Foto: Roberto García Roa

VNIVERSITAT DE VALÈNCIA

VI JORNADA CIENTÍFICA

Institut Cavanilles de Biodiversitat i Biologia Evolutiva (ICBiBE)

27 DE GENER DE 2022

SALA D'ACTES

PARC CIENTÍFIC
CARRER DEL CATEDRÀTIC
JOSÉ BELTRÁN MARTÍNEZ, 2
46980, VALÈNCIA

VNIVERSITAT DE VALÈNCIA

ICBiBE
Institut Universitari Cavanilles de Biodiversitat i Biologia Evolutiva

Il·lustració portada: Roberto García Roa

Comité organitzador: Andreu Rico, Juan Antonio Balbuena, Leonardo Cabus, Juan Soria, Patricia Moya

Agraïments: Jardí Botànic de la Universitat de València per la cessió de l'exposició d'Illustraciencia

EXPOSICIÓ DEL PREMI INTERNACIONAL D'IL·LUSTRACIÓ CIENTÍFICA I DE NATURALESA. ILLUSTRACIENCIA 7

Illustraciencia és un projecte nascut al 2009 sota la coordinació de Miquel Baidal Crespo amb l'objectiu de divulgar i premiar la il·lustració científica i de la naturalesa. Illustraciencia duu a terme nombroses accions, entre les quals destaca el certamen internacional d'il·lustració científica i naturalista. A cada edició, es seleccionen les millors 40 obres per a crear una exposició itinerant a través de la qual acostar la ciència a la societat. Les il·lustracions seleccionades es recullen també a un catàleg virtual d'accés lliure que podeu visitar al següent enllaç: https://my.matterport.com/show/?m=SrG3GNhVjFg

Tant les exposicions com les activitats es realitzen en col·laboració amb universitats, museus, biblioteques i altres entitats compromeses amb la divulgació de la ciència. L'exposició del Premi Internacional d'Il·lustració Científica i de Naturalesa, Illustraciencia 7, que podeu visitar a les VI jornades de l´ICBiBE ha estat cedida pel Jardí Botànic de la Universitat de València.

Cada làmina mostra una espècie botànica o animal, o un element geològic, representats amb diferents tècniques, com el grafit, l'aquarel·la o el dibuix digital, atenent sempre al rigor científic que caracteritza la disciplina de la il·lustració científica. Entre les obres que trobarem estan les premiades: ´Passeriformes de Santiago de Xile´, d'Elvis Antonio Salazar Jorquera, i ´Threadfin morphology´, de Paulo Presti, premis d'il·lustració naturalista i científica, respectivament. També hi ha hagut tres esments especials a les obres ´El netejador de cavalls´, de Camilo Enrique Maldonado Marin; ´La granota cristall´ de Yaku Luis Alonso Diatchenko´; i ´Botella colonitzada per organismes marins´ de Juan Francisco Rodríguez García.

Esdeveniments com aquest i l'alta presència del projecte en xarxes socials han permès crear una comunitat d'il·lustradors científics creixent que promou la col·laboració entre professionals i la difusió del seu treball. Així mateix, al seu web es publica contingut d'interès per al sector: https://illustraciencia.info/

Programa

9.00-10.00

Apertura
Juan S. Monrós

Informe sobre l´estat de l´estació biològica
Raquel Ortells

Presentació convidada: Señales filogenéticas y fenotípicas de las redes de interacciones ecológicas
Miguel Verdú

10.00-11.00

El calentamiento global complica la estrategia de vida de las aves
Iris Solís, Elena Álvarez, Emilio Barba

The threatened marsh passerine community of a Mediterranean wetland with hydrological problems: population dynamics and habitat selection
Iván Alambiaga, Manuel Carrasco, Carlos Ruiz, Francesc Mesquita-Joanes and Juan S. Monrós

Use of environmental enrichment for reptiles in zoos across Europe
Alicia Bartolomé, Pau Carazo, Enrique Font

11.00-11.30 Pausa café + Posters + Illustraciencia

11.30-13.30

Biogeochemical diversity of Mediterranean wetlands: from genomics to the environmental protection and management
Daniel Morant, Carlos Rochera, Antonio Picazo, Javier Miralles-Lorenzo, Carolina Doña, Maykoll Corrales-González, Pedro Cabello-Yeves, Andreu Rico and Antonio Camacho

Evolution of reproductive isolation in diverging populations
Ivana Jezkova, Javier Montero-Pau, Raquel Ortells and Manuel Serra

Evaluation of the diversity of aquatic invertebrates in temporary ponds: comparison between the active and the egg bank metacommunities
Maria Bisquert-Ribes, Alex Martínez, Andreu Castillo-Escrivà, Ángel Gálvez, Sanda Iepure, Berenice de Manuel, Maria Marinho, Fabio Martins, Carla Olmo, Francesc Mesquita-Joanes & Xavier Armengol

Risk assessment of chemicals on aquatic ecosystems: from hazardous contaminant identification to chemical stress ecology
Andreu Rico

Which is the role of constructed wetlands on pollutants such as heavy metals and pesticides?
Nuria Carabal, Eric Puche and Maria A. Rodrigo

El uso de la teledetección como herramienta en los estudios limnológicos aplicados a la calidad de las aguas.
Juan M. Soria, Xavier Sòria-Perpinyà, Lucía Vera-Herrera, Rebeca Pérez, Bárbara Alvado, Eduardo Vicente

13.30-15.00 Dinar + Posters + Illustraciencia

15.00-16.00

From morphology and phylogeny to physiology, reappraising the lichen phycobiont genus *Trebouxioid* (Chlorophyta)
César Daniel Bordenave, Ayelén Gázquez, Salvador Chiva, Patricia Moya, Marta Pérez-Rodrigo, Francisco Marco, Isaac Garrido-Benavent, Arantzazu Molins Piqueres, Lucía Muggia, Pedro Carrasco and Eva Barreno

When sexual selection meets insect food plant relationships: morphology of the male hindwing costal roll in Cochylini (Lepidoptera: Tortricidae) with an ecological and evolutionary perspective
José Vicente Pérez Santa-Rita (online)

The paralaminar nucleus of the amygdala: a comparative study
Lucía Inés Torrijos Saiz, Vicente Herranz Pérez, Shawn Sorrells, Jose Manuel García Verdugo

16.00-16.30 Pausa café + Posters + Ilustraciencia

16.30-17.30

Histological analysis of the infective process of *Anisakis* spp. in gilthead seabream (*Sparus aurata L.*).
López-Verdejo Alejandro, Born-Torrijos Ana, Raga Juan Antonio, Montero Francisco Esteban

Cofilogenómica de un joven sistema de hospedadores y parásitos
Mar Llaberia Robledillo, José Ignacio Lucas Lledó, Alan Codoñer Alejos, Isabel Blasco-Costa, Juan Antonio Balbuena Díaz-Pinés

Homenatge a Edward Osborne Wilson
Enrique Font

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Presentacions orals

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Presentació convidada

Señales filogenéticas y fenotípicas de las redes de interacciones ecológicas

Miguel Verdú

Desertification Research Centre (CIDE) joint Research Centre Universitat de Valencia-CSIC-Generalitat Valenciana, Valencia, Spain

El hecho de que no existan especies que vivan sin interaccionar con otras especies unido al de que todas ellas son producto de la evolución biológica, nos permite representar las comunidades ecológicas como redes de interacciones modeladas por procesos evolutivos. La evolución dota a las especies de los rasgos fenotípicos que las capacitan para establecer interacciones con otras especies. Por lo tanto, las relaciones evolutivas entre especies nos pueden informar de sus semejanzas fenotípicas y derivar de ellas reglas de ensamblaje de las comunidades. Paradójicamente, el uso de las filogenias está suplantando al estudio de los rasgos fenotípicos que son la causa próxima de las interacciones. En esta charla ejemplificaremos cómo el estudio de los rasgos nos proporciona una información única para entender la estructura de las redes de interacción entre plantas.

Ecologia de vertebrats terrestres

El calentamiento global complica la estrategia de vida de las aves

Iris Solís, Elena Álvarez, Emilio Barba

Instituto Cavanilles de Biodiversidad y Biología Evolutiva, Universitat de València.

El ciclo anual de las aves está dividido en tres periodos regulares, relativamente cortos y bien marcados: reproducción, muda y, en el caso de algunas poblaciones, migración (post y prenupcial). Estos tres procesos son muy costosos energéticamente, por lo que las aves intentan evitar solapar cualquiera de estos procesos con otro. Sin embargo, el incremento de las temperaturas debido al calentamiento global está provocando el adelanto del comienzo de la temporada reproductora en muchas especies de aves. Este avance permite a más parejas intentar dos puestas en la misma temporada, por lo que finalizan más tarde su actividad reproductora. Si el inicio de la muda no se retrasa, es posible que algunos individuos solapen ambas actividades en el tiempo. Hemos comprobado que esto ocurre en una población de carbonero común (*Parus major*) en Sagunto (España). La proporción de parejas que realizan dos puestas se ha incrementado del 1% al 32% durante el periodo de estudio (1995-2019), pero la fecha de inicio de muda no ha variado. Así, la proporción de individuos de ambos sexos que solapan la temporada reproductora con la muda postnupcial se ha incrementado de forma inevitable. La probabilidad de solapamiento es mayor en los machos de primer año y menor en las hembras adultas. Además, las parejas en las que ambos miembros solapan muda y reproducción ponen menos huevos, lo que se traduce en una menor producción de pollos, y los pollos producidos tienen menor peso y peor condición corporal al abandonar el nido.

Keywords: Calentamiento global, cambios fenológicos, carbonero común, éxito reproductor, muda postnupcial, Parus major

Ecologia de vertebrats terrestres

The threatened marsh passerine community of a Mediterranean wetland with hydrological problems: population dynamics and habitat selection

Iván Alambiaga, Manuel Carrasco, Carlos Ruiz, Francesc Mesquita-Joanes and Juan S. Monrós.

Ecología de vertebrados terrestres. Institut Cavanilles de Biodiversitat i Biologia Evolutiva

Marsh passerines present high degrees of specialisation to wetlands, and many species are severely threatened as a consequence of the widespread deterioration of these systems. Analysing the habitat requirements of the different bird species that compose a community can be useful to avoid potential conservation conflicts resulting from species-specific requirements and achieve optimal wetland management and conservation measures. In this study we analyse the population dynamics and habitat selection of five threatened marsh passerines (Great Reed Warbler, Moustached Warbler, Reed Bunting, Savi's Warbler and Bearded Tit) in a Mediterranean wetland with persistent human-induced hydrological problems. Abundance of the target species and categorisation of the habitat were carried out in each of the more than 120 listening points that were carried out in Tablas de Daimiel (Spain) annually for 8 consecutive years. Great Reed Warbler populations declined by 90% during the study period while those of the reed bunting quadrupled; the remaining species experienced an initial increase in abundance but later declined in recent years. All the measured habitat variables (relative cover of common reed, saw sedge, bulrush, dry vegetation, open water and dry surface surfaces) were found to be important for the population dynamics of the target species. Despite having specific, even opposite, habitat requirements the abundance of focal species ultimately depended on the wetland water regime.

Keywords: bird conservation, habitat requirements, marsh passerines, water management, wetland.

Etologia

Use of environmental enrichment for reptiles in zoos across Europe

Alicia Bartolomé, Pau Carazo, Enrique Font

Ethology Lab. Institut Cavanilles de Biodiversitat i Biologia Evolutiva

Environmental enrichment is an essential tool for the welfare of captive animals. There is an increasing interest in zoo-based enrichment research, although interest in reptile enrichment has lagged behind that for other taxa. Different reasons have been suggested for this neglect, such as the misconception that reptiles are highly tolerant to impoverished captivity conditions. This, along with an obvious disconnect between scientific literature and environmental enrichment practice, hinders our understanding of the value of enrichment for reptiles in zoos. We used a survey to evaluate the current use of environmental enrichment for reptiles in European zoos. 121 zoos (32% response rate) took part in the survey. This was followed by a second, more detailed survey in which we questioned participants about their specific enrichment techniques. We found significant differences between both use of different enrichment types within each reptile group and between reptile groups for each enrichment type. Tortoises and monitor lizards are the most enriched taxa while venomous snakes are the least. The most commonly used enrichments are structural/habitat design and dietary. By contrast, training/behavioural conditioning is rare. A great array of different specific enrichment techniques were reported, with three being represented across all taxa. Structural/thermal complexity is the most commonly used enrichment across taxa, except in turtles, tortoises and crocodilians. In turtles and tortoises, cohabitation is the predominant enrichment while associative learning is mainly restricted to crocodilians and monitor lizards. Finally, chemical enrichment is used almost exclusively with venomous snakes. These results suggest that our understanding of enrichment for reptiles is in need of a re-evaluation, as many of the enrichment techniques reported by European zoos wade the sometimes blurry line between basic husbandry and enrichment.

Keywords: environmental enrichment, animal welfare, reptiles, zoos.

Limnologia

Biogeochemical diversity of Mediterranean wetlands: from genomics to the environmental protection and management

Daniel Morant, Carlos Rochera, Antonio Picazo, Javier Miralles-Lorenzo, Carolina Doña, Maykoll Corrales-González, Pedro Cabello-Yeves, Andreu Rico and Antonio Camacho

Laboratori de Limnologia, Grup d'Investigació de Limnologia (GIUV-135) - Institut Cavanilles de Biodiversitat i Biologia Evolutiva

Mediterranean wetlands have experienced anthropic structural and functional changes over decades. Current restoration and management policies aim to recover their ecological values. The ability of wetlands to exchange carbon with the atmosphere, and therefore their climate change mitigation capacity, are affected by such human-induced changes. Some of the projects currently conducted by the Limnology Laboratory of ICBiBE aim to unveil the main factors regulating and potentially disturbing the C-balance and its biogeochemical processes, mainly microbial, in Mediterranean wetlands. C-exchanges with atmosphere are being assessed by measurements of the metabolic activity of plankton, benthos and marginal vegetation, and greenhouse gases (GHG, both CO_2 and CH_4) exchanges, then modelled. Moreover, NGS, omics and bioinformatics are underway to get a comprehensive understanding of the taxonomic structure and metabolic functioning of the microbial guilds involved in the C-cycling. Results for different types of wetlands show how the natural conditions alteration induce losses in their climate change mitigating capacity, mainly by favoring degradative processes and enhancing methane emissions. The diverse restoration and management actions affect in contrasting ways the natural ecological patterns of each wetland type, including the C-cycle. Accordingly, specific management actions are now being evaluated to maximize wetland's C-sequestration capacity. An assessment of the ecological status of wetlands to fit the European conservation Directives targets is being conducted in parallel. Furthermore, for the assessment of the ecological status to be related with the C-cycling capacity, we are developing a series of e-DNA based techniques and indices and, at the other extreme of the approach, we develop remote sensing techniques allowing wider-scale assessments of some wetlands' relevant functional parameters, such as those related to the hydrological patterns, that are also determining GHG exchanges.

Keywords: Metabolic carbon (C) balance, GHG emissions, taxonomic composition, functional patterns, mitigating capacity, lenitic ecosystems

Ecologia evolutiva

Evolution of reproductive isolation in diverging populations

Ivana Jezkova, Javier Montero-Pau, Raquel Ortells & Manuel Serra

Laboratori d'Ecologia Evolutiva. Institut Cavanilles de Biodiversitat i Biologia Evolutiva

The emergence of pre-mating reproductive isolation stabilizes differentiation within the species, is one critical step of speciation, and favors biodiversity by promoting the coexistence of sister species. It can be triggered by different processes and mechanisms, often creating a complex loop of causes and consequences. In our presentation, we will shed light in the early stages of pre-mating reproductive isolation in the rotifer zooplankter *Brachionus plicatilis*. We studied Iberian populations that are known to have diverged either by local adaptation or by historical events associated with glaciations.
First, we quantified the degree of behavioral reproductive isolation via mating tests in both geographically distant populations, which diverged due to restricted gene flow, and in neighboring but ecologically divergent populations. Second, we characterized the genetic variation of *mmr* genes in the focal populations. The *mmr* genes encode the Mating Recognition Protein, a glycoprotein involved in male-female recognition.
A priori, both (1) high dispersal ability, which probably causes non-negligible gene flow and (2) stabilizing selection on the mate recognition system might cause genetic identity of the mate recognition system, and thus no sign of pre-mating reproductive isolation within species. Contrastingly, we found clear indications for behavioral reproductive isolation in most of the interpopulation crosses. We also found relatively high diversity in length and sequence polymorphism of *mmr*. These findings were more pronounced in populations with known ecological divergence than in geographically distant ones.

Keywords: local adaptation, reproductive isolation, cyclical parthenogenesis, rotifers, mating tests.

Ecologia i biogeografia de sistemes aqüàtics

Evaluation of the diversity of aquatic invertebrates in temporary ponds: comparison between the active and the egg bank metacommunities

Maria Bisquert-Ribes, Alex Martínez, Andreu Castillo-Escrivà, Ángel Gálvez, Sanda Iepure, Berenice de Manuel, Maria Marinho, Fabio Martins, Carla Olmo, Francesc Mesquita-Joanes & Xavier Armengol

Laboratori d'ecologia i biogeografia de sistemes aqüàtics. Institut Cavanilles de Biodiversitat i Biologia Evolutiva

Temporary ponds are aquatic ecosystems characterized by an alternation between wet and dry periods. Many aquatic invertebrates have a state of dormancy during the unfavorable dry period. They produce resting stages that remain in the sediment of the pond and build up the egg bank. When the favorable season returns, the resting stages hatch and the community is restored. This study tries to evaluate the diversity of a metacommunity of 32 Mediterranean temporary ponds by comparing the active and the egg bank metacommunities (by carrying out a hatching experiment) of microcrustaceans and rotifers. We compare the active and the experiment metacommunities with a Procrustes analysis, assess the beta diversity and its components (turnover and nestedness) for the two metacommunities, and evaluate differences in gamma diversity among them by means of a size-based rarefaction curve and an evenness profile. Our results indicate that both metacommunities are similar, although both also show some exclusive species. Beta diversity was high in both metacommunities and the differences among them were explained by species turnover. We also determined that the overall species richness was similar but the evenness of the species of the experiment was slightly higher than in the active metacommunity. Our study shows the potential of temporary ponds to maintain a high level of biodiversity and of hatching experiments to uncover it. With this work, we set up a preface to develop future management plans to protect temporary ponds in order to preserve elevated rates of aquatic invertebrate biodiversity.

Keywords: beta diversity, hatching experiment, resting stages, species richness.

Limnologia

Risk assessment of chemicals on aquatic ecosystems: from hazardous contaminant identification to chemical stress ecology

Andreu Rico

Laboratori de Limnologia, Grup d'Investigació de Limnologia (GIUV-135) - Institut Cavanilles de Biodiversitat i Biologia Evolutiva

Anthropogenic chemical pollution is one of the main drivers of biodiversity loss in aquatic ecosystems. However, the extent to which these chemicals contribute to alter structural and functional features of aquatic ecosystems is still to be properly quantified. Several river monitoring studies show that aquatic organisms are exposed to dozens of different chemicals, with varied physicochemical properties and toxicological mode of action. One of the main tasks of ecotoxicologists and chemical risks assessors has been to identify what are the main contaminants that contribute to ecosystem effects, and to derive mechanistic knowledge and models to predict them. In this presentation I will show some examples on chemical monitoring and risk prioritization approaches established in large river networks (Amazon, Danube, Tagus) and pinpoint some contaminant groups that are expected to be the main drivers of biodiversity effects. Furthermore, I will explain how novel particulate contaminants, such as microplastics, can interact with aquatic organisms and contribute to habitat deterioration. Finally, I will show some examples on how micro- and mesocosm experiments help to understand the interactive effects of chemicals and other stressors related to global change (e.g. nutrient loadings, temperature increase, salinity peaks) in high levels of biological organization and discuss future avenues to improve our understanding on the effects of multiple stressors in aquatic ecosystems.

Keywords: freshwater ecosystems, chemical pollution, ecotoxicology, global change

Ecologia integrativa

Which is the role of constructed wetlands on pollutants such as heavy metals and pesticides?

Nuria Carabal, Eric Puche and Maria A. Rodrigo

Ecologia Integrativa. Institut Cavanilles de Biodiversitat i Biologia Evolutiva

The concentrations in water of 12 heavy and other metals (and metalloids) have been analysed seasonally along two horizontal-flow constructed wetlands -CWs- (*Tancat l'Illa* -TLI- and *Tancat Mília* -TM-) located within the *Albufera de València* Natural Park during 2020-2021. A wide-scope screening of pesticides present in waters was also performed. Both CWs were created to improve water quality and increase biodiversity. They currently receive effluents from two tertiary-treatment wastewater plants, and the water passes through the CWs before being discharged to *Estany Plana* and *Albufera* lagoons in TLI and TM, respectively. TLI-CW achieves to reduce (Mn) or to maintain at the same level than outside (Zn-Ni-Hg-Cr-Fe-Cd-Cu) most of the studied element's concentration (67%). Only Al-Pb-B-As remain with higher concentrations. TM-CW also reduces Zn-Cu and keeps Cr-Cd-Hg concentrations (42%). Al-Pb-B-As remain with higher concentrations as happens in TLI but also Ni-Fe-Mn. Although both CWs have variable performance in element removal, no risks to human health/environment have been detected due to the low element concentration in the outlets, all of them (except Hg) below EU-environmental-quality legal limits. A total of 40 herbicides, 36 insecticides and 26 fungicides were detected among both CWs (most frequent compounds in both CWs were: the herbicides Clethodim-imin-sulfone and Diuron, the insecticides Carbofuran and Piperonyl butoxide, and the fungicides Azoxystrobin, Carboxin, Fenpropimorph, Pyrimethanil, Spiroxamine, Tebuconazole and Tricyclazole). TM-CW contains more pesticide compounds, some of them catalogued as concern substances. The impact of pesticides originated from areas with high agricultural pressure on systems created to preserve biodiversity is discussed.

Keywords: domestic wastewater, Herbicides, Fungicides, Insecticides, Rice fields, Mediterranean area.

Limnologia

El uso de la teledetección como herramienta en los estudios limnológicos aplicados a la calidad de las aguas.

Juan M. Soria; Xavier Sòria-Perpinyà; Lucía Vera-Herrera; Rebeca Pérez; Bárbara Alvado; Eduardo Vicente.

Laboratori de Limnologia. Institut Cavanilles de Biodiversitat i Biologia Evolutiva.

La Limnología como estudio de los ecosistemas acuáticos se ha basado en el trabajo de campo y en la toma de muestras para obtener los datos que permitan conocer la calidad de las aguas y más recientemente conocer su estado trófico. Con la aplicación de la Directiva Marco del Agua, también se ha ampliado a conocer el estado ecológico. Con la puesta en servicio de los satélites de observación de la tierra y concretamente desde 1984 (en que empezó a proporcionar imágenes Landsat-5), los estudios orientados a inferir la calidad de las aguas a partir de sus propiedades ópticas aparentes (las que se perciben desde el satélite) han ido avanzando. El lanzamiento de este tipo de estudios se sitúa a partir de 2013. En ese momento se pone a libre disposición las imágenes satelitales, en tiempo real y esto lleva a que muchos investigadores puedan integrar esta información en sus trabajos.
Desde 1985 este grupo ha trabajado en la Albufera de Valencia, conjuntamente con el Departamento de Física de la Tierra. Posteriormente en embalses de la cuenca del Júcar conjuntamente con el CEDEX durante la sequía de 1994-95. Y a partir de 2013, con el Laboratorio de proceso de Imágenes (IPL), en diversos lugares: cuencas del Ebro, Júcar, Tajo; lagunas costeras del mediterráneo, lagunas manchegas y en general, todo lo que se ponga al alcance, mayoritariamente desde el punto de vista de la limnología y la calidad en los ecosistemas acuáticos, sin abandonar los datos de campo para validación.

Keywords: Landsat; Sentinel; embalses; lagos; estado trófico; propiedades ópticas.

Biodiversitat vegetal i ecofisiologia

From morphology and phylogeny to physiology, reappraising the lichen phycobiont genus *Trebouxia* (Chlorophyta)

César Daniel Bordenave[1], Ayelén Gázquez[1], Salvador Chiva[1], Patricia Moya[1], Marta Pérez-Rodrigo[2], Francisco Marco[2], Isaac Garrido-Benavent[1], Arantzazu Molins Piqueres[1], Lucía Muggia[3], Pedro Carrasco[2] and Eva Barreno[1]*

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[2] Universitat de València, Institut Universitari de Biotecnologia i Biomedicina (BIOTECMED), 46100 Burjassot, Spain.
[3] University of Trieste Department of Life Science Via L. Giorgieri 10 34127 –Trieste Italy.

Lichens are valuable systems for studying symbiotic interactions resulting from associations between at least one heterotrophic fungus (mycobiont) and one or more photoautotrophic organisms (algae and/or cyanobacteria). The mycobiont builds a three-dimensional structure of hyphae in which photobiont cells are enwrapped extracellularly forming the lichen thallus, a true micro-ecosystem where other microorganisms are also hosted. In the past ten years, however, lichenologists and phycologists have increasingly focused their interest on the lichen photobionts and numerous studies have shed light on an unexpected genetic diversity at both intraspecific and interespecific level. In addition, the intrathalline coexistence of various microalgal lineages is a frequent event in lichen thalli. The availability of different symbionts depends on the environmental conditions of the habitat and the ability of the symbiotic partners to grow in these conditions. The genus *Trebouxia* Puymaly is the most widespread genus of lichen phycobionts worldwide. In *Trebouxia*, reliable differentiation and characterization of the species-level lineages can be achieved by studying the diversity of key diagnostic features of ultrastructure and morphology of axenically grown algal cultures and by modern molecular approaches like metabarcoding. Our research group aims to study the relationships between the diversity of *Trebouxia* genotypes within the thalli and the environmental conditions of the habitat, as well as the physiological processes involved in the growth and development of *Trebouxia* lineages both in axenic cultures and in symbiotic association.

Keywords: Biodiversity, fungi, lichen, microalga, symbiosis; *Trebouxia*

Entomologia i control de plagues

When sexual selection meets insect food plant relationships: morphology of the male hindwing costal roll in Cochylini (Lepidoptera: Tortricidae) with an ecological and evolutionary perspective

José Vicente Pérez Santa-Rita

Laboratorio de Entomología y Control de Plagas. Institut Cavanilles de Biodiversitat i Biologia Evolutiva

Secondary sexual characters in the Lepidoptera, such as those associated with male pheromone production and dissemination, are not directly involved in copulation, but they usually play an exceedingly important role in intraspecific communication, particularly at relatively short distances. The hindwing costal roll is a scent organ restricted to the Cochylina subtribe of the Tortricidae family. In this research, we have examined the structure of the costal roll, its variation and phylogenetic distribution as well as its evolutionary significance. The costal roll appears as a complex structure that involves modifications of the wing membrane and may include several types of sex scales including a hair pencil and microscales. Optical and scanning electron microscopy (SEM) are used thoroughly to explore these structures in a sample of 653 specimens of more than 250 species. Data are analysed in an evolutionary context. Scent organs are supposed to have evolved primarily because of sexual selection. Secondarily a scenario of habitat sharing contributes to maintain these expensive organs. By using food plants as a proxy of habitat use we have analysed if the costal roll may have evolved in this context. Network analyses techniques help us to understand how sexual and habitat selection have contributed to the evolution of the character. Moreover, the organ has evolved in a phylogenetically restricted clade. Gains and losses may be traced across the phylogeny of the group. Prevailing ideas predict that sexually selected characters are labile and lack the adequate phylogenetic structure, but the costal roll reveals a strong phylogenetic signal suggesting the underlying selective forces have remained stable.

Keywords: secondary sexual characters, sex scales, hindwing, insect host plant relationships, network analysis, phylogenetic signal

Neurobiologia comparada

The paralaminar nucleus of the amygdala: a comparative study

Lucía Inés Torrijos Saiz[1], Vicente Herranz Pérez[1], Shawn Sorrells[2], Jose Manuel García Verdugo[1]

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[2] University of Pittsburgh, Pennsylvania, United States of America

The paralaminar nucleus (PL) is a region of the amygdala which has been little studied and whose cells in humans and non-human primates show a late maturation profile. A large population of its cells present simple morphology, dense clustering, and expression of DCX and PSA-NCAM, markers of immature neurons. Since the PL has been described in several species, our main hypothesis is the existence of a homologous region to the PL in the mouse brain, a species with no evidence in the matter.
In this work, we studied the cellular dynamics of the PL during four stages of postnatal development in C57BL6 mice (P7, P14, P21 and P28). First, we characterized the PL cell populations by immunohistochemistry and then, the ultrastructural characteristics were studied by transmission electron microscopy and pre-embedding immuno-gold for DCX.
Our results indicate that, in mice, the PL is a discrete region of the amygdala and is characterized by the presence of neurons in different maturational stages in juvenile individuals. Ultrastructurally, most of DCX^+ cells presented immature morphology, with compacted heterochromatin and reduced cytoplasmatic volume. However, low expression of DCX in more complex neurons, suggests an active maturation process of these cells.
In conclusion, immature DCX^+ cells in the PL of mice which mature at juvenile postnatal stages support the idea that protracted maturation could provide neuronal plasticity at an important time in the development of the amygdala.
Furthermore, the PL will be compared across several species, such as the rabbit, to stablish the similarities and differences.

Zoologia marina

Histological analysis of the infective process of *Anisakis* spp. in gilthead seabream (*Sparus aurata L*.).

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Anisakis spp. are parasitic nematodes known by their economic and health impact as their L3 larval stages infect a vast range of fish species, many of them commercial, causing zoonotic episodes by consumption of undercooked fish. The aim of this study is to explore the infection process and potential effects of *Anisakis* spp. on gilthead seabream (*Sparus aurata* L.), an important fish in Mediterranean aquaculture, through periodic histological monitoring of the infective process.

Fish were experimentally infected and analysed up to 6 months post ingestion. All samples were observed under the stereomicroscope and later fixed for histological examination.

Parasite larvae were only found on visceral surface and mesenteric tissue, but never in muscle. *Anisakis* spp. larvae were observed within the coelomic cavity for the first time 6 hpi, being found up to 48 hpi. While the earliest evidence of fibrocytes surrounding *Anisakis* spp. L3 larvae was observed 18 hpi, the complete spiral capsule formation occurred around 72 hpi. No damage was observed in the tissue surrounding the capsule.

Despite the infection of the gilthead seabream by *Anisakis* spp. larvae is feasible, it seems unlikely to happen, especially in aquaculture, given the sanitary controlled feeding regimes. In case of infection, the transmission rate would likely be despicable due to the poor condition in which parasites are found. Furthermore, as no larvae were detected in the fish's muscle, human infections seem unlikely to occur.

Study supported by the project ANITEST PLEAMAR (Biodiversity Foundation, Ministry for the Ecological Transition and the Demographic Challenge/UE).

Keywords: Anisakiasis, aquaculture, nematode, gilthead seabream, zoonosis.

Biologia computacional

Cofilogenómica de un joven sistema de hospedadores y parásitos

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En los últimos años, con la amplia disponibilidad de metodologías moleculares, se ha resaltado la existencia de una estructura filogenética en las comunidades ecológicas. Las especies del género *Coregonus* (Salmonidae) se han vuelto un modelo popular para estudiar la reciente radiación adaptativa postglacial (10.000-15.000 años) debido a su evolución independiente en diferentes lagos de Europa. Se cree que, a día de hoy, puede existir una variedad genética suficiente como para diferenciar especies crípticas. Este escenario permite el estudio de un sistema joven de hospedadores y parásitos que permite examinar los mecanismos coevolutivos entre ambos. El proyecto que engloba este trabajo tiene como objetivo desarrollar y optimizar un nuevo marco cofilogenético para evaluar la relación entre las interacciones y la historia evolutiva de hospedadores y parásitos. Por el momento, hemos secuenciando 280 muestras de individuos de *Coregonus* procedentes de diferentes lagos de Suiza y Noruega, mediante ddRAD-seq. Los parásitos encontrados en estos individuos están siendo secuenciados. Aquí, presentamos los resultados preliminares después de la secuenciación de las muestras, con las cuales aspiramos a obtener marcadores moleculares para *Coregonus*. Presentamos la calidad de los datos en función de un primer filtrado, una agrupación según la procedencia de la muestra, y una aproximación final del número de loci secuenciados. Esto nos permitirá determinar, de manera general, si nuestros datos son suficientes para evaluar la estructura genética de la población de hospedadores y parásitos.

Keywords: cofilogenia, Coregonus, ddRADseq

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Presentacions póster

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Biodiversitat vegetal i ecofisiologia

Symbiotic *Trebouxia* sp. TR9, *Asterochloris erici* and free-living *Chlorella vulgaris* green microalgae respond diferentially to osmotic and saline stresses

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Tolerance to drought and salinity has been extensively studied in plants. However, information concerning the responses to these types of stresses in free-living microalgae is scarce, or even unavailable in the case of lichen symbiont microalgae. In this study, molecular mechanisms of resistance to saline and osmotic stresses were analyzed in the phycobiont *Trebouxia* sp. TR9 and compared to those of the symbiotic *Asterochloris erici* and the free-living microalga *Chlorella vulgaris*. Salt and osmotic stresses severely affected growth and functionality *in C. vulgaris;* however, *Trebouxia* sp. TR9 showed extraordinary ranges of tolerance, followed by *A. erici*. Ultrastructural modifications due to saline and osmotic stresses included chloroplast retraction, vesicle formation and starch accumulation, which were barely noticeable in *Trebouxia* sp. TR9 compared to the other two species. Abcisic acid, the hormone used by plant cells to cope with salt stress or water deficit, did not appear to play a role in in the response of these microalgae. Furthermore, the transcriptomic analysis carried out comparing the response of the three species to these stress conditions revealed groups of genes with a differential behavior. The function of these group of genes could be the key to understanding the observed differences of tolerance intervals between both phycobionts and the free-living *Chlorella*, as well as the extraordinary tolerance of *Trebouxia* sp. TR9. These results suggest that phycobionts may have developed alternative adaptation mechanisms to those of vascular plants and free-living green microalgae to cope with habitats with high osmotic stress. Funding: PROMETEO/2017/039 (GVA).

Keywords: Phycobionts, Osmotic stress, Saline stress, Tolerance, *Trebouxia.*

Biodiversitat vegetal i ecofisiologia

The ASUV collection of symbiotic microalgae: a cradle of undescribed *Trebouxia* isolated from mediterranean and macaronesican lichens

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Lichen symbioses are microecosystems hosting many other living organisms besides the two major lichen symbionts (i.e., the mycobiont and green microalgae or cyanobacteria) and are considered suitable sources of undescribed green microalgae for scientific knowledge. Recently, it has been stablished the “Collection of Symbiotic Microalgae-Phycobionts” at the University of Valencia (ASUV) with the aim of the isolation, propagation and conservation of lichen symbiotic or associated microalgae. The ASUV currently holds more than sixty strains, including formally described microalgae and a large number of undescribed strains news to science. In this study lichen species from the Iberian Peninsula and the Canary Islands, with different growth form and habitat requirements, were used to obtain symbiotic microalgae using an innovative isolation protocol where tiny clumps of the algal layer were captured and inoculated directly into BBM media. To reveal their phylogenetic position within the genus, molecular data (ITS) were considered to build a phylogeny. The phylogenetic analysis was combined with a detailed ultraestructural investigation, using LM, TEM and confocal microscopy. Finally, seven new lineages are proposed as suitable candidates to be described as new species in the genus *Trebouxia* belonging to clades A and S, provisionally named as: *Trebouxia maresiae* nom. prov., *Trebouxia arnoldoi* nom. prov., *Trebouxia* sp. OTUA25, *Trebouxia* sp. S02/S08, *Trebouxia* sp. aff. *simplex*, *Trebouxia* sp. OTUA12, *Trebouxia* sp. OTUA19, Funding: PROMETEO/2021/005.

Keywords: Algae description, confocal microscopy, integrative approach, light microscopy, phylogeny, transmission electron microscopy

Biodiversitat vegetal i ecofisiologia

Insights into lichen symbionts biosynthesis of NO

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NO is key in biotic and abiotic stress responses and is also involved in the establishment of symbioses like *Rhizobium*-legume and plant-mycorrhizae. In lichens, NO release increases during rehydration and in the presence of pollutants. NO biosynthesis is mainly catalysed by nitrate reductase (NR) in plants and NO-synthase (NOS) in animals but is unexplored in lichens. Our objective is to quantify and characterize NOS and NR activities in *R. farinacea* and its isolated phycobionts (*Trebouxia jamesii* and *Trebouxia sp.*, TR9). A commercial kit for animal cells was used for NOS analysis whereas a specific protocol for lichen NR activity was optimized. NOS-like specific activity of *R. farinacea* is 49.93 ± 4.13 µU/mg protein, in the range of animal cells, whereas *T. jamesii* and TR9 rendered 1031.31 ± 168.05 and 1423.26 ± 391.83 µU/mg protein respectively. NADH-NR specific activity in *R. farinacea* is 3.62 ± 0.43 mU/mg protein, one order of magnitude above *Arabidopsis thaliana*. NADPH-NR specific activity in *R. farinacea* is 2.13 ± 0.37 mU/mg protein. The addition of both cofactors renders 2.50 ± 0.11 mU/mg protein. No significant differences were found between *R. farinacea* and its isolated phycobionts or between cofactors. Further analysis of the genome of TR9, points to a gene coding for a NR-like protein highly similar to microalgae. In conclusion, *R. farinacea* and its isolated phycobionts exhibit a complex pattern of NO biosynthesis with the participation of both NOS-like and NR-like enzymatic activity. Funding: PROMETEO/2021/005 and URJC/PREDOC21-001.

Keywords: Enzymatic activities, genetic analysis, lichens, microalgae, NO synthesis

Ecologia evolutiva

Environmental predictability and transgenerational effects on sexual reproduction in rotifer populations

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Transgenerational plasticity is a type of phenotypic plasticity that occurs across generations. This transgenerational effect can have adaptive consequences in relation with environmental predictability. Facultatively sexual rotifers inhabiting water bodies that cover a wide gradient of environmental predictability are a good study model for this issue. Sex is necessary to produce diapausing eggs that are resistant to adverse conditions and enable survival in pond sediment between growing seasons, when the water column is unsuitable for population growth. We hypothesize that in ponds where the growing season length is more predictable, clones proliferate asexually longer, hence allowing rotifer genotypes to fully exploit the growing season and maximize diapausing-egg production by the end of the season. We tested this prediction in populations of rotifer *Brachionus plicatilis* inhabiting ponds that differ in the predictability of the length of the growing season. Results showed that rotifer clones from more predictable ponds were unresponsive to sex-inducing cues during a higher number of generations, exhibiting transgenerational effects.

Keywords: Transgenerational plasticity, predictability, cyclical parthenogenetic rotifers, *Brachionus plicatilis,* diapausing egg.

Ecologia evolutiva

Cuantificación de la dispersión espacial en rotíferos y caracterización de rasgos evolutivos asociados

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La dispersión es un componente esencial en la historia vital de los organismos que tiene implicaciones ecológicas muy relevantes. En este trabajo estudiamos los factores asociados a la dinámica de la dispersión y comprobamos cuantitativamente si existen mecanismos específicos para esta en el zooplancton. Para ello, utilizamos un sistema bien caracterizado, como el constituido por las poblaciones de tres especies congenéricas de rotíferos que habitan una laguna temporal ubicada en el Prat de Cabanes-Torreblanca (Castellón). En relación con estas especies, estamos cuantificando la dispersión a corta distancia de sus huevos diapáusicos mediada por el viento y estudiando los patrones de dispersión en relación con el régimen de viento (dirección e intensidad), el estado de la laguna de origen (superficie de sedimento expuesto al viento) y la cantidad de huevos diapáusicos de las tres poblaciones en dicha laguna. Cabe esperar que exista un compromiso entre los dos destinos alternativos de un huevo diapáusico (dispersarse o no) y que respondan a presiones y estrategias selectivas diferenciadas para cada especie. Esto podría implicar polimorfismo en los huevos ─promoviendo un destino u otro─, y en los genotipos de los huevos ─más o menos orientados a una colonización exitosa─. Específicamente, una elevada inversión sexual facilitaría la adaptación a nuevos entornos, por lo que también estudiamos si los genotipos dispersantes constituyen una muestra sesgada del banco de genotipos de las poblaciones de origen, y si este sesgo está relacionado con rasgos que favorecen el transporte por el viento (tamaño pequeño, contenido lipídico) y con la propensión al sexo.

Keywords: dispersión por viento, rotíferos, huevo diapáusico, rasgos dispersivos, propensión al sexo.

Ecologia de vertebrats terrestres

Sex discrimination in large eagles: a comparison among methods

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Biometric analysis allows sexing vertebrates, particularly birds. Birds of prey and specifically, the Golden eagle and the Bonelli's eagle, show reverse sexual dimorphism, a phenomenon by which females are usually larger than males. In contrast to blood sampling, the use of morphometrics allows sex differentiation, being a non-invasive method and facilitating fieldwork. By means of linear discriminant analysis of biometric variables, I have obtained different equations that allow sexing individuals of both species. To this end, 30 adult Bonelli's eagles, 12 adult Golden eagles and 49 juvenile Bonelli's eagles were sampled in eastern Iberian peninsula during the period 2015 - 2021. In addition, the validation procedure of these equations facilitated the reduction of the number of variables used and, consequently, the optimization of working time and sexing accuracy. The data obtained after linear discriminant analysis were compared with molecular analysis, obtained by PCR and electrophoresis of blood samples from each individual. After the comparison, considering the molecular sexing as the correct one, five equations showed a 100% success rate for golden eagle and three for Bonelli's eagle, ensuring a correct distinction between males and females. The results were plotted and statistically compared by univariate analyses. My results showed that the variables with lower overlap between sexes were the dorso-ventral tarsus and the lateral tarsus, while those showing the greatest overlap were the central tail feather and the seventh primary feather. The results obtained in this work allow sexing Golden and Bonelli's eagles in the field. Hence, this is an easy, accurate, rapid and non-invasive methodology with multiple applications, including studies on population dynamics, survival analysis or extinction risk assessments that, ultimately, could contribute to the improvement of the conservation status of both species.

Ecologia de vertebrats terrestres

Assessing reintroduction outcome: comparison of the juvenile post-fledging dependence period between wild and reintroduced Bonelli's eagles

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Reintroduction projects have recently gained popularity; however, their relatively elevated cost and chance of failure make them controversial, hence assessing their effectiveness is essential. Within the early stages of raptors, the post-fledging dependency period (PFDP) is the one in which individuals must face dangers without having completely developed their skills. Thereby, comparing wild and reintroduced PFDP patterns is of major interest for planning and improving future conservation actions. We analyzed the behavior of 38 juvenile Bonelli's eagles tracked through GPS telemetry, tagged as nestlings in two insular environments. The study period encompassed a total of nine-year movement data from reintroduced chicks in Mallorca (Spain) and wild chicks from Sicily (Italy). Movement parameters (i.e., age of first flight, age of first soaring, age of dispersal, length of the PFDP, revisits to the natal or release area, and residence time in them) were analyzed together with their behavior during the PFDP. Similar movement patterns were obtained for both origins, although wild individuals revisited the natal site more often, and performed first soaring flight and dispersed earlier. Behavior varied throughout the PFDP, observing a more abrupt progress in wild individuals and an earlier development of travelling and hunting behaviors. These differences are probably due to body condition, parental pressure, and fledglings flight capacities. Our results show that reintroduction projects aimed at encouraging the natural behavior of reintroduced individuals favor reintroduction success. Parental presence only anticipates the onset of dispersal and the development of skills but does not affect at any other behavioral level.

Keywords: GPS, island environment, movement ecology, post-fledging dependence period, reintroduction.

Ecologia i biogeografia de ecosistemes aquàtics

Chelarctus biodiversity from Coral Se Waters: a study of their phyllosoma larvae

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Chelarctus Holthuis, 2002 is widely distributed throughout the Indo-West Pacific (IWP), but its biogeographic patterns are unknown because Southern Hemisphere areas, such as the Coral Sea, remain poorly explored. Recent cruises organized by the Muséum national d'Histoire naturelle and the Australian Institute of Marine Science allowed the molecular identification of *Crenarctus crenatus* (Whitelegge, 1900) subfinal (IX) and final (X) stage larvae, *Chelarctus aureus* (Holthuis, 1963) stages VI, IX and X and stages IX and X of *Chelarctus crosnieri* Holthuis, 2002. The Coral Sea *C. crenatus* larvae are identical to *Scyllarus* sp. Z stages IX and X described in detail by Webber and Booth (2001). In addition, the complete description of *Ch. aureus* and *Ch. crosnieri* phyllosomae is provided. Morphological differences between *Crenarctus* and *Chelarctus* larvae are established for the first time and previous misidentifications in the literature are re-assessed. New molecular evidence also supports an origin of *Chelarctus* spp. in Central Indo-Pacific waters and speciation at higher latitudes during the Oligocene / Miocene transition.

Ecologia i biogeografia de ecosistemes aquàtics

Ingesta de microplásticos por el pez exótico *Gambusia holbrooki* en dos lagunas costeras mediterráneas

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Gambusia holbrooki is a fish of North American origin introduced in the early 20th century in wetlands of the Iberian Peninsula for the biological control of mosquitoes. This fish feeds mainly on invertebrates, but they are also susceptible to ingesting and accumulating microplastic residues similar in size to some of their usual prey. In this study, we analyzed the contents of the gastrointestinal tract of adult individuals of this species from two restored coastal lagoons, to characterize the ingestion of microplastics. 156 specimens of *Gambusia holbrooki* were analyzed: 92 females and 64 males. Females had a greater weight and length than males. 44% of the fish presented some microplastic residue (fibers or fragments) in their gastrointestinal contents. Most of the microplastics (48%) ranged between 100 and 400 µm. Blue fibers and brown fragments were the most common. The average number of microplastics per individual was slightly higher in males than in females, in spring samples than in summer ones, and in lagoon G02 compared to L04, although only significant differences were found between the lagoons. In addition, individuals with lower weight presented a greater amount of microplastics. In this sense, the presence of microplastics in the gastrointestinal contents of fish can be an indicator of the increase in plastic residues in Mediterranean coastal ecosystems, with the potential to alter the trophic dynamics of aquatic organisms.

Keywords: microplastic fibers; microplastic fragments; ingestion; restored lagoons

Ecologia i biogeografia de ecosistemes aquàtics

Cambios en la tasa metabólica en respuesta a la temperatura en ostrácodos nativos (mediterráneos) y exóticos (tropicales) mediante experimentos de respirometría

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Las invasiones biológicas constituyen una gran amenaza en la actualidad para la estabilidad de los ecosistemas, poseyendo un gran potencial nocivo en los más frágiles,
como las charcas temporales mediterráneas. Uno de los grandes factores reguladores de estos ambientes es la temperatura. El presente trabajo fue diseñado para estudiar los efectos que generan los cambios de temperatura en la respiración de dos especies de ostrácodos, uno de origen nativo, *Cypridopsis vidua* y otro de origen exótico, *Dentocypria* sp., una especie que ha aparecido recientemente en los arrozales del Parque Natural de la Albufera de Valencia y donde se encuentra ampliamente extendida. Los resultados obtenidos muestran un aumento del consumo de oxígeno con el aumento de la temperatura en ambas especies, siendo especialmente acusado en *Dentocypria* sp., obteniéndose un valor mínimo de 0,358 µL $O_2 \cdot h^{-1} \cdot mg^{-1}$ (a 10ºC) para *Dentocypria* sp. y 0,0007 µL $O_2 \cdot h^{-1} \cdot mg^{-1}$ (a 5ºC) para *C. vidua*; y un valor máximo de 1,257 µL $O_2 \cdot h^{-1} \cdot mg^{-1}$ (a 25ºC) para *Dentocypria* sp. y de 0,497 µL $O_2 \cdot h^{-1} \cdot mg^{-1}$ (a 30ºC) para *C. vidua*; valores que concuerdan con lo esperado. A 30ºC de temperatura se observa un descenso del consumo para *Dentocypria* sp. debido a que alcanza su límite térmico. A pesar de obtener unos valores de Q10 con un patrón irregular según los cambios de temperatura, estos son especialmente elevados tanto a temperaturas altas como bajas para *Dentocypria* sp. Así queda comprobado el aumento de la tasa metabólica de ambas especies, ligado al incremento de la temperatura lo cual afecta a su eficacia biológica.

Keywords: Ostracoda, Metabolismo, Respiración, Efecto térmico, Invasiones biológicas

Ecologia integrativa

Anaerobic oxidation of methane coupled to denitrification in lakes (DAMOLAKE): Subproject-1. Role of the aquatic plants and implications of the associated trophic web

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DAMOLAKE addresses the anaerobic oxidation of methane coupled with denitrification in lakes from two differentiated but complementary disciplines: one related with the functional approach of lakes, focused on biogeochemical processes and the other based on the effects on lake structure, focused on the responses of the food web. Our subproject will assess the implication of submerged macrophytes and their associated trophic web on the DAMO. We will cover from the population to the ecosystem levels in lakes from two different climatic scenarios (temperate -Spain- vs tropical -México-) and two trophic conditions (oligotrophy vs eutrophy). The subproject comprises field studies and experiments at three levels of complexity. In the first experiment, here presented, we evaluate the transformation of macrophyte-derived organic matter to greenhouse gases such as methane and carbon dioxide. We compare submerged vascular plants to conspicuous green macroalgae such as charophytes and filamentous algae. Senescent aboveground tissues of four phanerogam species, two charophyte species and one filamentous green algae species were incubated anaerobically in the dark at the temperature 20°C for one month for CO_2 and CH_4 concentration measurements. Variation in the organic matter quality has been also determined. Preliminary results indicate that production of both CO_2 and CH_4 is higher from phanerogams than from macroalgae and is also higher under eutrophic conditions.

Keywords: lakes, trophic web, aquatic phanerogams, macroalgae, methane, carbon dioxide.

Limnologia

New tools and technologies for the risk assessment of chemical pollution in Mediterranean wetlands: the ERAHUMED project

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The anthropogenic contamination pressure and global (climate) change are considered two of the main drivers affecting the biodiversity of Mediterranean coastal wetlands. The ERAHUMED project aims to develop new tools and technologies to assess the exposure, effects, and risks of chemicals on these ecosystems considering global change scenarios. The project will consider the Albufera Natural Park as the area of study and will conduct research on three major topics: (1) water flow, nutrient balance, occurrence and exposure of pesticides, pharmaceuticals, microplastics, and other contaminants in water and sediment matrices; (2) the assessment of the biological effects of these contaminants by performing laboratory and mesocosm studies; (3) the evaluation of the impacts of eutrophication and chemical pollution on aquatic biodiversity and on ecosystem services. The ERAHUMED project proposes the implementation of advanced analytical techniques to evaluate nutrient and chemical exposure, and the construction of mesocosms to assess chemical effects on aquatic populations and communities representative of the Albufera Natural Park. Furthermore, we will develop a decision support system to assess multiple stressor effects on ecosystem structure and functioning, which will be based on (1) water and nutrient balance an rice-plot pesticide exposure modelling tools, (2) regional modelling tools to assess water, nutrient and chemical loads and distribution patterns, and (3) ecological models to assess the impacts of nutrient inputs and synthetic chemicals and other stressors (e.g. temperature raise, salinity, water scarcity) on several species and their interactions. Through this project we aim to set a range of risk reduction measures for present and future chemical emission scenarios that is pioneer for the Mediterranean region, and that can be extrapolated to other wetland ecosystems.

Keywords: wetland ecosystems, nutrients, pesticides, ecological models, ecosystem services, global change

Limnologia

Análisis del transporte de sedimentos en la cuenca del río Ebro y el delta mediante teledetección. Caso de estudio: Inundaciones de los últimos 4 años.

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El transporte de sedimentos es un proceso esencial para los sistemas fluviales, así como para los ecosistemas costeros y marinos que reciben dicho material. La cuenca del Ebro constituye un sistema fluvial extenso, siendo la mayor cuenca hidrográfica de España. Está drenada por el río Ebro en sentido NO-SE, y en su discurrir transporta gran cantidad de agua y sedimentos provenientes de su cuenca. En su desembocadura forma el delta del Ebro, un sistema que se encuentra sujeto a la dinámica del transporte de los sedimentos arrastrados por el río. Una característica importante de la cuenca del río Ebro es la importante presencia de embalses a lo largo de todo su recorrido. Cuando se construye un embalse, el cauce que se sitúa aguas abajo de la presa se modifica el transporte y dichas alteraciones se terminan observando también en los deltas. Con la llegada de las lluvias, sobre todo si son torrenciales, se produce un mayor transporte de sedimentos. Con el objetivo de conocer la afección que ha tenido los recientes episodios de lluvias torrenciales en la sedimentación en la cuenca del río Ebro, se ha estudiado el transporte de sedimentos en el tramo de los embalses de Ribarroja y Mequinenza, así como en la zona del Delta. Para ello, se han procesado imágenes captadas por los satélites Sentinel 1, 2 y 3 durante los períodos previos, durante y posteriores a las lluvias torrenciales, observando una importante disminución de la llegada de sedimentos al delta, que sea posiblemente causa de su regresión.

Keywords: sólidos en suspensión, transporte, embalses, sistema deltaico, lluvias torrenciales, misiones Sentinel

Limnologia

Detección de floraciones algales en embalses mediante teledetección con imágenes de Sentinel-2

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Actualmente, las floraciones de algas afectan gravemente a la calidad del agua para los usos habituales. En general están relacionadas con procesos de eutrofización en la cuenca del embalse, tanto de origen agrícola como procedentes de los vertidos de aguas residuales tratadas en los cauces públicos. Los actuales satélites del programa Copernicus son una magnífica oportunidad para realizar un seguimiento de las masas de agua continentales. El objetivo es aplicar un caso práctico con ecuaciones validadas para la determinación de la clorofila y la ficocianina en embalses de la zona templada de la Península Ibérica. Con ello se podría realizar un seguimiento en tiempo casi real de la situación en las masas de agua problema, especialmente aquellos de difícil acceso. Para la realización de este estudio se aplicaron las fórmulas a imágenes tomadas en verano entre 2017 y 2020 en embalses de la cuenca del río Tajo. El procesado de las imágenes se realizó con el programa SNAP para obtener los valores de reflectancia. Tras aplicar ecuaciones para la clorofila y la ficocianina, se obtienen mapas temáticos de distribución espaciotemporal de las floraciones algales fitoplanctónicas. Los resultados muestran que se produce una floración al año, con una duración entre tres y seis semanas, que comienza hacia el mes de julio en la cuenca del Tajo. Comienza por la zona de cola, donde entran las aportaciones superficiales y se extienden por toda la superficie en unos días. Este tipo de estudios profundizan en el uso de la teledetección como herramienta de análisis limnológico en estos fenómenos resultado de la presión humana.

Keywords: floraciones algales, SNAP (Sentinel Application Platform), reflectancia, clorofila y ficocianina.

Neurobiologia comparada

BCAS1 defines a heterogeneous population in diffuse gliomas

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Glial-derived tumors such as oligodendrogliomas (OGs), astrocytomas (ASs) and glioblastomas (GBs) account for the majority of CNS tumors. OGs and ASs are subclassified into grade II and III according to malignancy. On the other hand, GBs are the most aggressive type of glioma (grade IV). The cell of origin of these neoplastic entities is still elusive. However, in the case of OGs, different state-of-the-art studies point towards immature oligodendrocytes as a possible source of gliomagenesis. Therefore, studying markers that identify oligodendrocyte precursors has become of great interest. Breast carcinoma amplified sequence 1 (BCAS1) has emerged as a novel marker that defines an immature oligodendrocyte population, but also it has been associated to non-CNS tumors. In this study, we analyzed the expression of BCAS1 in a series of surgically removed OGs (n=17), GBs (n=58) and ASs (n=8) from human patients. To study the distribution and the proliferative status of this cell subpopulation within this samples, we co-stained BCAS1, with EGFR, Vimentin and Ki-67. Additionally, we analyzed the ultrastructure of $BCAS1^+$ cells by immunoelectron microscopy. Our results depict that $BCAS1^+$ cells, in these tumors, constitute a heterogeneously distributed population, which displays two different morphologies: stellate or spherical cells. In particular, stellate cells can form tightly packaged nodules and present a high proliferative rate. This suggests that BCAS1 is a marker defining a specific cell subpopulation within diffuse gliomas, which could correspond to a state of transient amplification, thus contributing to tumor malignancy.

Keywords: Diffuse gliomas, BCAS1, oligodendrocyte precursors, oligodendrogliomas, glioblastomas.

Zoologia marina

Una nueva especie de Cardicola (Plathyhelminthes, Aporocotylidae) parásita de la dorada (Teleostei, Sparidae) en acuicultura

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En acuicultura, las condiciones de cultivo promueven la proliferación de parásitos de ciclo directo o de los que su hospedador intermediario está en las inmediaciones. En este estudio se describe un nuevo parásito que infecta a la dorada (*Sparus aurata* L.). El análisis de 150 doradas salvajes y de cultivo reveló la presencia de dos especies del género *Cardicola* (Trematoda, Aporocotylidae): *Cardicola aurata* y una nueva especie. Estos parásitos se han relacionado con epizootias que pueden causar graves efectos negativos sobre la salud de los peces. *Cardicola mediterraneus* n.sp. se diferencia de la especie más cercana por la longitud de los ciegos posteriores y la forma del testículo. El género *Cardicola* comprende 39 especies. Hasta la fecha solamente cinco de estas especies se han registrado en el mar Mediterráneo. Las presiones evolutivas que ocurren en acuicultura son diferentes a las del medio salvaje y podrían interferir en los procesos de especiación. El género *Cardicola* presenta una taxonomía compleja pero los datos disponibles muestran altas diferencias intragenéricas para los ADNr 28S e ITS2, similares a las diferencias intergenéricas entre aporocotílidos, sugiriéndose que el género podría dividirse en el futuro. Este estudio es un claro ejemplo de que se requiere la combinación de datos moleculares y morfológicos para distinguir entre especies y conseguir datos sobre su relación evolutiva. La nueva especie debe ser considerada en los análisis sanitarios rutinarios futuros, ya que se desconoce si pudiera presentar un mayor impacto o potenciar los efectos patológicos de la especie previamente descrita.

Keywords: acuicultura, *Cardicola,* Trematoda, ADNr, efectos patológicos.

Zoologia marina

La tortuga boba *Caretta caretta* como indicadora de contaminación marina; caso de estudio en el Mediterráneo Occidental

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La contaminación es una de las principales amenazas que afectan a la biodiversidad marina. En este trabajo se analiza la basura ingerida por 63 tortugas bobas (*Caretta caretta*) vivas (n= 24) y muertas (n= 39), varadas o capturadas accidentalmente en la Comunidad Valenciana entre 2017 y 2019. Este estudio incluye como novedad el análisis de las basuras ingeridas por ambos grupos en la zona de estudio. En total, se registraron 843 ítems de basura, con un peso seco de 226,197 g y un volumen húmedo de 343,155 ml. El 43% fueron plásticos de uso, principalmente de color blanco-transparente, de los tipos “Lámina” (51%) y “Fragmento” (32%). La Frecuencia de Aparición de basura antrópica para tortugas muertas fue del 66,7%, mientras que el total de las muestras de tortugas vivas analizadas presentaron basura. Se encontró mayor cantidad de basura antrópica en tortugas de mayor tamaño, aunque en tortugas vivas dicha cantidad también se relacionó con la estación y la provincia donde fueron capturadas accidentalmente. En tortugas muertas se encontró mayor probabilidad de presencia de basura antrópica en otoño y primavera, y al sur del Cabo de la Nao; así como una tendencia a ingerir más basura en la zona bento nerítica. Este estudio reafirma el papel de la especie como indicadora de contaminación marina en el Mediterráneo Occidental y se encuentra enmarcado en el Proyecto INDICIT II de la Unión Europea. Los autores agradecen a los veterinarios de la Fundación Oceanogràfic su colaboración en la recolección de muestras de tortugas vivas.

Keywords: “*Caretta caretta*”; “basura antrópica”; “plástico”; “Comunidad Valenciana”; “indicador”.

Zoologia marina

Epibiotic fauna of Antarctic minke whale, *Balaenoptera bonaerensis* Burmeister, 1867, in the Southern Ocean

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Antarctic minke whales, *Balaenoptera bonaerensis*, typically inhabit waters of the Southern Hemisphere and migrate alone or in small groups to higher latitudes during the austral summer, where they feed on Antarctic krill. We examined the epibiotic macrofauna of 333 Antarctic minkes captured in the Indo-Pacific region of the Antarctic by a Japanese scientific expedition between 2018 and 2019 and explored its potential use as biological tags of their hosts. Four of the taxa found were obligate epibionts of cetaceans, i.e. the parasitic amphipod *Balaenocyamus balaenopterae* (prevalence: 21.3%) and the copepod *Pennella balaenoptera* (0.6%), and the commensal cirripeds *Xenobalanus globicipitis* (11.1%) and *Coronula* spp. (9.5%); and two were generalist commensal barnacles, i.e. *Conchoderma auritum* (9.0%) and *C. virgatum* (0.3%). Interestingly, epibiotic composition was nearly identical to that found on a similar survey of common minke whales, *Balaenoptera acutorostrata*, from the opposite pole, thus providing an excellent opportunity to perform future phylogeographic analyses. Lastly, most individuals of *X. globicipitis* were found dead and degraded. Since this is a typical temperate species, it is likely that barnacles died soon after whales entered Antarctic waters and their use to trace whales' migration movements is thus investigated.

Keywords: antarctic, minke whale, epibiont, macrofauna, migration