy et al, 2022). In wild teleost fish this type of interactions can be observed between cleaner fish and their visiting fish (known as “clients”), where stress decrease is also associated to cleaning, as cleaners touch clients to calm them down (Soares et al 2011). Similar to previous studies where fish have been given access to physical contact in laboratorial conditions (Gauy et al, 2021), here we asked if freshwater fishes would also benefit from this new type of physical enrichment, influencing both stress levels and behavioural response in freshwater fish. We selected three different species, two invasive and one native, from distinct families, *Australoheros facetus* (Cichlidae), *Lepomis gibbosus* (Centrarchidae) and *Squalius alburnoides* (Cyprinidae). Each species was exposed for 15 days to an artificial device that aimed to mimic touch. This device was composed of a rectangular PVC structure with vertical plastic sticks equipped with silicone bristles that provide tactile stimulation as fish pass through them. To provide a control, a similar structure was used, but without the bristles. To analyse behavioural differences, all interactions between individuals and between individual and equipment were recorded and analysed. Preliminary results have demonstrated differences in the behaviour between individuals exposed to tactile stimulation compared to individuals without exposure as well as differences between different species responses.

Keywords: Welfare; freshwater; fish; behaviour; captive

Poster 13

Birds follow the island rule in absence of predator pressure

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The similar characteristics shared by island environments have been shown to lead to common patterns of adaptations in island species, commonly referred to as the "insularity syndrome". In vertebrates, the "island rule" is the best-known pattern, in which large species evolve in small sizes, and small species evolve in giant forms. Since body size evolution has been largely studied in birds and the island rule accepted, the underlying mechanisms still need to be better understood. Here, we focused on the role of ecological release by accounting for the potential predators and competitors co-occurring on islands. Using 120 pairs of endemic island species and their mainland sister species, we tested the island rule and evaluated the effect of presence or absence and the density of raptors and competitors in the insular bird body mass evolution. Our data supported the island rule, and we found a strong effect of predation on body size evolution. The island rule is strong for species occurring on islands with no predator pressure, while the pattern disappears in the presence of raptors. However, we did not find an effect of competition on the studied pattern. This study highlights the importance of considering ecological interactions, especially predator pressure, in triggering or limiting birds' body shifts.

Keywords: ecological release; body mass; insularity; raptors; competitors

Poster 14

Evolution of plumage and body size in cooperative breeding birds

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In cooperative breeding, individuals help raise conspecific offspring that are not their own, leading to high selection pressures on females due to the resulting reproductive skew. This phenomenon raises several questions about the evolution of female and male traits and their underlying mechanisms. There is no common consensus regarding how such selection pressures affect sexual dichromatism and size dimorphism as earlier studies have presented conflicting results. In this study, we analyse a comprehensive dataset of over 5800 bird species, encompassing more than half of global avian diversity. Our research aims to unravel the effects of cooperative breeding and family living on plumage and body size evolution. By considering factors such as social system, breeding latitude, and phylogenetic history, we explore variations within sexes and social systems. We hypothesize that cooperative breeding species exhibit reduced size and colour dimorphism compared to non-cooperative breeders due to intensified selection pressure on females. Further, we anticipate that cooperative females will be bigger and more colourful than non-cooperative females. This research seeks to establish an understanding of how social systems influence plumage and body size, shedding light on the adaptive strategies of avian social systems.

Keywords: cooperative breeding; colour; comparative study; female ornaments; sexual selection

Poster 15

Whistles production of bottlenose dolphins during specific behavioral contexts in the Algarve region (Portugal).

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The bottlenose dolphin (*Tursiops truncatus*) is one of the most frequently observed cetacean species in the Algarve, South of Portugal. However, more information is needed on its bioacoustics repertoire. Understanding the whistle variations in the species' repertoire can reveal ecological and social reasons for group formations in the Algarve. This study provides the first insight into the acoustic behaviour of bottlenose dolphins in the Algarve region. Data were collected from May to September 2023, based on 37 hours and 33 minutes of effort in the field. The species' whistles were recorded in different contexts and categorized according to the key activities observed at the surface, such as traveling, socialization, and foraging. The group size was estimated by direct count by team observers and later average calculation. The whistle rates were obtained by dividing the number of whistles by the number of minutes of each sample and by the group size. Acoustics data were collected with a hydrophone towed from a research boat and connected to a digital recorder. The sound emissions were analysed using spectrograms plotted in Raven 1.6.5 (Cornell Lab of Ornithology, Ithaca, NY). Only whistles with clear contours were counted (N=1777) in the 41 recording samples (33 minutes and 10 seconds of sound recordings). Preliminary results showed that foraging (3,41 whistles/min/dolphin) and socialization (2,31 whistles/min/dolphin) behaviours presented the highest whistles emission while traveling had the lowest whistles emission (0,92 whistles/min/dolphin). The highest whistle rate during foraging suggests that bottlenose dolphins use these signals for group coordination and cooperation.

Keywords: *Tursiops truncatus*; acoustic behavior; surface behavior; group size; South of Portugal.

Poster 16

Acoustic communication during mating interactions in two-spotted goby, *Pomatoschistus flavescens*

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The two-spotted goby (*Pomastoschistus flavescens*) produces drums and thumps during courtship and mating takes place inside a nest. However, how sound production changes throughout the mating ritual is not known. Here, we ascertained the association of these two sound types with mating context, defined by the position of the male and the female in relation to the nest. Thumps were produced more frequently than expected by chance when the male was inside the nest but the female was outside, while Drums were emitted mostly when both were in the nest and mainly upon the female's entrance. Taken together, this study suggests that thumps are mate attraction signals and that drums are courtship signals, likely having an important role in mate choice. Acoustic activity is key for breeding success as only males that produced sounds mated successfully. However, whether particular acoustic cues are allowing the female to make their spawning decisions remains to be investigated.

Keywords: Bioacoustics, mate selection, Gobiidae, courtship.

Poster 17

Vacation in Lisbon? Occurrence and habitat use of *Delphinus delphis* in the Tagus Estuary, Portugal.

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Distribution of *Delphinus delphis* appears to be linked to environmental variations that affect prey's movements. Dolphins have been seen in the Tagus Estuary, Portugal for the past two centuries. However, there is a lack of data collection and scientific reports about the presence of cetaceans in this area. To investigate the occurrence and habitat use of common dolphins' lower section of the Tagus estuary, a land-based program was established in the VTS tower in Algés, Lisbon. Trained volunteers used a standardized visual-scan protocol to monitor the study area from March 2022 to March 2023. Common dolphins were sighted on 30% of the 97 observation days, and calves/juveniles were present in 55.72% of these encounters. Dolphin were recorded year-round, except in November and December; and no significant seasonal differences were detected ($F_{Welch}(3,49.82)=0.92$, $p=0.437$). Interestingly, there were variations in habitat use, with significant sector preference ($H(6)=15.055$, $p<0.05$): dolphins used mainly sectors 2, 3, and 4. The activities in which more time was spent were traveling (1640 min) and foraging (972 min), and resting was never reported; the activity pattern differed significantly during spring ($H(3)= 2.378$, $p<0.05$) and summer ($H(2)=8.317$, $p<0.05$). Comparing the time spent by common dolphins engaged in various activities across different sections of the lower estuary, significant differences were also noted ($F= 7.567$, $p < 0.05$). These results offer valuable insights into the dolphins' habitat use in Tagus estuary and suggest that it may serve as a feeding hotspot and potential nursery area for groups of common dolphins.

Keywords: Behaviour; Ecology; Habitat use; Conservation; Common dolphins

Poster 18

Know your food: *Cyrba algerina* (Araneae, Salticidae) requires previous experience with prey to respond to its cues

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Cyrba algerina (Araneae, Salticidae) is known to exhibit geographic variation in its responsiveness to the odour cues of one of its common spider-prey, *O. machadoi* (Oecobiidae). Additionally, and contrary to other jumping spiders, only field-collected individuals respond to this prey's odour cues. Here, we investigated the underlying determinants of *C. algerina's* responsiveness to *O. machadoi* and to oecobiids in general. Specifically, we examined: i) whether the response towards oecobiid cues requires previous experience or, on the contrary, is strictly innate, and ii) if the ability to respond is restricted to sympatric *O. machadoi* or if it applies to oecobiid species in general. Response to visual and odour cues of prey was evaluated using laboratory-reared individuals of *C. algerina* in prey-choice tests: i) after a seven-day feeding period with sympatric (*O. machadoi*) and allopatric spider prey (*O. amboseli* and Nephylengys sp. (Nephilidae)) and ii) after a seven-day exposure solely to the odour cues of allopatric *O. amboseli*. Feeding on sympatric and allopatric oecobiids elicited an odour- and visual-based response for both oecobiid species in *C. algerina* individuals. However, feeding on Nephylengys sp. never elicited a response. Exposure solely to the odour cues of allopatric *O. amboseli* elicited a vision- but not an odour-based response for this species. Results indicate that previous experience with sympatric and allopatric oecobiids is necessary for *C. algerina* to respond to their cues and suggest *C. algerina* has an innate bias towards oecobiids as prey, controlled through a developmental switch mechanism.

Keywords: jumping spider, behaviour, plasticity, prey-choice, predation

Poster 19

Feeding behaviour of *Hippotragus niger variani*

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The giant sable is one of the most endangered mammals in the world, endemic and with a restricted distribution in Angola. In addition to its very important relevance in terms of conservation, it is also a national symbol, contributing emotionally to the national unity in Angola. Using the microhistologic technique, we were able to carry out a quantitative analysis of their diet during a half-year period. Another goal of this study was to understand the link between diet and sexual segregation. Many ungulates outside the breeding season are sexually segregated, which means that males and females mostly occur in separate groups, similar to what is described for the giant sable. However, giant sable is reported as often having a male in close proximity to family herds throughout the year. Sexual segregation is usually associated with differences in energy requirements, social affinity, reproductive strategies and risk assessment, and can lead to marked differences in the diets of males and females. Our results demonstrate that the diet of the giant sable has a predominance of herbaceous species accounting for 56.6%, with the arboreal/shrubby species accounting for 43.4%. Some of the most relevant species are *Cryptosepalum maraviense*, *Digitaria monodactila*, *Oryza longistaminata*, *Cyperus* sp, Poaceae and *Brachystegia* sp. Despite what was expected, we did not find significant differences between the diet composition of males and females in each season. On the other hand, we found differences between the seasons, independent of sex, results that do not seem to support the FSH.

Keywords: Herbivore diet study; sexual segregation; critically endangered mammal; giant sable antelope

Poster 20

Sei whale feeding and transiting behaviour in the Azores

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Sei whales (*Balaenoptera borealis*) of the North Atlantic were brought to near extinction by twentieth-century industrial whaling. Currently, this species is classified as Endangered, and it is one the baleen whales more poorly understood. This species uses the Azores region during their annual latitudinal migrations towards the northern areas, but little is known yet to know the importance of this region to their migration success. From August to November of 2022, a large feeding aggregation was registered near Faial and Pico islands. Thus, the present study describes in detail this species feeding behaviour. For the analysis, opportunistic data, collected during whale-watching surveys is used, with support of statistical tests and photo-identification of the individuals observed in the aggregation event too. This feeding aggregation gives a new idea about the importance of the Azores to *Balaenoptera borealis*, as it might be becoming an important feeding ground during its migration to northern areas. With this new insight on the species ecology, a species ethogram is created and local conservation measures are revised and proposed, so the navigation of vessels and whale-watching in the feeding zones do not have major impacts on the behaviour and feeding of the animals.

Keywords: *Balaenoptera borealis*, Faial, aggregation feeding event, habitat use, social ecology

Poster 21

Behavioural trade-offs between native and invasive fish species

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Fish exhibit remarkable adaptability in response to interspecific competition, which includes resource allocation, predator avoidance strategies, and disease resistance (Keiller et al., 2021). This adaptability is crucial for their survival and has garnered significant scientific attention (Davies et al., 1997). Conversely, invasive species serve as stressors on native freshwater fish populations, disrupting ecosystems and imposing various ecological pressures on indigenous species (Ribeiro & Leunda, 2012). As a result, invasive species can profoundly impact the behavior and social interactions of native species, often driven by intensified resource competition, heightened predation risks, and altered ecosystem dynamics (Gozlan et al., 2010). Here we aimed to investigate whether the presence of invasive species induces noticeable shifts in the behavioral patterns of native fish species. To achieve this objective, we conduct controlled experiments using the portuguese native species *Squalius alburnoides* as our focal subject, in relation to the presence and absence of two invasive species, specifically *Gambusia holbrooki* and *Lepomis gibbosus*, and recorded social and predator-prey dynamics. Preliminary results show differences in the behavior of native individuals exposed to invasive species compared to those solely interacting with conspecifics.

Keywords: conservation, behaviour, freshwater, interaction

Poster 22

Sex differences in coping with stress in Common waxbills, *Estrilda astrild*

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Corticosterone (CORT) is known to play a major role in physiological stress variations, and as the basis for animal coping mechanisms. But how does stress variation affect social behavior in both males and females? Common waxbills (*Estrida astrild*) are a highly gregarious and social species, with both sexes feeding and flocking together year-round. To investigate how stress can affect social behavior in both sexes we resorted to the 1) tonic immobility (TI) test, which is commonly used to assess fear, widely used in birds, and 2) competition over food tests, which are used to assess social behavior. We firstly performed a correlation study, assessing baseline CORT plasma levels, fear response (TI test), and social behavior (competition over food test) in the common waxbill. Then, we manipulated CORT levels (HighCort, LowCort, Antagonist and Control) and through the competition over food test, we evaluated the effects on social behavior of an acute stress challenge. We found that sexes differed in their baseline plasma CORT, with females having higher levels than males. In females, lower aggressiveness related to higher baseline plasma CORT levels, but females' aggressiveness increased with an acute CORT increase in a competition over food test. The treatment with a CORT antagonist decreased the females' activity compared to controls. Males were unaffected by any CORT treatment in the competition over food test. In males, time spent in TI related to activity in the competition over food test. Our findings suggest that common waxbills stress coping mechanisms are sex-dependent.

Keywords: Corticosterone, birds, aggressiveness

Poster 23

Flexible microbiome and plastic pace-of-life strategy among and within desert adapted species

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How organisms adapt to their environment and tolerate change are key questions in evolutionary ecology. Pace-of-life syndrome (POLS) hypothesis predicts that species, populations, and individuals differ in a suite of co-evolving life-history, physiological, and behavioural traits, but co-evolution of these phenotypic components often varies along environmental/ecological selection gradients, and may limit, or be limited by, plasticity in heterogeneous environments. Furthermore, the gut microbiota influences, and is influenced by, host biology and can play a role in adaptation and plasticity, making it difficult to predict the conditions under which POLSs evolve.

To improve our understanding of the processes of diversification and the origins of the unusually high endemism in the Sahara-Sahel, we are testing multiple hypotheses surrounding modes of adaptation and microhabitat specialisation. We will measure behaviour and metabolism at the species, population, and individual level and collect climatic, landscape, ecological, and microbiome data to determine ecological and phylogenetic patterns of POLS and whether trait variation in wild species and populations is due to consistent individual differences or plasticity. We will determine how climate affects spatial distributions of microbiota and POLS, and the potential of microbiota to influence host response to changing environments.

Keywords: pace-of-life, behavioural syndromes, metabolism, microbiome

Poster 24

Effects of amphetamine racemic and its enantiomers on zebrafish avoidance behaviour

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The illicit market of psychoactive drugs has increased markedly, causing the emergence of new psychoactive substances (NPS). Amphetamine (AMP) is a chiral NPS available as a racemate and reported in wastewaters effluents. After consumption, chiral NPS may undergo enantioselective metabolism and both parent and metabolites can be excreted in different enantiomeric fractions. Despite the increasing presence of NPS in aquatic ecosystems, no study was found on the enantioselective evaluation of AMP in fish, like zebrafish (*Danio rerio*). The main objective was to evaluate the potential toxic effects of AMP and its enantiomers at the avoidance behaviour of zebrafish. For this, embryos were exposed for 96 hours to different concentrations of AMP racemic and enantiomers (0.02, 0.2, 2, 20 and 200 µg/L). After exposure, larvae were collected to evaluate the effects AMP on avoidance behaviour in the presence of a visual stimuli for 10 minutes. It was observed that animals exposed to (R,S)-AMP (0.02 µg/L) did not avoid visual stimuli. Also, at 0.02, 0.2, 2 and 200 µg/L animals exposed to (R)-AMP did not show avoidance behaviour. Additionally, at 0.02 and 0.2 µg/L the larvae exposed to (S)- AMP did not avoid the bouncing ball. These findings suggest that exposure to environmental relevant concentrations of AMP (0.02 and 0.2 µg/L) may affect the ability of larvae to have an avoidance behaviour in the presence of a predator. Further research is needed to bring new knowledge of AMP toxic effects on larvae behaviour and improve environmental risk assessment.

Keywords: avoidance behaviour, new psychoactive substances, *Danio rerio*, amphetamine, enantiomers

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Awards

Vitor Almada award

The Vítor Almada Award, conferred by the Portuguese Society of Ethology, is presented to the top student oral presentation at each National Congress. It includes support for the student's participation in an international ethology conference. This award pays tribute to one of Portugal's most eminent ethologists, renowned for his substantial contributions to the advancement of Ethology in the country. Vítor Almada, a founding member of the SPE and its President for several years, acted as the guiding scientific influence for a generation of animal behavior researchers, and his passion and expertise in the field were truly inspiring.

Springer award

Springer will be presenting awards for outstanding communications delivered by students. Springer is a publishing company specializing in books, e-books, and peer-reviewed journals across various fields, including science, humanities, technical, and medical publishing. They are the publisher of the society's journal, acta ethologica.

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Diana Vasconcelos	CIBIO-BIOPOLIS	
Elise Huchard	CNRS;U.Montpellier	Plenary speaker
Eva de la Peña	IREC	Oral 21
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