

LIBRO DE RESÚMENES



Sociedad
Chilena
de Neurociencia



SOCIEDAD DE
ECOLOGÍA DE CHILE



LXV

REUNIÓN ANUAL
SOCIEDAD DE BIOLOGÍA
DE CHILE



XVIII

REUNIÓN ANUAL
SOCIEDAD CHILENA
DE NEUROCIENCIA



XXVIII

REUNIÓN ANUAL
SOCIEDAD DE
ECOLOGÍA DE CHILE

📍 HOTEL ENJOY, PUCÓN

📅 5, 6 Y 7 DICIEMBRE 2022



LXV REUNIÓN ANUAL
SOCIEDAD DE BIOLOGÍA DE CHILE
XXVII REUNIÓN ANUAL
SOCIEDAD DE ECOLOGÍA DE CHILE
XVIII REUNIÓN ANUAL
SOCIEDAD DE NEUROCIENCIA DE CHILE

HOTEL ENJOY, PUCON 5, 6 Y 7 DICIEMBRE 2022

Auspiciadores



CONFERENCIAS





CONFERENCIA INAUGURAL

Chile as a Biogeographic and Evolutionary Model: Contributions of Mammalogy. (Chile como Modelo Biogeográfico y Evolutivo: Aportes de la **Mastozoología**)

R. Eduardo Palma

Laboratorio de Biología Evolutiva, Departamento de Ecología

Pontificia Universidad Católica de Chile, Santiago, Chile.

The geographic isolation of Chile among several barriers such as the Atacama Desert, the Cordillera de los Andes, the Pacific Ocean and the Fjords and Icefields in Patagonia, make this country an interesting area to study the biogeography and evolution of several taxonomic groups. And mammals are not the exception, although our country does not characterize for being a species rich spot for terrestrial forms, if compared to other South American geographic regions. Here, I present several major milestones in the study of small mammals, along different ecoregions from the Andean Puna to the Patagonia of Chile. The compilation of studies shows what we have been working in the Laboratory of Evolutionary Biology at Pontificia Universidad Católica de Chile, the last couple of decades. Major contributions include studies in sigmodontine mice (one of the most species rich groups of South American rodents), and mouse opossum marsupials. The evolutionary approaches have involved morphometrics, molecular systematics and phylogeographic studies in small mammals along several of the diverse ecosystems that are part of this biogeographic island that constitutes Chile.



CONFERENCIA

SOCIEDAD DE ECOLOGIA DE CHILE

Why should we do more field studies in physiological ecology? Lockdowns, marsupials, and hibernation: moving the lab to the forest.
(¿Por qué deberíamos hacer más estudios de campo en ecología fisiológica? Encierros, marsupiales e hibernación: trasladando el laboratorio al bosque.)

Roberto Fernando Nespolo Rossi¹

(1) Universidad Austral de Chile

Hibernation - the reversible metabolic depression that many mammals experience as an adaptation to seasonal climates - has fascinated scientists for more than a century. However, most hibernation experiments have been mechanistically approached (laboratory studies). But mimicking natural conditions in the laboratory is challenging—doing so requires prior natural-history knowledge of ecologically relevant body temperature cycles, photoperiods, food rations, social environments, among other variables. Here I'll describe how (partly induced by the pandemics) we moved the laboratory to the field. We set up a mesocosm experiment aimed at studying the energetics of hibernation in the monito del monte (*Dromiciops gliroides*), an endemic marsupial of the southern South American temperate rainforests. We got interesting lessons. From the logistical perspective, we learned that field studies are notably cheaper than laboratory studies, more precise, less laborious, and more assertive ("the organism do the experiment"). From the scientific point of view, we developed a novel approach for estimating energy savings of hibernation (monitos exhibited 95% savings during their 6 months of hibernation), but we also demonstrated that hibernation energy budget is modulated by the environment. Also, we extended our estimation to other hibernators, revealing a surprising result, the isometric scaling of hibernation metabolism. This means that a gram of a hibernating bat has a similar metabolic rate with a gram of a hibernating bear, 20,000 times larger. I'll finish by discussing the enormous opportunities that field stations offer (especially these days of social distancing and screens), for training, research, and collaboration in ecological work..

Financing: Millennium Science Initiative Program – Center Code NCN2021-050; iBio; ANID PIA/BASAL center FB0002 and Fondecyt 1221073.



CONFERENCIA

SOCIEDAD DE ECOLOGIA DE CHILE

A paradigm shift based on plant facilitation: from exotic-productive to native-conservation. (Un cambio de paradigma basado en la facilitación de plantas: de exótico-productivo a nativo-conservación)

Alex Fajardo^{1,2}

(1) Universidad de Talca, Instituto de Investigación Interdisciplinaria (I3), Vicerrectora Académica, Avenida Lircay s/n, Talca, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile

Existe sobrada evidencia de que las interacciones positivas entre plantas (facilitación) ocurren principalmente en condiciones estresantes. Sin embargo, existe menos evidencia de que la facilitación ocurra entre individuos de la misma especie, individuos que, en principio, comparten el nicho ecológico completamente y que, por lo tanto, deberían competir intensamente. En el sur de Chile, los bosques secundarios post-incendio de especies de *Nothofagus* desarrollan árboles multi-fustales que son más frecuentes en el borde de los rodales. Se hipotetiza que este fenómeno se relacionaría con las condiciones estresantes experimentadas durante el establecimiento del bosque. Experimentalmente se demostró que efectivamente el establecimiento de plántulas de *Nothofagus pumilio* se ve favorecido cuando éstas se plantan en grupos, elevando la supervivencia y el crecimiento cuando se las compara con plántulas plantadas solitariamente. Este resultado no tan solo demuestra la existencia de facilitación a nivel intra-específico como un proceso estructurador de la población que podría estar relacionada con selección de parentesco, sino que abre la posibilidad real de modificar las prácticas de plantación con especies nativas para alcanzar altas tasas de supervivencia. La restauración exitosa basada en la observación del funcionamiento de nuestros sistemas naturales, en oposición a la basada en los protocolos de plantación de especies exóticas, constituye un cambio de paradigma en el establecimiento artificial de masas boscosas



CONFERENCIA

SOCIEDAD DE ECOLOGIA DE CHILE

How did we get here (to the Anthropocene)?

Eugenia Gayo^{1,2,3}

(1) Instituto de Ecología y Biodiversidad (IEB), Las Palmeras 3425, Santiago, Chile

(2) Center for Climate and Resilience Research (CR)2, Blanco Encalada 2002, Santiago, Chile

(3) Núcleo Milenio UPWELL, Concepcion, Chile

While Social sciences question on unequal human agencies for the Anthropocene, Geosciences are mostly focused on identifying best candidates for Stratotype Sections and Points. Such problematizations for one the most influential concepts over recent decades, reflect predominant reductionist perspectives to portray feedback processes that might compromise the stability and resilience of socio-ecological systems. Still, the Historical Ecology approach has the potential to promote a real paradigm shift to understand interactions that have shaped the human-dominated Earth state through time and, apparently, into the future. In this talk, I will outline some challenges in implementing this research program by revising study cases delineated for the Atacama Desert and central Chile for the last 3.5 ka. I will also highlight the importance of integrating of large datasets for biophysical conditions and socio-cultural behaviors in our understanding of processes that govern human-engineering capacities at several spatio-temporal scales. But more importantly, to recognize that the Anthropocene cannot be solely linked to an “universal imprint” of Industrialized societies, but that this phenomenon is intrinsically tied to (paleo)historically and geographically diverse configurations in the human-environment interactions.

Financing: ANID PIA/BASAL FB210006, ANID/FONDAP/15110009, ANID-Millennium Science Initiative Program-NCN19_153

CONFERENCIA Dr. Mario Luxoro
PREMIO A LA TRAYECTORIA EN NEUROCIENCIA
SOCIEDAD CHILENA DE NEUROCIENCIA

A Long Journey into Ca^{2+} Signaling in Excitable Cells

Cecilia Hidalgo

Department of Neurosciences, Biomedical Research Institute (BNI), Physiology and Biophysics Program, ICBM and Center for Exercise, Metabolism and Cancer (CEMC), Faculty of Medicine, Universidad de Chile, Santiago, Chile.

My studies on how excitable cells utilize Ca^{2+} for essential cellular functions began in the summer of 1965, at the Marine Biological Station in Montemar, where I worked with Eduardo (Guayo) Rojas. We showed that temperature and mitochondrial inhibitors affected active Ca^{2+} fluxes across the membrane of the axons of the Chilean squid *Dosidicus gigas*, and published these results in 1968. My research on Ca^{2+} signaling has continued up to this day. After a postdoctoral stay at NIH (1969-1972), upon returning to Chile I studied Ca^{2+} fluxes in the giant barnacle muscle cells. When moving to Boston in 1974, I continued studying Ca^{2+} signaling in rabbit skeletal muscle until we returned to Chile by the end of 1983. In the last 39 years my work on Ca^{2+} signaling has included studies on how Ca^{2+} release from the endoplasmic reticulum mediated by ryanodine receptor (RyR) channels, which has a key role in skeletal and cardiac muscle function, is affected by cellular redox state, and how RyR-mediated Ca^{2+} release is essential for hippocampal synaptic plasticity and spatial memory processes. Of course, I have not done all this work alone, since I have been fortunate to have worked along with many talented colleagues and gifted students.

Support: FONDECYT (1170053), BMBF (180051), BNI (P09-015-F; ICM09_015).



CONFERENCIA

SOCIEDAD CHILENA DE NEUROCIENCIA

Understanding Neuroimmune Pathways in Neurodegeneration

Bruce T. Lamb

Executive Director, Stark Neurosciences Research Institute

Abstract: Alzheimer's disease (AD) is the most common form of dementia in the elderly and is an increasing cause of morbidity and mortality in the world. At the pathological level, Alzheimer's disease is characterized by extracellular deposits of the beta-amyloid peptide and intracellular aggregation of the microtubule associated-protein tau along with marked activation of microglia, the innate immune cell of the brain. Increasing genetic, systems biology and pathological studies of human AD suggest that neuroimmune pathways selectively expressed in microglia may play an active role in the pathogenesis of the disease and could prove effective as novel therapeutic targets. One of these pathways includes the receptor TREM2, which has been rigorously studied by a number of different labs, although we still understand little regarding the signaling pathways that act downstream of TREM2. Through the efforts of two major US-based consortia, the Model Organism Development and Evaluation for Late-onset Alzheimer's Disease (MODEL-AD) and the Target Enablement to Accelerate Therapy Development for Alzheimer's Disease (TREAT-AD), we have investigated the role of the *Inositol Polyphosphate-5-Phosphatase (INPP5D)* and *Phospholipase C Gamma 2 (PLCG2)* genes in AD pathogenesis. Our data suggest that inhibiting INPP5D and activating PLCG2 is likely protective in AD pathogenesis, and we have initiated drug discovery efforts to therapeutically target both INPP5D and PLCG2 that we aim to bring forward ultimately to AD clinical trials.



CONFERENCIA

DR. HERMAN NIEMEYER

Biominería para la obtención de metales mediante el uso de microorganismos extremófilos. Procesos empleados en la actualidad y posibles usos futuros en el Espacio.

Carlos Antonio Jerez Guevara¹

(1) Departamento de Biología, Facultad de Ciencias, Universidad de Chile.

La biominería, emplea principalmente microorganismos acidófilos y termoacidófilos para extraer desde los minerales metales como cobre, níquel y otros de gran uso a nivel mundial. La utilización de metales preciosos será muy requerida en los próximos años, ya que muchos de estos recursos son muy escasos y se agotan. Los principales intereses en el estudio de los microorganismos extremófilos son: 1) Aplicaciones Biotecnológicas Diversas. 2) Conocer los mecanismos de adaptación de estas células a los ambientes extremos. 3) Grandes desafíos en la biología sintética espacial. En esta presentación analizaré parte de los procesos tradicionales de biominería utilizados en Chile y muchos otros países, con variantes que dependen principalmente del tipo de minerales a procesar en cada lugar. Adicionalmente, se espera que los avances recientes para modificar genéticamente microorganismos ambientales sin peligro para el medio ambiente permitirán un gran avance para la biominería mundial.. Financiado en parte por FONDECYT N° 1191554 con fines de conservación (y no de producción) en el país.

Financing: Fondecyt 1190900ANID PIA/BASAL FB210006

SIMPOSIOS



SIMPOSIO

SOCIEDAD CHILENA DE NEUROCIENCIA

BRAIN DYSFUNCTIONS: COMPUTATIONAL INSIGHTS

Coordinadores: Patricio Orio y Leonel Medina

Slow Inactivation of Fast Sodium Channels Mediates Accommodation of Nerve Fiber Activity During Kilohertz-Frequency Spinal Cord Stimulation

La Inactivación Lenta de Canales Rápidos de Sodio Participa en la Acomodación de la Actividad de Axones Durante Estimulación Medular Kilohertz

Leonel E. Medina^{1,2}, Nathan Titus³, Warren M. Grill^{3,4,5,6}

(1) Universidad de Santiago de Chile, Departamento de Ingeniería Informática

(2) Millennium Nucleus for Applied Control and Inverse Problems

(3) Duke University, Biomedical Engineering

(4) Duke University, Department of Neurobiology

(5) Duke University, Department of Neurosurgery

(6) Duke University, Department of Electrical & Computer Engineering

Spinal cord stimulation (SCS) is a well-established treatment for chronic pain, in which current pulses are applied epidurally to activate the dorsal column (DC) fibers. Recently, kilohertz-frequency (KHF) SCS was proposed as a potentially more effective treatment than conventional SCS. DC fibers respond to KHF signals with complex patterns of activity, including cessation of firing without conduction block. However, the mechanisms underlying these responses are not clear. We combined computational modeling and experimental measurements to clarify the mechanisms underlying the complex response of DC fibers to KHF SCS. We implemented a cable model of a DC fiber using published morphological data and ion channel dynamics. We validated the model using *in vivo* measurements of rat single DC fibers. Subsequently, we incorporated a model of the dynamics of extracellular potassium and added a slowly inactivating gate to the fast sodium channels at the nodes of Ranvier. We coupled the fiber model to a volume conductor model of SCS and applied the KHF SCS signal to quantify firing activity for different fiber diameters at different locations in the DCs. Only after incorporating the slowly inactivating gate, the model fibers were able to replicate the profiles of firing activity observed in experimental recordings of single fibers. As well, we measured the extracellular potassium concentration *in vivo* and found that, during KHF SCS, it increased transiently in a manner that resembled the onset firing response. The presence of a slowly inactivating gate in the DC fibers replicates the accommodation of activity during KHF SCS.

Financing: ANID-Fondecyt 11190822, ANID-Iniciativa Científica Milenio NCN19_161

High-order statistics: How they emerge in neural models and their use as biomarkers for aging and disease

Estadística de alto orden: de su estudio en modelos neuronales a biomarcadores de envejecimiento

Patricio Orio^{1,2}, Fernando Lehue Bermedo^{2,3}, Javier Palma Espinosa^{2,4}, Sebastián Orellana Villota^{2,3}, Marilyn Gatica Briceño^{2,3}

(1) Universidad de Valparaíso, Instituto de Neurociencia, Facultad de Ciencias, Gran Bretaña 1111, Valparaíso, Chile

(2) Centro Interdisciplinario de Neurociencia de Valparaíso, Pasaje Harrington 269, Valparaíso, Chile

(3) Universidad de Valparaíso, Doctorado en Ciencias mención Biofísica y Biología Computacional, Facultad de Ciencias, Valparaíso, Chile

(4) Universidad de Valparaíso, Doctorado en Ciencias mención Neurociencia, Facultad de Ciencias, Valparaíso, Chile

High order statistical interdependencies, beyond pair-wise correlations, allow for the description of information integration in a complex system. The recently proposed O-information measure allows for the distinction between synergy- or redundancy-dominated high order interactions. It has been shown that the resting-state brain activity of healthy humans, as recorded by fMRI-BOLD, contains more redundancy and less synergy in older subjects than younger ones. We are using dynamical models of neural oscillators, whole-brain models, and models informed with human connectomes, to understand the emergence of redundancy and synergy in neural dynamics. Using simple oscillators, we found that synergy emerges

in attractors of high dimension, however statistical testing must be applied to discard spurious synergy. In large-scale models, we found that networks having a topology between small-world and random have a larger chance of establishing synergistic interactions between their nodes. Further studies are helping to understand the measurements of high-order interdependencies in healthy and diseased brains.

Financing: Fondecyt 1211750, Basal FB0008.

Study of superficial white matter bundles based on diffusion MRI

Estudio de los fascículos de materia blanca superficial basado en la RM de difusión

Pamela Guevara Alvez¹, Cecilia Hernández Rivas¹, Claudio Román Godoy², Miguel Guevara Olivares³, Jean-François Mangin³

(1) Universidad de Concepción, Faculty of Engineering, Concepción, Chile

(2) Universidad de Valparaíso, Faculty of Engineering, Valparaíso, Chile

(3) CEA, Neurospin, I2BM, Gif-sur-Yvette, France

Diffusion MRI (dMRI) is sensitive to the movement of water molecules in tissues. Using dMRI acquisitions and a processing pipeline, it is possible to reconstruct the trajectories of the main white matter fiber bundles. Numerous methods have been developed to analyze brain tractography and study deep white matter connections, composed of commissural, projection, and long association tracts. However, short association fibers have been less studied, due to their smaller size and greater inter-subject variability. In recent years, there has been an increased interest in studying them, probably due to the better MRI equipment and processing algorithms available, which allow better reconstruction of short fibers. With this, 4 atlases of whole brain tracts, ranging from 100 to 500 fascicles, have been constructed. The latest atlases provide greater coverage of the brain and cortical surface. This enables a more complete study of brain connectivity. Studies have already emerged on the alterations of these connections in psychiatric disorders such as autism spectrum disorder and schizophrenia, demonstrating differences in these connections, and recently in early-stage multiple sclerosis, finding that these fibers appear more altered than the deep white matter fascicles at that stage of the disease. More focused studies also attempt to disentangle the inter-subject variability of these connections, associating them with their connections to the cortex and functional activity. In summary, this is a new and growing area that promises to provide tools and studies for a better understanding of brain connectivity and its relationship to function and dysfunction.

Financing: We acknowledge the financial support of ANID, Chile: FONDECYT 1221665; ANILLO ACT210053; and BASAL Centers FB0008 (AC3E) and FB210017 (CENIA).

Enhanced habit formation in Tourette patients: insights from a hierarchical model of the multiple cortico-basal ganglia loops

Javier Baladron Pezoa^{1,2}

(1) Universidad de Santiago de Chile, Departamento de Ingeniería Informática, Facultad de Ingeniería

(2) Chemnitz University of Technology, Artificial Intelligence, Computer Science

In this talk I will explain how we have used a neuro-computational model of hierarchically organized cortico-basal ganglia-thalamo-cortical loops to shed more light on habit formation and its alteration in Tourette patients. I will first introduce the key features of the model and how it can account for the effects of devaluation in two tasks with rats. Then I will show how we extended the framework to build a spectrum of neuro-computational models that were used to simulate the task-related behavior of control subjects and Tourette patients. We successfully replicated this group difference in our simulations by comparing the task performance among different pathological models and a healthy control model whose parameters have been fit to the control group. Particularly, we show that aberrant cortico-thalamic shortcut activation can make the model rely more on habitual behavior. In line with two major Tourette hypotheses, such aberrant patterns could be indirectly produced by enhanced dopamine modulation or reduced local striatal inhibition.

SIMPOSIO

SOCIEDAD CHILENA DE NEUROCIENCIA

Neuroethology of the birdsong: behavior, hormones and neural circuits

Coordinadores: Máximo Fernández-Jorge Mpodozis

Conducta vocal y sustrato neuroanatómico en suboscinos chilenos: desafiando la perspectiva canónica del aprendizaje vocal en aves paserinas.

Máximo Fernández¹, Tomás Salas Orchard¹, Elisa Sentis¹, Macarena Faunes Carvallo³, Manfred Gahr², Jorge Mpodozis¹

(1) Universidad de Chile, Departamento de biología, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

(2) Max Planck Institute, Ornithology, Eberhard-Gwinner-Straße, 82319, Starnberg, Alemania

(3) Pontificia Universidad Católica, Veterinaria, Santiago, Chile

Social learning of vocalizations is a powerful mechanism of social integration. In birds it is considered a distinctive trait present in three groups: Oscines, Parrots and hummingbirds. The prevailing view has stated that vocal learning evolved independently in each clade. nonetheless, recent phylogenetic reconstructions placed Parrots and Passerines (Oscines plus Suboscines) as sister groups, raising the question of whether vocal learning evolved from a basic form present in the ancestor of this whole avian branch. Since vocal learning demands some kind of vocal production plasticity, either acoustic or temporal, such hypothesis leads to expect that Suboscines (typically considered innate-vocalizers) would present some form of vocal plasticity alongside an appropriate neural substrate to it.

To assess that possibility we studied the vocal behavior of eight suboscine species. During eighteen months we recorded all possible vocalizations of these species in two different native environments, plus a more specific characterization with individualized recordings of 25 specimens of three selected species. Our results show that the repertory size ranges from 1-9 distinct vocalization types, depending on the species. Individualized birds proved being capable of producing the whole repertory. Moreover, syntactic-contextual, temporal and frequency plastic modulations of vocalizations were produced by individuals. On the other side, motoneural innervation and muscular development was found in the vocal organ of these species, suggesting that vocal plasticity can be reached directly by neuromotor control.

These results challenge the canonical view of bird vocal learning, broadening its frame and allowing to think a novel evolutionary perspective on the matter.

Financing: Fondecyt Postdoctorado 3210410

Seasonality, environmental cues, and neuroendocrine regulation of birdsong

Estacionalidad, claves ambientales, y regulación neuroendocrina del canto de pájaros oscinos

René Quispe Valdés¹

(1) Universidad de Chile, Departamento de Ciencias Biológicas Animales, Facultad de Ciencias Veterinarias y Pecuarias, Santa Rosa 11735, Santiago, Chile

In the presentation I will comparatively review the neuroendocrine physiology underlying the song of songbirds in interaction with the changing environment. Song behavior is typically expressed in a cyclical manner, primarily throughout the breeding stage, and plays a central role for reproduction. In the brain, it is controlled by a network of interconnected neural nuclei collectively called the song control system. In all songbird studied, the nuclei of this brain circuit are directly sensitive to testosterone by expressing androgen receptors in its neurons. Further, estrogen receptors alpha are only expressed in the sensory-motor integration nucleus, the HVC. Thereby, testosterone (and its metabolites) is directly involved in both the developmental acquisition and the seasonal production of songs. At temperate regions, it is assumed that seasonal singing is stimulated by increasing day-length and elevated circulating testosterone. In addition, some species can modulate song behavior by changes of the brain's sensitivity to androgens and estrogens, while hormone levels are maintained low. However, despite that the extent of seasonality and predictability of the environment differs enormously among different biomes, relatively little work has been done to identify how prevalent the neuroendocrine mechanisms of song are, and if a diversity of environmental cues can regulate it. Finally, the highly contrasting environmental conditions found in Chile along its geography, and the diversity within the songbird lineage, offer a unique opportunity for comparative studies to address the interaction

of hormones, neural systems, and the environment in the context of a naturally-occurring behavior.

Financing: proyecto SIA2021 n°SA77210088

Hormonal control of birdsong

Manfred Gahr¹

(1) Department of Behavioural Neurobiology, Max Planck Institute for Ornithology

Birdsong is a communication that is very frequently involved in socio-sexual behaviors. Therefore, bird song generally responds to the gonadal steroid hormones testosterone (T) and estradiol (E2). These hormones control both the development of singing behaviour and the adult bird's performance in terms of singing speed and/or song pattern. These hormone dependencies are species- and sex-specific. In songbirds, song does not

SOCIEDAD DE BIOLOGIA DE CHILE

Simposio de Investigadores(as) Jóvenes Dr. Humberto Maturana

Coordinador: Michael Seeger

Tanycytes control peripheral adiposity and energy balance via the glucose-6-phosphatase system.

Los tanicitos controlan la adiposidad periférica y el balance energético vía sistema de la glucosa-6-fosfatasa.

María José Barahona Figueroa¹, Luciano Ferrada Cofré², Francisco Nualart Santander^{1,2}

(1) Universidad de Concepción, Laboratorio de neurobiología y células madres NeuroCellT, Facultad de ciencias biológicas, Barrio universitario sin número, Concepción, Chile

(2) Universidad de Concepción, Centro de microscopía avanzada CMA BIOBIO, Ciencias biológicas, Barrio universitario sin número, Concepción, Chile

En la hipoglicemia, el hígado libera glucosa hacia la sangre usando el sistema de la glucosa-6-fosfatasa, un complejo multiproteico localizado en el retículo endoplásmico (RE). Aquí, nosotros mostramos por primera vez que el sistema de la glucosa-6-fosfatasa también está expresado en tanicitos hipotalámicos, células gliales que regulan el balance energético interaccionando con neuronas neuroendocrinas.

Usando microscopía de célula viva, determinamos que los tanicitos secuestran glucosa-6P en el RE por medio del transportador de glucosa-6P (G6PT). Además, utilizando múltiples enfoques *in vitro*, detectamos que los tanicitos liberan glucosa en hipoglicemia vía GLUTs. De manera sorprendente, el silenciamiento de G6PT en tanicitos *in vivo* (*G6pt^{TankD}*) reduce el peso corporal, disminuye los depósitos de grasa en el tejido adiposo blanco y altera la expresión de genes asociados a la lipogénesis, lipólisis y oxidación de ácidos grasos. Adicionalmente, los ratones *G6pt^{TankD}* desarrollan un fenotipo metabólico anorexigénico, observado a través de una reducción significativa en la ingesta de alimentos y una disminución en la expresión génica de neuropéptidos que promueven la alimentación como *Npy* y *AgRP*. En conclusión, el sistema de la glucosa-6-fosfatasa en tanicitos es requerido para regular la homeostasis energética y es un posible blanco terapéutico contra la obesidad. Financing: Agradecimientos: FONDECYT 3210076, 1221147 y 11200335.

Modelling the Human Cardiomyocyte Cell Cycle Using a Novel Thymidine Analogue

Oswaldo Contreras^{1,2}, Chris Thekkedam¹, Richard P Harvey^{1,3}

(1) Victor Chang Cardiac Research Institute, Developmental and Regenerative Biology Division,, Darlinghurst, NSW 2010, Sydney, Australia

(2) University of New South Wales, School of Clinical Medicine, UNSW Medicine & Health, St Vincent's Healthcare Clinical Campus, Faculty of Medicine and Health,, Kensington 2052, Sydney, Australia

(3) University of New South Wales, School of Biotechnology and Biomolecular Science, UNSW Sydney,, Kensington, Sydney, Australia

Congenital heart disease (CHD) affects about 1% of newborns, and severe CHD is associated with DNA damage and abnormal cardiomyocyte (CM) proliferation. The cell cycle is a cornerstone in cell replication and division, regulating several cellular processes, including cell commitment and fate. However, studying the human cardiomyocyte cell cycle is challenging, and its regulation and progression remain elusive. Here, we explored the human cardiomyocyte cell cycle leveraging patient-derived pluripotent stem cells and quantitative multiplex analyses. To detect and evaluate the human cardiomyocyte cell cycle, specifically S-phase, we have optimised an in-house Click-iT chemistry protocol to detect two thymidine analogues, EdU and F-ara-EdU. We studied the cardiomyocyte cell cycle at two distinct stages using high-throughput imaging and single-cell flow cytometry. We show that most cardiomyocytes exit the cell cycle as early as 10 days post differentiation induction. Most CMs are in the G0/G1 phase, whereas a significant fraction is positive for Ki67, a known cell cycle marker. Both EdU and F-ara-EdU label replicating cardiomyocytes. However, F-ara-EdU is a better option to evaluate their cell cycle over long periods due to reduced cell cycle arrest and lower toxicity than EdU. We also observed a minor fraction (0.3%) of mitotic phospho-Histone3^{ser10}+ cardiomyocytes. Our novel, reliable and user-friendly approach allowed us to study cell cycle progression and the effect of multiple stimulatory and inhibitory signalling pathways on it cost-effectively. Our data provide an entry point for deeper analysis of cardiac cell cycle behaviour in heart development, homeostasis, and congenital and acquired diseases.

Financing: Funding sources:NSW Health Cardiovascular Disease Senior Scientist GrantSchool of Clinical Medicine 2022 Research project bursaryThe Victor Chang Cardiac Research InstituteContact: o.contreras@victorchang.edu.au

Evolutionary potential of interspecific lager yeast hybrids to brewing fermentative environments

Potencial evolutivo de levaduras híbridas interespecíficas lager en ambientes fermentativos

Jennifer Molinet^{1,2}, Roberto F. Nespolo^{2,3,4,5}, Francisco A. Cubillos^{1,2,3}

(1) Universidad de Santiago de Chile, Departamento de Biología, Facultad de Química y Biología, Avenida Libertador Bernardo O'Higgins 3363, Santiago, Chile

(2) ANID-Millennium Science Initiative-Millennium Institute for Integrative Biology (iBio), Santiago, Chile

(3) ANID-Millennium Nucleus of Patagonian Limit of Life (LiLi), Valdivia, Chile

(4) Universidad Austral, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Valdivia, Chile

(5) Center of Applied Ecology and Sustainability (CAPES), Santiago, Chile

Interspecies *Saccharomyces* hybrids are possible to generate due to the absence of a pre-zygotic barrier between species and are tightly associated with domestication in industrial processes. The best-known yeast hybrid example, *Saccharomyces pastorianus* (*S. cerevisiae* x *S. eubayanus*), is widely used to produce lager-pilsner beer at low temperatures, which is currently the most produced alcoholic beverage worldwide. Given that the exact *S. cerevisiae* and *S. eubayanus* parental genomes of *S. pastorianus* are not available, the complex molecular origin and how genome plasticity under environmental stress prompted a greater fitness in lager hybrids is unknown. Thus, understanding how hybrid genomes stabilize and evolve is an essential step to determine the origin of hybrid vigor, and to elucidate how a different genome configuration can facilitate rapid adaptation to changing environments. Here, we determined the genome plasticity and evolvability of *S. cerevisiae* x *S. eubayanus* laboratory hybrids under different environmental conditions normally found in fermentation. For this, we generated a large set of novel interspecific lager yeast hybrids using a genetically rich collection of wild Chilean strains for beer wort fermentation. Four F1s were selected for improvement through a process of adaptive evolution. After 250 generations, the different evolved lines showed higher fitness in the same evolution environment than the ancestral hybrids, demonstrating that hybrids rapidly adapt to stressful conditions and greatly improve their fitness. Whole-genome sequencing demonstrated signatures of selection that explained this greater fitness. Consequently, our results demonstrate the greater genomic plasticity of hybrids to adapt to stressful environments.

Financing: ANID-FONDECYT grants 1220026 and 1180917, ANID-FONDECYT POSTDOCTORADO grant 3200545. ANID-Millennium Science Institute Program -ICN17_022. FIC "Transferencia Levaduras Nativas para Cerveza Artesanal". Fundación Ciencia & Vida.

Automated recognition of pollinating bees based on computational bioacoustics

Reconocimiento automatizado de abejas polinizadoras basado en bioacústica computacional

José Neiva Mesquita Neto¹

(1) Universidad Católica del Maule, Biología y Química, Ciencias Básica, Avenida San Miguel 3605, Talca, Chile

El reconocimiento taxonómico de abejas y otros insectos no es una tarea sencilla, requiriendo la participación activa de expertos en la toma de decisiones. Además, la gran cantidad de especies de abejas (464 especies en Chile) es un tremendo desafío para un número cada vez menor de taxónomos. Debido a las limitaciones de la taxonomía tradicional, se ha hecho necesario el desarrollo e implementación de nuevas tecnologías que también cumplan con los requisitos taxonómicos, entre ellos, se destacan los sistemas automáticos de clasificación basados en imágenes y sonidos. El sonido, en particular, es relativamente fácil de adquirir, en principio, puede captarse de forma remota y continua, sin embargo, sus características son complejas y pueden variar ampliamente con el tiempo, lo que dificulta su análisis utilizando los métodos estadísticos habituales. Ante este problema, planteamos una inédita aplicación de modelos basados en Machine-Learning para el reconocimiento automático de abejas en función de sus zumbidos. Tomamos como modelo las abejas visitantes de flores de arándano cultivado, en el cual las abejas producen, además del zumbido de vuelo, un tipo particular de zumbido durante la vibración de las flores. Descubrimos que los algoritmos clásicos de ML pueden generar clasificadores capaces de reconocer rápidamente abejas en función de sus zumbidos. El reconocimiento automático asociado a la eficiencia de cada especie de abeja en polinizar y incrementar la calidad/cantidad de frutos de un determinado cultivo puede resultar en un incentivo hacia una agricultura más sostenible, priorizando la conservación de los polinizadores nativos, especialmente los más exitosos.

Financing: This work was supported by the ANID/Fondecyt Iniciación en Investigación under Grant No. 11190013.

SIMPOSIO

SOCIEDAD CHILENA DE NEUROCIENCIA

Neuronal Circuits and Behavior

Coordinadora: Dra. Alexia Nuñez

Codificación del significado conductual de los sonidos en la corteza auditiva

Diego Enrique Elgueda González¹

(1) Universidad de Chile, Departamento de Patología Animal, Facultad de Ciencias Veterinarias y Pecuarias, Av. Santa Rosa 11735, La Pintana, Santiago, Chile

The brain integrates acoustic feature information with internal representations (such as behavioral goals, expectations and memories of previous sound-meaning associations) and links them with appropriate audio-motor responses. However, it is currently unknown how and where in the brain veridical acoustical information integrates with top-down abstract information. In order to better understand how the brain performs this task, we recorded auditory responses in auditory cortex of ferrets and rats. Our results reveal that neurons in VPr, a newly described tertiary area in the ferret, while being responsive to auditory stimuli, can greatly enhance the contrast between sound representations belonging to different behavioral categories during performance of auditory discrimination tasks. VPr neurons also show sustained short-term memory activity after target stimulus offset, correlated with task response timing and action - a type of persistent response we previously reported in Frontal Cortex neurons. These rapid task-related changes in activity and filter properties enable VPr neurons to quickly switch between different responses to the same acoustic stimuli in different behavioral contexts, reflecting either the timing or spectrotemporal properties or behavioral meaning of the sound. Furthermore, they demonstrate an interaction between the dynamics of long-term learning and short-term attention as incoming sound is selectively attended, recognized and translated into action. In order to extend these results, we are currently recording from primary and non-primary auditory areas in rats trained to discriminate complex sound based on their frequency. This will allow us to better understand how decisions are encoded and transformed in the auditory cortical hierarchy.

Financing: FONDECYT 11190278, ANID

Altered processing of odor-objects and perceptual stability in a mouse model of Fragile X Syndrome

Codificación olfatoria alterada y estabilidad perceptual en un modelo murino de Síndrome X Frágil

Alexia Francisca Nunez-Parra¹

(1) Universidad de Chile, Biology Department, Faculty of Science, Santiago, Chile

Sensory perception is one of the most fundamental brain functions allowing individuals to properly interact and adapt to a constantly changing environment. Individuals with Fragile X Syndrome (FXS), the most common monogenetic cause of autism spectrum disorder, exhibit atypical sensory perception across sensory modalities including olfaction and social interaction defects greatly affecting their life quality. Here, we use a combination of behavioral, anatomical and electrophysiological tools to study the neuronal circuitry in olfactory-guided behaviors of the FXS mouse model (*Fmr1*-KO). We found that these animals exhibit altered olfactory sensitivity, olfactory memory and pheromonal signaling, which is central for social behavior. When perceptual stability, the cognitive process consisting in recalling an odor-objects even though there are some features of the sensory stimulus missing was evaluated, we found that cortical representations are incredibly stable and inflexible in the *Fmr1*-KO. This augmented stability prevented animals for discriminating similar mixtures in contrast with what is found in WT controls. Moreover, this deficiency is accompanied with an excitatory/inhibitory disbalance leading to a hyperexcited cortical network in the *Fmr1*-KO. Altogether, our results suggest that *Fmr1*-KO create inappropriate olfactory representations for social and non-social odors partially relying on a dysfunctional cortical processing that could underpin the observed social interaction deficits.

Sleep-dependent decorrelation of hippocampal spatial representations

Decorrelacion de representaciones espaciales hipocampales regulada por sueño

Pablo Fuentealba¹

(1) Pontificia Universidad Católica de Chile, Psiquiatria, Medicina, Marcoleta 391, Santiago, Chile

Distributed ensembles of coordinated hippocampal neurons play a critical role in both episodic memory formation and spatial mapping during environment exploration. Memory consolidation strongly relies on slow-wave sleep, yet its role in regulating spatial representations remains unexplored. Here, we used hippocampal single-unit and field potential recordings in rats performing a spatial memory task to assess the role of sleep in spatial mapping and memory consolidation. Our results show that spatial memory linearly improved with slow-wave sleep duration, yet cortical oscillations and coordinated neuronal spiking depressed accordingly. The excitability and synchrony of place cells was consistently stronger during cortical oscillations than for nonspatial neurons across sleep. Moreover, spatial representations provided by both single-neurons and neuronal populations became increasingly unstable as sleep progressed, consistent with enhanced plasticity mechanisms underlying spatial remapping. Our data reveal that spatial mapping is largely dependent on slow-wave sleep, which actively sustains the decorrelation of spatial representations generated by place cells.

Financing: fondecyt regular 1190375

SIMPOSIO

SOCIEDAD CHILENA DE NEUROCIENCIA

Jovenes Neurocientificos

Coordinador: Patricio Orio

The vicious cycle between neuroinflammation and iron overload: too many irons in the fire.

El círculo vicioso entre neuroinflamación y acumulación de hierro: muchas cuestiones pendientes

Pamela Urrutia¹, Marco Tulio Núñez²

(1) Universidad San Sebastián, Escuela de Tecnología Médica, Facultad de Medicina y Ciencia, Lota 2465, Santiago, Chile

(2) Universidad de Chile, Departamento de Biología, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

Neuroinflammation, oxidative stress, mitochondrial dysfunction and iron accumulation are cardinal features of cerebral aging and are associated with the etiology of numerous neurodegenerative diseases. However, the molecular connections that support the coexistence of these processes have remained obscure. A decade ago, our pioneering work established the causal relationship between neuroinflammation and iron accumulation, linking extracellular signals like pro-inflammatory cytokines, with expression changes in key iron transporters in brain cells. At cellular level, bioinformatic analyzes of large-scale CRISPRi screening revealed that impairment of macroautophagy and the mitochondrial electron transport chain are the main mechanisms that generate increased iron levels in neurons. Particularly, mitochondrial complex I inhibitions stimulates an iron deprivation response program through the Iron regulatory protein 1 (IRP1), sustaining iron loading and leading to cell death. The incorporation of an iron-sulfur cluster (ISC) allows IRP1 to act as a sensor of mitochondrial iron availability (where ISCs are synthesized), but it can also be abnormally activated by ISC disruption triggered by reactive oxygen and nitrogen species. These reactive species are profusely produced during innate immune activation, suggesting that IRP1 could act as the intracellular connector between neuroinflammation and increased iron levels. Preliminary results suggest that mitoNEET, a mitochondrial outer membrane protein, can counteract the anomalous activation of IRP1 under these conditions, becoming a promising therapeutic target that would break the vicious cycle of neuroinflammation and iron accumulation.

Financing: This work was supported by FONDECYT Initiation in Research 11201141

Beyond energy demand: the role of arousal and energy supply on brain dynamics

Más allá de la demanda energética: el rol de la vigilia y el suministro de energía en las dinámicas cerebrales

Vicente Medel^{1,2}

(1) Universidad de Chile, Neurociencia, Medicina, Independencia 1027, Santiago, Chile

(2) The University of Sydney, Brain and Mind Centre, 94 Mallett St, Camperdown, Sydney, Australia

Cognition operates at multiple temporal domains, which require both basal energy for maintaining global brain states and a rapid energy supply to cater to ever-changing environmental demands. These transitions require a critical amount of metabolic energy and are supported by neural activity closely related to fluctuations in the ascending arousal system, which underly fast changes from inattentive to vigilant states. However, it is still not clear how arousal-related modulation triggers energy to support changes in brain states. Here, we show in-silico that neural field potential activity supporting arousal states can be addressed by changes in activity-dependent adaptation -an energy homeostatic neural mechanism related to K⁺ channels- and show that these predictions are consistent with in-vivo electroencephalography data. We extend these results by mapping lactate transport, a candidate metabolic pathway required for activity-dependent energy recruitment. We found that the gene coding for neuronal MCT2 lactate transporter is highly expressed in the cerebral cortex, and coexpression network analysis revealed this gene was participating in an organized gene cluster enriched in K⁺. Indeed, the expression of K-ATP subunits, which mediate lactate increases with spiking activity through activity-dependent adaptation, is spatially coupled to MCT2 distribution, closely overlapping fMRI brain regions associated with attention, arousal, and stress. Finally, we will present preliminary evidence suggesting that lactate metabolism is modulated by arousal through astrocytic noradrenergic beta2 receptors.

Our results highlight a close relation between arousal state, activity-dependent energy supply, and brain dynamics that could shed new perspectives on brain function and its disorders.

Financing: ANID BASAL FB0008, FONDECYT 1220607, FONDEF ID20110371

Social-scientific evolution of the use of Cannabis sativa and/or its derivatives in Chile: Role of knowledge-generating centers in areas of social relevance

Evolución científico-social del uso de Cannabis sativa y/o sus derivados en Chile: Rol de los centros generadores de conocimiento en áreas de relevancia social

Victor Vergara^{1,3}, Nicolas Garate², Manuel Nova¹, Bastian Oyanedel⁴, Ximena Steinberg^{2,3}, Felipe Aguilera⁶, Patricio Puentes^{4,5}, **Fernando Sepulveda**^{1,2}

(1) Laboratorio de Control de Calidad de Cannabis sativa y/o sus derivados (LCCC), Universidad de Concepción (UdeC), Concepción, Chile.

(2) Laboratorio de Bioquímica y Biología Celular (LBBC), UdeC, Concepción, Chile

(3) Fundación Ciencias para la Cannabis, Concepción, Chile.

(4) Gemmacert Chile, Santiago, Chile

(5) Biocrom, Santiago, Chile.

(6) Laboratorio de Genómica Marina, Desarrollo y Evolución, UdeC, Concepción, Chile.

In our country, there are currently a discrete, but increasing initiatives relates to study the effects of Cannabis sativa and/or derivatives including, 3 laboratories of pharmaceutical production for human use, 4 productive crops of Hemp that in average includes 40ha of crops, a type of THC-free type of Cannabis sativa. Moreover, there are at least one NGO that at present produces flowers of Cannabis sativa with a pharmaceutical grade, 4 pharmacies that provide pharmaceutical preparations based on cannabinoids for human use, and 1 veterinary pharmacy that provide pharmaceutical products for domestic animals based on CBD. In summary, we have an increase in the use of cannabinoids in Chile, without a great development of basic and applied science to support and allow to make a better use of Cannabis sativa or Hemp in Chile. This talk will focus on four key aspect including: 1) wide distribution of the SEC in nature, 2) the generation of basic and applied knowledge in Chile for a better understanding of modulation of the SEC using phytocannabinoids present in the Cannabis sativa plant, 3) development of pharmaceutical R&D of cannabinoids in human and non-human animals, 4) characterization of cannabinoid content in strains of Cannabis sativa and hemp in productive sector vs civil society.

Human neural rosettes secrete extracellular vesicles enriched in neural and glial cellular components

Las rosetas neurales humanas secretan vesículas extracelulares enriquecidas en componentes celulares neurales y gliales

Malena Herrera López¹, Matías Bertone Arolfo¹, Mónica Remedi², Laura Gastaldi¹, Danilo Ceschin¹, Alfredo Cáceres¹, **Ana Lis Moyano**¹

(1) Instituto Universitario de Ciencias Biomédicas de Córdoba (IUCBC), Centro de Investigación en Medicina Traslacional "Severo Amuchástegui" (CIMETSA), Avenida Naciones Unidas 420, Córdoba, Argentina

(2) Instituto de Investigación Médica Mercedes y Martín Ferreyra (INIMEC-CONICET-UNC), Friuli 2434, Córdoba, Argentina

Extracellular vesicles (EVs) are a heterogeneous group of membrane-enclosed nanovesicles that shuttle bioactive molecules (e.g., proteins, lipids and RNAs) between cells. EVs participate in stem cell renewal and differentiation during central nervous system (CNS) development. Human neural rosettes (hNRs) are radial structures of neuroepithelial cells that assemble from human induced pluripotent stem cells (hiPSCs) differentiation into neural and glial cells. hNRs are an *in vitro* model that recapitulates some stages of the neural tube morphogenesis and expresses molecular components expressed *in vivo* during CNS development. Here we showed that hiPSCs and hNRs secrete EVs (hiPSC-EVs and hNR-EVs, respectively) enriched in proteins associated with EVs and the endomembrane system. hNR-EVs are specifically enriched in cellular components from neural and glial origin. Remarkably, among glial-derived components associated with hNR-EVs we found the myelin proteolipid protein (PLP1). Although PLP1 is the major protein of myelin in the CNS it is also expressed at embryonic stages in animal models and humans, *i.e.*, long before myelin is assembled. Through *in silico* analysis, we demonstrate that PLP1 is expressed in fetal tissue during CNS development and also in hNRs at different time points and culture conditions. Moreover, PLP1 localizes radially along the lumen and edges of hNRs. These results indicate that EVs secreted by hNRs exhibit neural and glial cellular components and might provide an innovative approach to study human neural tube formation and EVs biological activity during CNS development.

Financing: This work was supported by ISN CAEN Return Home Grant to ALM; CONICET, PIP 2021-2023 GI, multi PI and FONCYT-ANPyCT-MINCyT, PICT-2019-I-D to ALM.

SIMPOSIO

SOCIEDAD DE ECOLOGIA DE CHILE

Aumentando la biodiversidad funcional para una transición agroecológica

Coordinador: Rodrigo Barahona

Towards an agroecological transition based in functional biodiversity

Hacia una transición agroecológica basada en biodiversidad funcional

Mauricio González Chang¹

(1) Universidad Austral de Chile, Instituto de Producción y Sanidad Vegetal, Facultad de Ciencias Agrarias y Alimentarias, Campus Isla Teja, s/n, Valdivia, Chile

Actualmente, el 85% de la superficie agrícola mundial está dominada por monocultivos, es decir, una especie vegetal creciendo en grandes superficies agrícolas y pecuarias. Debido a esta simplificación del agroecosistema, es necesaria la utilización de insumos de origen sintético, que aumentan problemas en este tipo de cultivos asociados con pérdida de biodiversidad y resistencia de plagas, enfermedades y malezas a estos compuestos sintéticos. Recientes meta análisis han demostrado la posibilidad de promover principios y prácticas basadas en biodiversidad funcional a nivel predial, con efectos positivos sobre distintos servicios ecosistémicos, como control biológico de plagas, polinización, descomposición de materia orgánica, secuestro de carbono, etc., con impactos importantes en la mejora de rendimiento en distintos agroecosistemas. A pesar de estos beneficios, existen también resultados negativos sobre la provisión de servicios ecosistémicos, visibilizando la necesidad de realizar investigación que promueva la adaptación y adopción de principios y prácticas agroecológicas exitosas mundialmente a nivel local. Así, se presenta un modelo que permite identificar el conocimiento local presente en una determinada localidad, así como guiar un proceso de co-creación de conocimiento entre agricultores y científicos, el cual apunta hacia la creación de “Faros Agroecológicos” que promueven metodologías horizontales como “Campesino a Campesino”. Por lo tanto, es necesario avanzar en programas horizontales que visibilicen y co-creen protocolos que sean discutidos, adaptados y validados con la comunidad agrícola local, para avanzar hacia una transición agroecológica en nuestros agroecosistemas.

Financing: Proyecto financiado por FONDECYT Regular 1221328

14 years of conservation of native biodiversity in vineyards in the Chilean Mediterranean region

14 años de conservación de la biodiversidad nativa en predios vitivinícolas del mediterráneo chileno

Karina Godoy Maldonado¹, Olga Barbosa^{1,2}, America-Paz Durán^{1,2}, Matt Smith³, Becky Trippier³, Michel Parra¹

(1) Instituto de Ecología y Biodiversidad (IEB-Chile), Santiago, Chile

(2) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Valdivia, Chile

(3) Joint Nature Conservation Committee, Peterborough, UK

La evaluación de los servicios ecosistémicos se ha incorporado en las estrategias de gestión agrícola como una solución prometedora basada en la naturaleza, que aporta beneficios tanto a la biodiversidad como a la producción agrícola. Sin embargo, en la práctica la integración de los servicios ecosistémicos en la gestión de la tierra ha demostrado ser un reto, ya que es necesario desarrollar estrategias conjuntas entre los y las interesadas con el fin de integrar diversos conocimientos y que sus resultados apoyen la toma de decisiones. Por lo tanto, basándonos en la experiencia de 14 años del programa Vino Cambio Climático y Biodiversidad (VCCB) y en colaboración con el Comité Conjunto para la Conservación de la Naturaleza (JNCC), se desarrolló una aplicación multivariable de gestión de la tierra. Esta herramienta se basa en redes de creencias bayesianas utilizando el conocimiento de los actores del sector vitivinícola y la información bibliográfica sobre la relación entre las prácticas agrícolas y las funciones del ecosistema. El carácter participativo de este estudio permitió analizar la utilidad de la herramienta como también identificar retos y proponer soluciones para promover la operatividad de los servicios ecosistémicos dentro de la agroindustria.

Financing: Fondo Basal FB210006 - IEB, Department for Environment, Food and Rural Affairs (DEFRA-UK)

Contribution of insectivorous bats to pest control in organic vineyards in Chile

Contribución de los murciélagos insectívoros al control de plagas en viñedos orgánicos en Chile

Annia Rodríguez-San Pedro^{1,2,3}, Juan Luis Allendes³, Clemente A. Beltrán³, Pascal N. Chaperon¹, Mónica M. Saldarriaga-Córdoba⁴, Andrea X. Silva⁵, Audrey A. Grez¹

(1) Universidad de Chile, Laboratorio de Ecología de Ambientes Fragmentados (LEAF), Departamento de Ciencias Biológicas Animales, Facultad Ciencias Veterinarias y Pecuarias, Av. Sta. Rosa 11735, Santiago, Chile

(2) Universidad Santo Tomás, Centro de Investigación e Innovación para el Cambio Climático, Facultad de Ciencias, Ejército 146, Santiago, Chile

(3) Bioecos E.I.R.L., Aponquindo 1064 Oficina 1004, Santiago, Chile

(4) Universidad Bernardo O'Higgins, Centro de Investigación en Recursos Naturales y Sustentabilidad, Av. Viel 1497, Santiago, Chile

(5) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Valdivia, Chile

The suppression of pest insects by bats represents an important ecosystem service in agricultural landscapes. Recognizing the importance of this zoological group as natural pest suppressors and further conserve their populations near agricultural systems could reduce damage to crops thereby potentially increasing the monetary gain of farmers. Vineyard plantings cover over 7.5 million hectares, mostly in the Mediterranean-climate zones, and account for 15 % of agricultural lands worldwide. While pest consumption by bats has been recently revealed in vineyards, direct evidence of the reduction of grapevine pests by bats in vineyards is lacking, and their benefits to wine grape production remains to be quantified. Using large nocturnal exclosures in vineyards and molecular diet analyses, we examined the top-down effects of insectivorous bats in suppressing insect populations by assessing leaf and grape cluster damage on organic vineyards in central Chile; we also examined the benefit of these natural pest predators by quantifying resulting increases in potential vineyard yield. Grapevine plants excluded from bats had significantly higher leaf herbivory and greater grape cluster damage than control plots. Grape cluster damage was 7% lower on control plots, yielding an average economic benefit of US\$188-\$248/ha/year due to bat predation. These results provide the first experimental evidence that bats reduce grapevine pest insect infections and thus increase vineyard yield and winegrowers' income.

Therefore, bats should be included in future biodiversity conservation plans in vineyards and be considered within agricultural management strategies based on natural pest suppression.

Financing: Fondecyt de Postdoctorado N° 3160188 and Proyecto GEF Corredores Biológicos de Montaña ID 5135 MMA-ONU, Chile

Factors that influence the richness and abundance of native apple pollinators in Chile: how do we move to a friendlier model for pollination?

Factores que influyen la riqueza y abundancia de polinizadores nativos de manzana en Chile: ¿cómo transitamos a un modelo más amigable para la polinización?

Rodrigo Moisés Barahona Segovia^{1,2}, Joaquín E. Sepúlveda³, Paz Gatica-Barrios¹, Vanessa Durán-Sanzana⁴, Cecilia Smith-Ramírez¹

(1) Departamento de Ciencias Biológicas y Biodiversidad, Universidad de Los Lagos, avenida Fuchslöcher #1305, Osorno, Chile.

(2) Moscas Florícolas de Chile citizen science program, Patricio Lynch #940, Valdivia, Chile

(3) Instituto Agroecosistemas, Chequenlemu s/n, Curicó

(4) Patagonia Rural SpA, Arturo Prat #1024, Ancud, Chile.

La evidencia global de los efectos de borde sobre la riqueza y abundancia de polinizadores nativos en ecosistemas agrícolas es escasa. Los polinizadores de manzana (*Malus domestica*) en Chile no han sido estudiados, pese a tener una gran superficie plantada y ser una de las frutas más exportadas. El objetivo del trabajo fue analizar la influencia del efecto de borde en la riqueza taxonómica y abundancia de polinizadores nativos en cultivos de manzana. En nueve localidades diferentes usamos como predictores el manejo (convencional vs orgánico), variedad (Fuji vs Gala), distancias al hábitat nativo más cercano, el área del cultivo y la cantidad de *Apis mellifera*, relacionando los predictores y las respuestas con un GLMM (modelo anidado). Encontramos que la riqueza fue de 26–67 especies/morfoespecies, pero no varió significativamente hacia el interior del cultivo ($F_{(6, 119)} = 1,919$; $p = 0,08$). La abundancia de polinizadores fue disminuyendo significativamente a partir de los 20 m ($F_{(6, 119)} = 3,25$; $p = 0,005$). Moscas, mariposas y abejas nativas no variaron su abundancia hacia el interior del cultivo, mientras los escarabajos fueron solo más abundantes en el borde ($F_{(6, 119)} = 2,824$; $p = 0,013$). Tanto la riqueza, abundancia total y abundancia de cada grupo funcional fue influenciada por la distancia al bosque nativo y variedades de manzana. La reducción de la distancia del cultivo a hábitats nativos por medio de restauración ecológica (corredores

o ampliación de parches) podría proveer una mayor diversidad y abundancia de insectos, incrementando el servicio de polinización natural.

Financing: ANID FONDECYT 3200817

SIMPOSIO

SOCIEDAD CHILENA DE NEUROCIENCIA

The arrow of time in brain and cognition: quantitative approaches for neural recordings

Coordinadores Samy Castro Novoa y Ruben Herzog Amunategui

Temporal irreversibility of neural dynamics as a signature of consciousness

Reversibilidad de las señales electrofisiológicas (iEEG) como un correlato de la consciencia

Laura Alethia de la Fuente^{1,2,3}, Federico Zamberland^{2,3}, Hernan Bocaccio^{2,3}, Yonathan Senz², Enzo Tagliazucchi^{2,3}

(1) INCyT, CABA, Argentina

(2) UBA, DF, Exactas, CABA, Argentina

(3) CONICET, CABA, Argentina

Dissipative systems evolve in the preferred temporal direction indicated by the thermodynamic arrow of time. The fundamental nature of this temporal asymmetry led us to hypothesize its presence in the neural activity evoked by conscious perception of the physical world, and thus its covariance with the level of conscious awareness. We implemented a data-driven deep learning framework to decode the temporal inversion of electrocorticography signals acquired from non-human primates. Brain activity time series recorded during conscious wakefulness could be distinguished from their inverted counterparts with high accuracy, both using frequency and phase information. However, classification accuracy was reduced for data acquired during deep sleep and under ketamine-induced anesthesia; moreover, the predictions obtained from multiple independent neural networks were less consistent for sleep and anesthesia than for conscious wakefulness. Finally, the analysis of feature importance scores highlighted transitions between slow (≈ 20 Hz) and fast frequencies (> 40 Hz) as the main contributors to the temporal asymmetry observed during conscious wakefulness. Our results show that a preferred temporal direction is manifest in the neural activity evoked by conscious mentation and in the phenomenology of the passage of time, establishing common ground to tackle the relationship between brain and subjective experience.

Financing: TAgencia Nacional De Promoción Científica y Tecnológica grants PICT-2018-03103, PICT-2019-02294 and ANID/FONDECYT Regular 1220995(Chile).

Hippocampal gamma oscillations form complex ensembles modulated by behavior and learning

Romain Goutagny¹

(1) Université de Strasbourg - CNRS, Laboratoire de Neurosciences Cognitives et Adaptatives - LNCA, 12 rue Goethe, Strasbourg, France

The hippocampus and the entorhinal cortex display a rich oscillatory activity, believed to support neural information processing in key cognitive functions. In the hippocampal region CA1, a "slow gamma" rhythm (30-80 Hz) generated in CA3 would support memory retrieval whereas a "medium gamma" rhythm (60-120 Hz) generated in the entorhinal cortex would support memory encoding. However, descriptions involving discrete gamma sub-bands can only partially account for the haphazard diversity of oscillatory behaviors observed in individual recordings during spatial navigation behavior, challenging thus functional interpretations based on a massive averaging over time and trials. Here, we stress that transient gamma oscillatory episodes at any frequency or phase relative to the ongoing theta (4-12 Hz) rhythm can be recorded at any layer within CA1. Eventually, the commonly reported averages are dominated by a minority of very strong power events overshadowing gamma heterogeneity. Nevertheless, we show that such gamma diversity can be naturally explained by a simple mechanistic model, and that behavior-related information (position within a maze)

can be decoded from most individual gamma events, despite their low power and erratic-like nature. Our results indicate that behavior specifically shapes ensembles of irregular hippocampal gamma oscillations, in a way which evolves with learning, depends on the hippocampal layer and is hard to reconcile with the hypothesis of rigid, narrowly tuned gamma sub-bands. Beyond randomness, the pervasive gamma diversity may thus reflect complexity at the edge-of-synchrony, likely functional but invisible to classic average-based analyses.

Financing: ANR HippoCompUSIAS Fellowship

Temporal irreversibility of large-scale brain dynamics in Alzheimer's disease

Irreversibilidad temporal de la dinámica cerebral a gran escala en la enfermedad de Alzheimer

Josefina Cruzat^{1,2}, Ruben Herzog^{1,2}, Pavel Prado¹, Yonatan Sanz-Perl^{3,4,5,6}, Sebastian Moguilner^{1,7}, Morten Kringelbach^{8,9,10}, Gustavo Deco^{6,11,12,13,14}, Enzo Tagliazucchi^{1,3,4,5}, Agustin Ibañez^{1,4,5,7,15}

- (1) Latin American Brain Health Institute (BrainLat), Universidad Adolfo Ibáñez, Santiago, Chile
- (2) Fundación para el Estudio de la Conciencia Humana (ECoH), Santiago, Chile
- (3) Department of Physics, University of Buenos Aires, Buenos Aires, Argentina
- (4) National Scientific and Technical Research Council (CONICET), Buenos Aires, Argentina
- (5) Cognitive Neuroscience Center (CNC), Universidad de San Andrés, Buenos Aires, Argentina
- (6) Center for Brain and Cognition, Computational Neuroscience Group, Universitat Pompeu Fabra, Barcelona, Spain
- (7) Global Brain Health Institute, University of California, San Francisco, US; and Trinity College, Dublin, Ireland
- (8) Department of Psychiatry, University of Oxford, Oxford, United Kingdom
- (9) Center for Music in the Brain, Department of Clinical Medicine, Aarhus University, Århus, Denmark
- (10) Centre for Eudaimonia and Human Flourishing, Linacre College, University of Oxford, Oxford, United Kingdom
- (11) Department of Information and Communication Technologies, Universitat Pompeu Fabra, Barcelona, Spain
- (12) Institució Catalana de la Recerca i Estudis Avançats (ICREA), Barcelona, Spain
- (13) Department of Neuropsychology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany
- (14) School of Psychological Sciences, Monash University, Melbourne, Australia
- (15) Trinity College Institute of Neuroscience (TCIN), Trinity College Dublin, Dublin, Ireland

Healthy brain dynamics can be understood as the emergence of a complex system far from thermodynamic equilibrium. Accordingly, brain dynamics are temporally irreversible and thus establish a preferred direction in time, also known as the arrow-of-time. However, little is known about how the time-reversal symmetry of spontaneous brain activity is affected by Alzheimer's disease (AD). We hypothesized that the level of irreversibility would be compromised in AD, signaling a fundamental shift in the collective properties of brain activity towards equilibrium dynamics. To assess this hypothesis, we investigated the arrow-of-time estimated from resting-state fMRI and EEG data in patients with AD and control subjects (HC). We quantified the level of irreversibility and proximity to non-equilibrium dynamics by comparing forward and backward timeseries through time-shifted correlations. Results showed that AD is associated with a breakdown of temporal irreversibility at the global, local, and network levels and at multiple oscillatory frequency bands. At the local level, temporoparietal and frontal regions were affected by AD. At the network level, the limbic, frontoparietal, default mode, and salience networks were the most compromised. The extent of temporal reversibility was associated with cognitive decline in AD and grey matter volume in HC. Moreover, the irreversibility of brain dynamics provided higher accuracy and more distinctive information than classical neurocognitive measures when differentiating AD from HC. Overall, the present results offer new evidence regarding a potential pathophysiological link between the entropy generation rate of brain dynamics and the clinical presentation of AD, opening new avenues for dementia characterization at different levels.



SIMPOSIO

SOCIEDAD DE BIOLOGIA DE CHILE

Damaging CNS inflammation due to a respiratory infection

Coordinador: Dr. Alexis Kalergis

Characterization of neuroimmunological alterations induced by human respiratory syncytial infection

Caracterización de las alteraciones neuroinmunológicas inducidas por el virus sincicial humano

Karen Bohmwald¹, Catalina Andrade¹, José T. Muñoz¹, Pablo A. González¹, Claudia A Riedel², Alexis M. Kalergis^{1,3}

(1) Millennium Institute on Immunology and Immunotherapy, Pontificia Universidad Católica de Chile., Departamento de Genética Molecular y Microbiología., Facultad de Ciencias Biológicas, Avenida Libertador Bernardo O'Higgins #340, Santiago, Chile

(2) Millennium Institute on Immunology and Immunotherapy, Universidad Andres Bello., Departamento de Ciencias Biológicas, Facultad de Ciencias de la Vida, República #440, Santiago, Chile

(3) Pontificia Universidad Católica de Chile, Departamento de Endocrinología., Facultad de Medicina, Lira #40, Santiago, Chile

Respiratory viruses are the leading cause of acute lower tract respiratory infection, mainly in infants, elderly and immunocompromised individuals, causing high morbidity and mortality rates. The most important of this kind of virus is the respiratory syncytial virus (hRSV), which can cause severe clinical pathologies, including bronchiolitis and pneumonia. However, increasing evidence shows this virus's ability to cause neurological alterations, such as seizures, encephalitis, and encephalopathy. Reports have been shown to detect hRSV RNA and pro-inflammatory molecules in cerebrospinal fluid from patients with neurological signs, supporting the notion of neuroinvasion and neuroinflammation caused by hRSV. Previous data has shown the detection of viral RNA and proteins in the brain of infected mice. In this research, we show that the viral infection alters the blood-brain barrier permeability, altering the tight junctions' expression and allowing the immune cells to infiltrate and increase pro-inflammatory molecules during and after the infection. Moreover, hRSV can infect astrocytes, microglia, neurons, and endothelial cells. Also, the alteration in the glutamate receptors' expression could cause behavioral impairment observed in mice after the hRSV clearance. The brain hRSV-infected cells such as astrocytes, neurons, and endothelial cells can secrete pro-inflammatory cytokines that could alter the neurological synapse's normal establishment and contribute to the long sequels observed in the mice model. Taken together, our work provides new insights into the effects of hRSV on the central nervous system and calls for attention to assess further this virus's effects on the brain and its function in humans.

Financing: This work was supported by ANID/FONDECYT grants #11221280; #1190830, the Millennium Institute on Immunology and Immunotherapy ACE 210015, ICN09_016 / ICN 2021_045; former P09/016-F.

Neurologic manifestations associated with SARS-CoV-2 infection in children.

Manifestaciones neurológicas asociadas a la infección por SARS-CoV-2 en niños.

Francisca Sandoval¹, Katherine Julio¹, Gastón Méndez¹

(1) Hospital Dr. Exequiel González Cortés, Neurología

Introduction:

Since December 2019, the SARS-CoV-2 virus has been a global health issue. The main clinical presentation is a flu-like disease; however, patients with diverse neurologic manifestations have also been reported, mainly in adults. Here, we described neurologic manifestations associated with COVID-19 in the pediatric population.

Methods:

In 2020 we conducted a retrospective case series report, including patients younger than 18 years, admitted with confirmed SARS-CoV-2 infection and neurologic manifestations at our hospital in Santiago, Chile. Demographics, clinical presentations, laboratory results, radiologic and neurophysiological studies, treatment, and outcome features were described. Cases were described based on whether they presented with predominantly central or peripheral neurologic involvement.

Results and Discussion:

Thirteen of 90 (14.4%) patients admitted with confirmed infection presented with new-onset neurologic symptoms and 4 patients showed epilepsy exacerbation. Neurologic manifestations ranged from mild (headache, muscle weakness, anosmia, ageusia), to severe (status epilepticus, Guillain-Barré syndrome, encephalopathy, demyelinating events). Children who presented with multi-system inflammatory syndrome had a higher incidence of neurologic manifestations. These findings were one of the first clinical reports on this subject worldwide.

Several neuro-pathophysiological mechanisms have been proposed, including direct virus invasion, hyper-inflammatory reactions, multi-systemic failure, prothrombotic states, and immune-mediated processes. On the other hand, the COVID-19 pandemic has affected patients with neurologic diseases, making it challenging to access controls, treatment, and therapies.

Conclusions:

We found a wide range of neurologic manifestations in children with confirmed SARS-CoV-2 infection. In general, neurologic symptoms were resolved as the systemic presentation subsided.

Asymptomatic Herpes Simplex Virus Type 1 Infection of the Central Nervous System Favors Autoimmune Neurodegenerative Disease Onset and Severity

Infección asintomática del sistema nervioso central con virus herpes simple de tipo 1 favorece el inicio y severidad de enfermedad autoinmune neurodegenerativa

Pablo Alberto Gonzalez Muñoz¹

(1) Millennium Institute on Immunology and Immunotherapy, Pontificia Universidad Católica de Chile, Genética Molecular y Microbiología, Facultad de Ciencias Biológicas, Av. Portugal 49, Santiago, Chile

Latent and asymptomatic herpes simplex type 1 virus (HSV-1) infection of the central nervous system (CNS) is common in the human population. Although this type of infection may seem inoffensive without apparent pathology, HSV-1 infection elicits numerous molecular and cellular effects in the CN that may relate to neurodegenerative diseases. Multiple sclerosis (MS) is a progressive autoimmune and debilitating chronic disease. Although HSV has been associated to this disease, there is scarce evidence for a direct relationship. Using an animal experimental model for MS termed experimental autoimmune encephalomyelitis (EAE), which recapitulates aspects of MS in humans, we assessed the effect of asymptomatic CNS infection by HSV-1 over EAE. Interestingly, we observe increased disease onset and severity in C57BL/6 mice, even with an HSV-1-mutant that is attenuated in neurovirulence. These findings support the notion that a previous exposure to HSV-1, leading to asymptomatic and latent infection, can modulate EAE and suggests that this virus may contribute to MS.

Financing: ANID - ICM - ICN09_016: MIII (ICN09_016; former P09/016-F), FONDECYT #1190864, FIC-R 2017 (BIP Code: 30488811-0).

Impairment of the immunological and neurological synapses by respiratory viruses. Implications for vaccine design during the Covid19 pandemic.

Alexis Kalergis¹

(1) Millennium Institute on Immunology and Immunotherapy. P. Universidad Católica de Chile, Departamento de Genética Molecular y Microbiología, Facultad de Ciencias Biológicas, Alameda 340, Santiago, Chile

Respiratory viruses are a leading cause of bronchiolitis and pneumonia worldwide due to inefficient viral immunity even after disease resolution. Because of an excessive inflammatory response, these viruses can cause severe symptoms both in the respiratory and nervous systems, such as bronchiolitis and encephalopathy, respectively. We have observed that some respiratory viruses prevent the proper function of immune cells, such as T cells and dendritic cells, by impairing the immunological synapse assembly between these cells. Inhibition of the immunological synapse could work as a major virulence factor by impairing host immunity and enhancing susceptibility to reinfection. Further, respiratory viruses can cause a learning impairment due to inflammation at the central nervous system. Due to alterations in the blood-brain barrier after infection, immune system elements enter the CNS, impairing the normal function of neurons and astrocytes in the host. Based on these data, we have generated novel vaccine approaches to strengthen the immunological synapse leading to protective immunity against these respiratory pathogens and preventing CNS damage. These findings have permitted us to design vaccines for RSV and SARS-CoV-2, which we have shown to be safe and efficacious.

Financing: Millennium Institute on Immunology and Immunotherapy. Fondecyt 1190830.

SIMPOSIO

SOCIEDAD CHILENA DE NEUROCIENCIA

Ecological approaches in Visual Perception: knowing the world through your eyes and brain

Coordinadores: Drs. Pedro Maldondo y Guiliانا Bucci

Development of eye movement patterns and visual attention during scene viewing

Andrea Helo^{1,2}, Pia Rämä³

(1) Universidad de Chile, Departamento de Fonoaudiología, Facultad de Medicina, Independencia 1027, Santiago, Chile

(2) Universidad de Chile, Departamento de Neurociencias, Facultad de Medicina, Independencia 1027, Santiago, Chile

(3) Université Paris Cité, INCC UMR 8002, CNRS, F-75006, Paris, Francia

Conceptual representations of everyday scenes guide our visual attention. Gaze allocation is influenced by the interaction of perceptual features and cognitive mechanisms (Itti & Koch, 2000; Parkhurst, Law, & Niebur, 2002). Objects that are either visually salient or relevant for scene comprehension attract our attention. Two distinct attentional modes have been proposed for scene exploration. An ambient mode—for object localization in early scene inspection—is characterized by short fixation durations and large saccade amplitudes and a focal mode—for object identification in later stages—is characterized by longer fixations embedded in short saccades. While these mechanisms have been extensively studied in adults, less is known in developing populations.

Here, we show the development of eye-movement patterns and guidance during scene perception in typically developing children in a large range of ages (3 months to 10 years). We demonstrate that eye movement control develops during early childhood (e.g., Helo, Pannasch, Sirri, & Rämä, 2014; Helo, Rämä, Pannasch, & Meary, 2016). Our results suggest that infants have developed an adult-like scene viewing behavior at the end of the first year of life. However, a clear indication for ambient and focal processing strategies was found by 2 years of age. We also show that saliency has a stronger impact on gaze allocation in younger (2-6 y.o.) than older (8-10 y.o.) children.

Finally, we show that the joint distribution of saccade amplitude and orientation changes with age and can be used to generate age-dependent scanpaths (Le Meur et al. 2017)

Financing: FONDECYT I 11180334

Intuitive physics as an interface between vision and action

Jason Fischer¹

(1) Johns Hopkins University, Psychological and Brain Sciences, 3400 North Charles Street, Baltimore, United States

Our seamless interaction with the world is no small feat. Packing delicate groceries, stacking glassware, reshuffling precariously balanced cans in a cabinet – each action selected and calibrated based on expectations about its physical consequences. In daily life, we continually form implicit, online physical predictions to guide our decisions and actions, and this process can often feel as effortless as the act of seeing. A recent wave of research has established that we are able to make accurate and nuanced inferences about the physical structure and dynamics of a scene, but it remains unclear what mental representations we draw on to form such inferences. One possibility is that information about how an object can interact with others may be embedded within its visual representation, and intuitive physics might be best thought of as a facet of high-level vision. Another possibility is that we leverage domain-general prediction mechanisms to reason about physical scenarios in an ad-hoc fashion. In this talk, I will draw on behavioral and neuroimaging findings to argue for a different account: that we possess dedicated mental resources for physical inference that we can flexibly deploy across a wide range of scenarios. I propose that intuitive physics sits at the apex of the dorsal visual processing stream, tightly linked with the neural systems for action planning and attentional control. Physical inferences are natively formatted for the implicit guidance of actions, and many apparent shortcomings in people's physical understanding arise from the inaccessibility of dorsal visual representations for explicit report.

Prediction of eye movement behavior with artificial neural networks

Predicción de movimientos oculares usando redes neuronales artificiales

Christ Devia^{1,2,3}

(1) Universidad de Chile, Departamento de Neurociencias, Facultad de Medicina, Av. Independencia 1027, Independencia, Santiago, Chile

(2) Centro Nacional de Inteligencia Artificial, CENIA, Av. Vicuña Mackenna 4860, Macul, Edificio de Innovación UC, piso 2, Santiago, Chile

(3) Instituto de Neurociencias Biomédicas, BNI, Facultad de Medicina, Universidad de Chile, Av. Independencia 1027, Independencia, Santiago, Chile

During free exploration of visual scenes, we move our eyes 2 to 4 times per second. This motor activity orientates our sensory surface toward different areas of the scene. And the ensuing visual processing modulates or integrates with current brain ongoing activity. One of the standing theoretical proposal is that vision is a predictive process, where, after the construction of the gist of the perceive image, the eye movements are part of an active sampling behavior to confirm and deeply understand the content of the scene. Thus, each eye movement acquires specific content that has been (partially) predicted by our brain. One way to test this hypothesis is by modifying scene content while subjects are performing an eye movement, this manipulation would disrupt the current prediction. But this experimental framework arises a specific problem on methods to predict eye movement occurrence. I will show our work on this line applying linear methods and artificial neural networks to predict eye movement behavior during free scene exploration. Evidence build over the linear method shows that manipulating areas of the image, where we predict that the current eye movement will land, modifies sequent subjects' ocular behavior. While the method based on artificial neural networks suggest that studying ocular behavior during natural scenes exploration generates the best model to predict eye movements on any kind of image.

Financing: Iniciativa Científica Milenio ICN09_015 PROYECTO ACE 210007 National Center for Artificial Intelligence CENIA FB210017, Basal ANID

Ecological visual neuroscience research and clinical applications

Investigación en neurociencia visual ecológica y aplicaciones clínicas

Ivan Plaza Rosales^{1,2,3}

(1) Universidad de Chile, Department of Medical Technology, Faculty of Medicine, Av. Independencia 1027, Santiago, Chile

(2) Universidad de Chile, Department of Neuroscience, Laboratorio de Neurosistemas, Faculty of Medicine, Av. Independencia 1027, Santiago, Chile

(3) Ecological Cognitive Neuroscience Group (ECNG), Chile

One of the most relevant questions for visual neuroscientists is how the brain processes context. The brain has a difficult job making decisions in a variable and uncertain world or knowing how to utilize the features of the natural world. However, this becomes very complex when our visual perception is modified by ocular pathology. There are an estimated 2.5 billion people with visual impairment worldwide, often resulting in significant disability and associated with substantial economic burden, reduced quality of life, concurrent medical problems, and mental health issues.

Currently, the study of visual status in the clinic and scientific experimental designs need to control the context in which observations occur. Many clinical tests are limited to the same checklist of stepwise control, unrealistic conditions, and low level of visual pathway integrity. How can we make visual research more ecological? Could the naturalistic approach improve the understanding, diagnosis, and treatment of visual pathologies? And how do this impact the low vision and visually impaired community?

In this presentation, I will share engaging approaches and examples of how it is possible to learn about the world through the eye and the brain using more naturalistic experimental paradigms and in a more ecological context. In addition, I will highlight current limitations for implementation in the clinic and discuss how we can further advance the field of visual neuroscience.

Financing: Supported by Department of Medical Technology Competitive Research Fund 2022, DETEM 570372; Iniciativa Científica Milenio ICN09_015 – Proyecto ACE 210007.

SIMPOSIO

SOCIEDAD CHILENA DE NEUROCIENCIA

Abnormal Neuronal Function in Disease and Aging.

Coordinadora: Dra. Cecilia Hidalgo

Obese Mice Display Synaptic Plasticity Inhibition and Spatial Memory Defects

Genaro Barrientos¹, Jamileth More², Alejandra Arias-Cavieres³, Paola Llanos⁴, José Luis Valdes⁵ and Cecilia Hidalgo^{1,5}

¹Physiology and Biophysics Program, ICBM, Faculty of Medicine, Universidad de Chile, Santiago, Chile.

²Center for Advanced Clinical Investigation (CICA), Hospital Clínico Universidad de Chile, Santiago, Chile.

³Institute for Integrative Physiology, The University of Chicago, Chicago, IL 60637, USA.

⁴Institute for Research in Dental Sciences (ICOD), Faculty of Dentistry, Universidad de Chile, Santiago, Chile.

⁵Department of Neurosciences and Biomedical Research Institute (BNI), Faculty of Medicine, Universidad de Chile, Santiago, Chile.

According to the World Health Organization, close to 3 million people die every year as a result of overweight or obesity and more than 350 million people live with obesity-related type-2 diabetes. In addition, recent studies in rodent models indicate that obesity causes memory defects. Hence, the purpose of this study was to investigate the effects of obesity on hippocampal synaptic plasticity and spatial memory in mice. To induce obesity, C57BL/6 adult mice were fed a high-fat diet for 20 weeks. This procedure, which induced substantial weight gain and insulin resistance, significantly reduced hippocampal long-term potentiation and long-term depression, decreased the performance of mice in an object-location memory task and increased the anxiety-associated behavior in an open field test. Obese mice also displayed significant increments in the hippocampal content of the ryanodine receptor (RyR) isoforms RyR2 and RyR3. We propose that the increased expression of these calcium release channels leads to the generation of anomalous calcium signals that prevent the natural development of synaptic plasticity and memory processes in obese animals.

Support: FONDECYT (1170053; 1190406) and BNI (P09-015-F; ICM09_015).

On the relevance of multifunctional compounds for the treatment of Parkinson's disease. A case for DHC12

Sobre la relevancia de los compuestos multifuncionales para el tratamiento de la enfermedad de Parkinson. Un caso para DHC12

Marco Tulio Nuñez¹, Pabla Aguirre¹, Pamela J. Urrutia², Bruce K. Cassels³, Olimpo García-Beltrán⁴

(1) Department of Biology, Faculty of Sciences, Universidad de Chile, Santiago, Chile.

(2) School of Medical Technology, Faculty of Medicine and Science, Universidad San Sebastián, Santiago, Chile.

(3) Department of Chemistry, Faculty of Sciences, Universidad de Chile, Santiago, Chile.

(4) Faculty of Natural Sciences and Mathematics, Universidad de Ibagué, Ibagué, Colombia.

An ever-increasing number of neurodegenerative processes share common features that includes iron dyshomeostasis, mitochondrial dysfunction, oxidative damage and protein aggregation. Moreover, it is apparent the existence of positive feed-back loops between these features, which accelerate, and sometimes makes irreversible, the neurodegenerative process. Specifically, therapeutic targets for the treatment of Parkinson's disease (PD) include mitochondrial destination, the center of iron-reactive oxygen species interaction, iron chelation capacity, to decrease cell iron content, and the ability to quench free radicals produced by the Fenton reaction. Desirable additional characteristics are selectivity for dopaminergic neurons, to lessen unwanted secondary effects during long-term treatment and inhibition of MAO B and COMPT activities, to increase intraneuronal dopamine content. The limited success of therapies targeting only one of these events raises the need for drugs that attack multiple aspects of the neurodegenerative process. Here we present results on the neuroprotective activity, both in cell and animal models of PD, of DHC12, a promising multifunctional neuroprotective agent for the treatment of PD, and analyze the chemical characteristics that underlie its multifunctionality. Financing: FONDEF 1710095; CVTUCH 2022.

Synaptic Plasticity, reactive oxygen species and the aging process.

Plasticidad sináptica, especies reactivas de oxígeno y proceso de envejecimiento.

Roberto De Pasquale¹

(1) Universidade de São Paulo, Fisiologia e Biofísica, Instituto de Ciências Biomédicas, Av. Prof. Lineu Prestes, 1524 - ICB-I - USP - Butantã, São Paulo, Brasil

Synaptic plasticity is the ability of nerve connections to modify their effectiveness in neural circuits. Based on this property, brain areas involved in cognitive abilities carry out important processes of information reorganization. It is well known that plasticity tends to be higher at the beginning of life and decreases progressively. In this respect, it is believed that the elderly brain accumulates large quantities of reactive oxygen species (ROS), which affect plasticity negatively. This process is considered as one of the probable causes of the decline of memory and cognition that typically accompanies the aged brain. This symposium problematizes these assumptions, showing that the relationship between age, ROS and plasticity is more complex. ROS are not only inhibitors of plasticity. In the young brain, these molecules play an important role in the induction of synaptic changes and may act as modulators of experience-dependent plasticity. The relationship between age and plasticity is also more complex. A lineage of animals that go through a premature aging process (SAMP-8), show alterations in plasticity in the adult that are not simply attributable to a process of decline.

Financing: FAPESP - Fundação de Amparo à Pesquisa do Estado de São Paulo.

Amyloid- β oligomers disrupt neuroprotective gene expression pathways induced by hippocampal neuronal activity

Los oligómeros del peptide beta-amiloide interrumpen las vías de expresión de genes neuroprotectores inducidos por la actividad neuronal hipocampo.

Andrea Paula-Lima^{1,2,3,4}, Pedro Lobos Zambrano¹, Ignacio Vega Vásquez¹, Barbara Bruna¹, Nicole Henríquez¹, Tatiana Adasme¹, Cecilia Hidalgo^{1,3}

(1) Biomedical Neuroscience Institute (BNI), F. Medicine, Universidad de Chile, Santiago, Chile;

(2) Interuniversity Center for Healthy Aging, Chile;

(3) Dept. Neuroscience and ICBM, F. Medicine, Universidad de Chile, Santiago, Chile;

(4) Institute for Research in Dental Sciences, F. Dentistry, Universidad de Chile, Santiago, Chile.

The expression of several hippocampal genes required for learning and memory entails activity-generated nuclear Ca^{2+} -signals. We have reported that Ca^{2+} -release mediated by the ryanodine receptor type-2 (RyR2) channel isoform contributes to the generation of nuclear Ca^{2+} -signals induced by gabazine (GBZ), a GABA(A) receptor blocker that promotes neuronal activity. Additionally, GBZ induces CREB phosphorylation, Npas4, and RyR2 upregulation; RyR inhibition reduces these responses. Moreover, RyR2 downregulation, which has been implicated in Alzheimer's disease (AD), occurs in primary hippocampal neurons treated with soluble amyloid beta-peptide oligomers (A β Os), known as AD -causative agents, and in rats injected intra-hippocampally with A β Os. Here, we evaluated the effects of A β Os on GBZ-induced nuclear Ca^{2+} signals and the expression of activity-dependent genes that regulate neurotrophic factors and antioxidant enzymes expression. We found that pre-treatment with A β Os disrupted nuclear Ca^{2+} -signals generated by GBZ. Moreover, while GBZ treatment for 2 h increased RyR2 expression, neurons pretreated with A β Os for 6 h showed reduced mRNA levels of RyR2, Npas4, glutamate-Cysteine-Ligase (GCL) and NADPH-Quinone-Oxidoreductase (Nqo1), when compared to the levels induced by GBZ alone. We propose that A β Os block activity-induced signaling pathways, disrupting the expression of neuroprotective genes essential to memory and learning which are affected in AD.

Financing: PROYECTO ACE210007; CONICYT 21161086 BNI-09-015F; FONDECYT (1170053; 1150736; 3120093) and BMBF180051.

SIMPOSIO

SOCIEDAD DE ECOLOGIA DE CHILE

Cophysiological and genomic studies at the Patagonian limit of life: plants, animals and microorganisms in a changing world.

Coordinador Dr. Roberto Nespolo

What does it explain the treeline formation in the Southern Andes?

¿Qué explica la formación del límite arbóreo en los Andes del sur?

Frida I. Piper^{1,3,4}, Alex Fajardo^{2,3,4}

(1) Universidad de Talca, Instituto de Ciencias Biológicas (ICB), Av. Lircay s/n, Talca, Chile

(2) Universidad de Talca, Instituto de Investigación Interdisciplinaria (I3), Vicerrectoría de Investigación, Av. Lircay s/n, Talca

(3) Instituto de Ecología y Biodiversidad (IEB), Barrio Universitario s/n, Concepción, Chile

(4) Núcleo Milenio Límite de la Vida en Patagonia (Lili), ICAEV, campus Isla Teja, Valdivia, Chile

El límite altitudinal superior de la distribución de los árboles, conocido como "límite arbóreo", coincide con la isoterma de 6.8°C para la estación de crecimiento. La coincidencia del límite arbóreo con esta isoterma se manifiesta a escala global, independientemente del tipo de bioma, suelo, o especie formadora del límite arbóreo. Este hecho se considera evidencia suficiente de que existe el factor responsable de la formación del límite arbóreo es común a nivel global. Dos hipótesis han sido planteadas. La hipótesis de limitación de carbono (HLC) sostiene que a medida que la temperatura disminuye con la elevación la fotosíntesis neta resulta insuficiente para las demandas de carbono, prediciendo que las reservas de carbohidratos no-estructurales (NSC) disminuyen también. La hipótesis de limitación de sumidero (HLS) argumenta que a medida que aumenta la elevación, el crecimiento disminuye más que la fotosíntesis por efectos directos de la temperatura, causando incrementos en la concentración de NSC. Aunque la evidencia a escala mundial apoya la HLS, los resultados obtenidos para la especie formadora del límite arbóreo en los Andes del sur de Sudamérica, *Nothofagus pumilio*, son contradictorios. En esta presentación, revisaremos la evidencia existente y expondremos algunas limitaciones de los estudios previos, indicando directrices que podrían contribuir en la identificación del mecanismo formador del límite arbóreo en *N. pumilio*.

Financing: ANID FB210006, ANID – Millennium Science Initiative Program NCN2021-050, Fondecyt 1190927, Fondecyt 1190900

Treeline growth responses to global warming in the southern Andes

Respuestas de crecimiento del límite arbóreo de los Andes del sur al calentamiento global

Alex Fajardo^{1,2}, Frida Piper^{2,3}

(1) Universidad de Talca, Instituto de Investigación Interdisciplinaria (I3), Vicerrectora Académica, Avenida Lircay s/n, Talca, Chile

(2) Núcleo Milenio Límite de la Vida en Patagonia (Lili), Valdivia, Chile

(3) Universidad de Talca, Instituto de Ciencias Biológicas (ICB), Avenida Lircay s/n, Talca, Chile

El límite arbóreo de los Andes del sur está dominado por *Nothofagus pumilio* (lenga). Si el principal control abiótico de la formación del límite arbóreo es la (baja) temperatura, ¿cómo se espera que responda este sistema al calentamiento global? El objetivo de esta presentación es mostrar tendencias de crecimiento del límite arbóreo de *N. pumilio* en dos escalas temporales (decadal y estacional) asociadas a variaciones en la temperatura. En cinco sitios ubicados a lo largo de 18 grados de latitud en los Andes del sur de Chile (desde Termas de Chillán hasta Tierra del Fuego), determinamos tendencias de crecimiento a través de análisis dendrocronológicos junto a tendencias en el uso eficiente del agua (basada en señales isotópicas). Además, determinamos la fenología del crecimiento de células xilemáticas (xilogénesis) a lo largo de una estación de crecimiento en el límite arbóreo de Coyhaique y correlacionamos esta fenología al registro de temperaturas a esta elevación. Primero, encontramos tendencias negativas de crecimiento en el periodo 1980–2010 asociado al salto climático de 1976. Segundo, el comienzo de la producción de conductos vasculares en el xilema ocurre a fines de noviembre, semanas después de la apertura de yemas foliares. En un escenario de calentamiento global, se espera que las tasas de crecimiento del límite arbóreo de *N. pumilio* sigan disminuyendo y que el comienzo de la xilogénesis se adelante.

Financing: Fondecyt 1190900Millenium Science Initiative Program NCN2021-050

Yeast ecology in Patagonian primary forests

Francisco Cubillos^{1,4,5}, Christian Oporto^{1,4}, Luis Saona^{1,4}, Frida Piper^{2,4}, Juliana Vianna^{3,4}, Roberto Nespolo^{4,5,6}

(1) Universidad de Sanitago de Chile, Santiago, Chile

(2) Universidad de Talca, Talca, Chile

(3) Pontificia Universidad Católica de Chile, Santiago, Chile

(4) Millenium Nucleus of Patagonian Limit of Life (LiLi), Valdivia, Chile

(5) Millennium Institute for Integrative Biology (iBio), Santiago, Chile

(6) Universidad Austral de Chile, Valdivia, Chile

Yeasts are unicellular fungi that have evolved fermentation traits as a key innovation, which allows them to use simple sugars as an energy source, and at the same time, competitively displace other organisms. Based on this, yeasts belonging to the *Saccharomyces* genus are widely used by humans in biotechnological processes, mainly through the successful hybridization between domesticated and wild species. In recent years, bioprospecting efforts in various geographic regions and ecosystems have expanded the repertoire of available yeasts. However, this development is not accompanied by sufficient knowledge in terms of their ecology, where the yeast isolation protocol and timing could confound various aspects of their genetics and fermentative performance under various conditions. The highest density of *Saccharomyces* yeasts has been reported in the Patagonian *Nothofagus* forests, where mainly *S. uvarum* and *S. eubayanus* were found. This allows answering basic questions about their ecology, such as: what is their distribution in the latitudinal gradient? How does temperature impact its distribution? How does the altitudinal gradient impact the distribution of these yeasts? What is their distribution and population density through the different seasons of the year? Currently, at the LiLi Millennium Nucleus, we are conducting intensive sampling using various techniques to answer the questions raised, which will be addressed and discussed in this work.

Financing: ANID - Programa Iniciativa Científica Milenio - ICN17_022 and NCN2021_050

COMUNICACIONES LIBRES



Energy savings of hibernation in a South American marsupial: calibrating a physiological model for predicting survival to warming

Ahorro energético de la hibernación en un marsupial Sudamericano: calibrando un modelo fisiológico para predecir la sobrevivencia al calentamiento

Roberto Fernando Nespolo Rossi^{1,6,7,8}, Carlos Mejías^{1,6}, Francisco Fontúrbel^{3,6}, Francisco Cubillos^{2,6,8}, Frida Piper^{5,6}, Juliana Vianna^{4,6}, Tamara Abarzúa Estay^{1,4}, Francisco Bozinovic^{4,7}

(1) Universidad Austral de Chile

(2) Universidad de Talca

(3) Universidad Católica de Valparaíso

(4) Pontificia Universidad Católica de Chile

(5) Universidad de Talca

(6) Instituto Milenio de Biología Integrativa, iBio

(7) Center for Applied Ecology and Sustainability (CAPES)

(8) Instituto Milenio de Biología Integrativa (iBio)

Models predicting the response of populations to global warming, normally use phenological data to forecast extinction, survival, or range shifts. However, in hibernators, winter survival is determined by the physiology of heterothermic thermoregulation. Essentially, winter temperatures cannot surpass certain threshold, above which animals arouse from torpor, increasing ten-fold their energy expenditure (and no food available). Here we parameterized a physiological model for estimating hibernation energy expenditure (DEE_H) in hibernators. We applied it in a South American hibernator, the endemic marsupial monito del monte (genus *Dromiciops*), which is associated to the cold rainforests of Chile and Argentina, including high Andean locations where winter temperatures reach freezing values. Monitos are non-Holarctic hibernators that exhibit a dynamic form of torpor ranging from daily torpor in summer, to hibernation in winter. Using modern technologies of miniature data loggers, quantitative magnetic resonance, and mesocosm experiments, we calibrated a model predicting daily energy expenditure, which we projected on the map of microclimate geographic temperatures. The model predicts that winter survival is maximized at a T_{As} on the range 0-2°C, and is reduced drastically by ~40% with +2.5°C of increase. Thus, even with the actual winter temperatures of the rainforests, monitos are severely constrained to find enough food in summer, to survive the winter. Projecting these data into future climate maps, the model predicts extinction for about half of monito's distribution (especially northern and western-coastal ranges), and range shifts toward higher altitudes and latitudes in the southern-Eastern (Andean) range, reaching the distributional limits of temperate rainforests.

Financing: Millennium Science Initiative Program – Center Code NCN2021-050 and iBio; ANID PIA/BASAL center FB0002 and Fondecyt 1221073.



COMUNICACIONES LIBRES I

SOCIEDAD DE ECOLOGIA DE CHILE

Ecological drivers of individual specialization in a stochastic Mediterranean ecosystem in a global change context

Factores ecológicos de la especialización individual en un ecosistema estocástico Mediterráneo en un contexto de Cambio Global

Natalia Ricote Martínez¹, Sara Bustamante², María Lucía Malaga², Pablo Sabat², Karin Maldonado¹

(1) Universidad Adolfo Ibañez, Departamento de Ciencias, Facultad de Artes Liberales, Diagonal Las Torres 2640 - Peñalolén, Santiago, Chile

(2) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Santiago, Chile

A central problem in ecology is understanding how organisms respond to environmental changes, especially to global change. Increasing evidence suggests that individual foraging strategies within populations may differ in resource utilization, a phenomenon known as individual specialization (IS). This sort of variation may be a crucial source of biodiversity compensating for the loss of ecological functions associated to species decline.

Trophic niches among and within populations might be modified due to changes in food availability and ecological interactions. In this sense, the niche variation hypothesis (NVH) relates higher diversity of resources with higher IS and wider population niches since individuals may specialize on the different resources available.

We evaluated seasonal changes in the degree of IS aiming to determine the ecological factors (food availability and competition) that may be driving its variation. We captured birds (*Zonotrichia capensis*) throughout two years and six seasons and collected different individuals' tissues from a Mediterranean population at central Chile, to quantify, using stable isotopes, their total niche width, and the levels of IS.

Our results support the NVH showing higher levels of IS and wider population niche during seasons with high resource diversity, on the contrary, when resources were scarce and interspecific competition was high, IS levels were low and population niche was narrower. We also observed interannual differences between a normal and a dry year. These findings contribute to the understanding of how IS is promoted or restricted in natural populations, suggesting that ecological factors are relevant drivers of IS.

Financing: Proyecto FONDECYT Postdoctorado N°3210704 y Proyecto FONDECYT Regular N°1200513

Changes in vegetation cover associated with the retreat of the Pichillancahue Glacier in Villarrica.

Cambios en la cobertura vegetal asociados al retroceso del Glaciar Pichillancahue en Villarrica.

Valentina Campos Ruiz¹, Angélica Casanova-Katny¹

(1) Catholic University of Temuco, Faculty of Natural Resources, Rudecindo Ortega 03694, Temuco Chile.

Campos Valentina¹, Angélica Casanova-Katny², Mario Romero¹, David Fonseca¹, Francisco Cereceda³.

Climate change has affected the earth's temperature and the ecosystems present in it, where the Chilean Andes are not exempt. It has been shown that plants and vegetation in general in the mountain environment are showing ample evidence of the impacts of climate change. In the Andes Mountains, the Pichillancahue Glacier, has decreased over time its glacier cover, leaving areas uncovered by melting, where it is hypothesized that colonization has been occurring by pioneers associated with the climax communities of the place. Therefore, we wish to analyze the local climate and ecological dynamics of the vascular flora in selected plots on the arboreal limit, determining the primary ecological succession of the area and the species present, estimating in turn the specific richness of the vegetation, vigorosity among other parameters, by means of a vegetation survey in the field and using satellite images to record the changes that have occurred during the last 20 years. It is expected that the pioneer species, after the glacial retreat of the Pichillancahue glacier, are native and/or endemic to the area; a study that will allow us to know the ecological dynamics of the vegetation in ice-free areas and their response to climate change. ANILLO ACONCAGUA ATC210021 y FOVI 210043

Reproductive biology of the *Echinopsis chiloensis* complex, a columnar cactacea endemic to Chile.

Biología Reproductiva del complejo *Echinopsis chiloensis*, cactacea columnar endémica de Chile.

Carmen Gloria Ossa^{1,2}, Tamara Bernal¹, Sebastian Godoy¹, Maren Silva¹, Carlos Maldonado¹, Valentina Herrera³, Cristian Villagra³

(1) Universidad de Valparaíso, Biología, Ciencias, Gran Bretaña 1111, Playa Ancha, Valparaíso, Chile

(2) Universidad de Valparaíso, CIGREN, Gran Bretaña 1111, Playa Ancha, Valparaíso, Chile

(3) Universidad Metropolitana de Ciencias de la Educación, Instituto de Entomología, Facultad de Ciencias Básicas, Av. José Pedro Alessandri 774, Ñuñoa, Santiago, Chile

Echinopsis es un género de cactus columnares, que presenta flores hermafroditas, actinomorfas, con diversos síndromes de polinización. En Chile, hay variados antecedentes sobre la biología reproductiva de *Echinopsis chiloensis chiloensis*, cactus autoincompatible que presenta una gran variedad de polinizadores y diferencias en la apertura floral a lo largo de su distribución. Este cactus es parte del complejo *E. chiloensis*, que cuenta con tres miembros *E. c. chiloensis*, *E. c. litoralis* y *E. c. skottsbergii*. En este trabajo evaluamos la biología reproductiva de las especies del complejo, sus visitantes florales, morfología floral y producción de néctar, con el fin evaluar diferencias entre los ensambles de polarizadores y morfologías florales dentro de taxa estrechamente emparentados, por lo que incluimos a *E. bolligeriana*, la que hasta hace poco, formaba parte del complejo. Nuestros resultados muestran todas las especies son autoincompatibles, con antesis diurna. Las flores presentaron ligeras diferencias morfológicas que separan claramente a *E. c. litoralis* y *E. bolligeriana*. El ensamble de polarizadores es generalista en todos los casos, y está representado principalmente por abejas y moscas, que varían en composición y frecuencia de visitas en cada especie de cactus. La producción de néctar es constante durante toda la apertura floral excepto en *E. litoralis* que produce néctar sólo por la mañana. En conclusión pudimos distinguir diferencias en los ensambles de polarizadores, morfología floral y producción de néctar entre las distintas especies del complejo *E. chiloensis*, lo que podría estar dando cuenta de las diferencias entre las taxa.

Financing: Fondecyt 11190305

Meso-mammal survey in central Chile coastal forest, using camera trap records: species diversity, interactions and activity patterns.

Estudio de mesomamíferos en bosque costero de Chile central, mediante registros de cámara trampa: diversidad de especies, interacciones y patrones de actividad.

María Belén Zaparte¹, Constanza Napolitano^{2,3,4}, Carmen Rosa Ringeling⁵, Gabriel Rodríguez⁵, Katherine Nuñez¹, Javier Borkosky¹, Carla Anfossi¹, Micaela Poutay¹, Patricio Plissock^{1,3,6,7}

(1) Proyecto Fondecyt Regular 1210834

(2) Universidad de Los Lagos, Departamento de Ciencias Biológicas y Biodiversidad, Osorno, Chile

(3) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile

(4) Centro Internacional Cabo de Hornos (CHIC), Puerto Williams, Chile

(5) Corporación Bosques de Zapallar

(6) Universidad Católica de Chile, Departamento de Ecología e Instituto de Geografía, Chile

(7) Universidad Católica de Chile, Centro de Ecología Aplicada y Sustentabilidad (CAPES), Chile

Mediterranean ecosystems represent 2% of the planet surface and are considered highly sensitive biodiversity hotspots. In coastal central Chile, patches of relict Mediterranean forest still remain in Zapallar, Valparaíso region, surrounded by a matrix of human-dominated landscapes. A proportion of this native habitat is protected by private conservation efforts, threatened by the expansion of real estate companies, human activities and exotic animals. We monitored two private protected areas of the Zapallar corridor: Parque El Bordo (PB) and La Judea (LJ). Four and eight camera traps were installed, respectively, in a grid 1 km apart, using attractor scents, from September 2021 to March 2022 (effective sampling effort 1,036 camera days). We used ReNamer, DataOrganize and DataAnalyze softwares for data analysis. We recorded a total of 3,947 photos (478 species independent events; separated >60 minutes) and identified a total of ten different species, being the culpeo fox (*Lycalopex culpaeus*) the most abundant. Native species richness was higher in LJ compared with PB, probably due to a greater proximity to human settlements, public access and/or lower sampling effort of the latter. Also, LJ had more abundance of domestic and exotic species (horses, cows, dogs and lagomorphs). Guigna (*Leopardus guigna*) and pampas cat (*Leopardus colocolo*) were detected associated with forest patches. This is the first stage of a study towards monitoring and understanding this native vegetation corridor. Our records contribute to understand the importance of protected areas in Mediterranean ecosystems as a native species refuge for their long-term persistence.

Financing: ANID Fondecyt Regular 1210834 (PP), and ANID PAI 77190064 (CN).

Microclimate and human footprint improve potential distribution models of invasive species in protected areas

Eduardo Fuentes-Lillo^{1,3}, Lohengrin Cavieres^{2,3}, Rafael A Garcia^{1,3}, Alejandra Jiménez^{1,3}, Aníbal Pauchard^{1,3}

(1) Laboratorio de Invasiones Biológicas (LIB), Facultad de Ciencias Forestales, Universidad de Concepción, Concepción, Chile.

(2) Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Concepción, Chile.

(3) Instituto de Ecología y Biodiversidad (IEB), Santiago, Chile.

Microclimate and anthropogenic activities have been shown to be important drivers of the establishment and dispersal of invasive plants in mountain ecosystems. However, so far, few studies have incorporated these variables to model the potential distribution of invasive species in the Andes, mainly due to the lack of microclimatic and anthropogenic databases. Integrating microclimatic and anthropogenic data may be key to generate more realistic distribution models and significantly improve biosecurity protocols, mainly within protected areas in the Andes. The objective of this paper is to understand if the incorporation of microclimatic and anthropogenic variables improves the performance of distribution models of five invasive species in the south-central Andes of Chile. The results showed that microclimatic (TSS= $-0.46 \pm 20\%$) and anthropogenic (TSS= $-0.43 \pm 12\%$) models presented better performance when compared to macroclimatic models (TSS= -0.38) for all invasive plants analysed. Both *A. dealbata* and *C. arvense* are the species that occupy the largest percentage of potential area within protected areas, occupying approximately $\sim 5\%$ to $\sim 53\%$ (prob. occ $0.7-0.9$) of the total area of protected areas. These results demonstrate the importance of including microclimatic and anthropogenic data when modeling the potential distribution of invasive plants as they provide more reliable results and provide more information when making decisions related to the protection of protected areas.

Financing: EFL, LC, RAG, AJ and AP funded by Fondecyt 1180205 and ANID/BASAL FB210006

Testing the congruence and indicative value of ecological uniqueness across multiple levels of biodiversity in a Chilean watershed under anthropogenic threats

Congruencia y valor indicativo de la singularidad ecológica a través de múltiples niveles de biodiversidad en una cuenca chilena bajo amenazas antropogénicas

Jéssica Bórquez¹, Sandra Sampertegui², Britt Wallberg², Diana Coral-Santacruz³, Víctor Hugo Ruiz⁴, Paul Samollow⁵, Nicolás Gouin^{2,6,7}, Angéline Bertin²

(1) Universidad Católica del Maule, Departamento de Formación Inicial, Facultad de Educación, Talca, Chile

(2) Universidad de La Serena, Departamento de Biología, Facultad de Ciencias, Raúl Bitrán 1305, La Serena, Chile

(3) Universidad Católica del Norte, Departamento Biología Marina, Facultad de Ciencias del Mar, Coquimbo, Chile

(4) Universidad de Concepción, Departamento de Zoología, Facultad de Ciencias Naturales y Oceanografía, Casilla 160-C, Concepción, Chile

(5) Texas A&M University, Department of Veterinary Integrative Biosciences, College of Veterinary Medicine and Biomedical Sciences, College Station, TX 77843 USA, USA

(6) Centro de Estudios Avanzados en Zonas Áridas (CEAZA), Raúl Bitrán 1305, La Serena, Chile

(7) Universidad de La Serena, Instituto de Investigación Multidisciplinario en Ciencia y Tecnología, La Serena, Chile

Identifying areas of conservation value is key to prioritize actions for halting biodiversity loss. The local contribution to beta diversity (LCBD) is a measure well suited for such purpose since it allows identifying sites presenting high ecological uniqueness (EC) within a region. Biodiversity is a multifaceted concept and it is unclear whether community-based ecological uniqueness, is a good surrogate for EC at other levels of biological organization. We investigated relationships between EC estimates derived from community and population diversity attributes in a watershed of south-central Chile under anthropogenic pressures and analyzed their responses to water and habitat quality variables. EC was estimated at the community level from fish and macroinvertebrate assemblages and at the population level for a gastropod and an insect species. Results revealed low spatial congruence between the five EC estimates and mismatches in sites with high LCBD values. Seven sites displayed significant LCBDs, but only one coincided for two diversity indicators. Water and habitat quality were major drivers of beta-diversity accounting for 30% to 74% of the spatial variation but their effects differed from one diversity indicator to other. Our results raise concern about which diversity components should be favored in EC studies to identify priority conservation areas, and suggests that no diversity component is a good surrogate for others. Despite the consensus on the need for holistic approaches considering essential forms of biodiversity, their implementation can turn out difficult, and preference for one diversity component may thus be given depending on the objectives to be achieved.

Sponsorship: Juan Carlos Ortíz

Systematic conservation planning focused on ecological restoration sites in central-southern Chile

Planificación sistemática de la conservación orientada a sitios de restauración ecológica en Chile Centro-sur

Diego Alarcón Abarca^{1,2}, Marcela Bustamante Sánchez^{1,3}, Michel Parra Calderón¹, Karina Godoy Maldonado¹, Rosa Alzamora Mallea³, Rodrigo Barahona Segovia⁴, Lohengrin Cavieres González^{1,5}, Pablo Ramírez de Arellano Donoso⁶

- (1) Instituto de Ecología y Biodiversidad (IEB-Chile), Las Palmeras 3425, Ñuñoa, Chile
- (2) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Chile
- (3) Universidad de Concepción, Departamento Manejo de Bosques y Medio Ambiente, Facultad de Ciencias Forestales, Barrio Universitario, Concepción, Chile
- (4) Universidad de Los Lagos, Departamento de Ciencias Biológicas y Biodiversidad, Av. Fuschlöcher 1305, Osorno, Chile
- (5) Universidad de Concepción, Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Barrio Universitario, Concepción, Chile
- (6) Bioforest S.A., Camino a Coronel s/n km 15, Coronel, Chile

COMUNICACIONES LIBRES II

SOCIEDAD DE BIOLOGIA DE CHILE

Drosophila MCT Silnoon and Small Chaski are induced by starvation in brain and its downregulation in motoneurons associate to defects at the larval neuromuscular junction

MCT Silnoon y Smal Chaski son inducidos por starvation en cerebro, su disminución en motoneuronas está asociada a defectos en UNM de larvas en *Drosophila*.

Estefania Lopez^{1,2}, Andres Gonzalez-Gutierrez^{1,2}, Andres Kohler Solis^{1,2}, Andres Esparza Martinez^{1,2}, Jimena Sierralta Jara^{1,2}

- (1) Laboratory of Cellular and Molecular Neurobiology, Department of neurosciences, Faculty of Medicine, University of Chile.
- (2) Institute of Biomedical Neurosciences, Faculty of Medicine, University of Chile.

The correct functioning of synaptic processes requires a high and continuous demand of energy. The transfer of glucose derived metabolites such as lactate and pyruvate between glia and neuron, is necessary, together with the uptake of glucose, to provide the source molecules for the oxidative phosphorylation. This transfer is achieved by glucose and monocarboxylate transporters (GLUTs and MCTs). In *Drosophila*, several MCT like proteins are expressed in the brain, however, neither their function as MCTs nor their function has been determined. Here, we hypothesize that neuronal MCTs are required for neuronal nutritional homeostasis under starvation conditions.

Two MCTs like proteins were studied, Silnoon and CG8389 (Small Chaski) using cell biology techniques and functional assays. We observed that both MCT-like proteins induced their expression after 5 hours of starvation. Moreover, downregulation of the genes by RNAi/ or the mutant animals presented alterations in mobility, viability and survival in addition to functional defects at the NMJ synapse. These results show that these two MCTs like proteins may be important in maintaining brain energy metabolism, especially during starvation in *Drosophila melanogaster*.

Financing: Proyecto Fondecyt 1210586, BNI.

KLK4 in breast cancer: a marker worthy of study?

KLK4 en cáncer de mama: ¿un marcador digno de ser estudiado?

Paulina Fuentes González^{1,3}, Iraidí Ramos^{1,3}, Adriana Stuardo^{1,3}, Pía Bascur¹, Francisco Díaz², Fabiola Sanchez^{2,3}, Claudia Torres^{1,3}, Alejandro Rojas^{3,4}, Patricia Burgos^{5,6,7}, Francisca Pavicic¹, Carlos Figueroa^{1,3}, Pamela Ehrenfeld^{1,3}

(1) Universidad Austral de Chile, Laboratorio de Patología, Instituto de Anatomía, Histología y Patología, Facultad de Medicina, Campus Isla Teja s/n, Valdivia, Chile

(2) Universidad Austral de Chile, Laboratorio de Inmunología Vascular, Instituto de Inmunología, Facultad de Medicina, Campus Isla Teja s/n, Valdivia, Chile

(3) Universidad Austral de Chile, Centro Interdisciplinario de estudios del Sistema Nervioso (CISNe), Valdivia, Chile

(4) Universidad Austral de Chile, Instituto de Medicina, Facultad de Medicina

(5) Universidad San Sebastián, CEBICEM, Facultad de Medicina y Ciencia

(6) Fundación Ciencia & Vida, Centro Ciencia & Vida

(7) Pontificia Universidad Católica de Chile, Center for Aging and Regeneration (CARE), Facultad de Ciencias Biológicas

Introduction: Kallikrein-related peptidases (KLKs) are serine proteases that have been reported as potential cancer biomarkers. Among them, both KLK4 mRNA and protein levels have been reported to be a prognostic marker in various types of cancer including breast cancer, where overexpression of KLK4 protein and mRNA are associated with poor prognosis. Although KLK4 has been linked with the development and progression of breast cancer its biological function remains unclear which specific stages of cancer progression are controlled by KLK4 is unknown.

Methodology: Estrogen-sensitive breast cancer cell lines (MCF-7) were stimulated with *i*) recombinant KLK4 (rKLK4; 2, 10, and 20ng/ml), *ii*) IL-8 (50, 100, and 150pg) or *iii*) Tamoxifen (TAM; 1μM). Western blotting, qPCR, ELISA, permeability assay, and MTT techniques were performed.

Results: rKLK4 induced promotes pro-tumorigenic properties including proliferation of MCF-7 in the presence of TAM and vascular permeability. Importantly, we observed that rKLK4 and IL-8 enhances KLK4 expression in MCF-7 cells. In agreement with this findings, we found increase serum levels of KLK4 and inflammatory cytokines in estrogen receptor positive breast cancer patients compared to healthy women participants, recruited in a pilot case-control study in Los Rios region.

Conclusions: KLK4 may contribute to breast cancer progression, but more studies are needed to clarify its specific role. Our results are relevant due to their possible translational implication of KLK4 as a biomarker of cell proliferation or resistance to TAM treatment.

Financing: This work was supported by FONDECYT 1201635 (PE); Doctorado nacional 21220130 (PF); CONICYT 21170849(IR); Fondecyt 1191207 (CT); Fondecyt 1200427 (AR)

Peroxidation of lipid droplets, a new therapeutic target for the induction of ferroptosis in difficult-to-treat cancer cells.

Peroxidación de lipid droplets, un nuevo blanco terapéutico para la inducción de ferroptosis en células de cáncer difíciles de tratar.

Luciano Ferrada¹, María José Barahona², Matías Vera¹, Brent R Stockwell³, Francisco Nualart^{1,2}

(1) Universidad de Concepción, CMA BIOBIO, Facultad de Ciencias Biológicas, Concepción, Chile

(2) Universidad de Concepción, Departamento de Biología celular, Laboratorio de Neurobiología y Células Madre, NeuroCellIT., Facultad de Ciencias Biológicas, Concepción, Chile

(3) Columbia University, Department of Chemistry, New York, United States

La ferroptosis, un nuevo tipo de muerte celular desencadenada por peroxidación de lípidos dependiente de hierro se ha postulado como un potencial tratamiento contra el cáncer. Desafortunadamente, diversos modelos tumorales altamente agresivos presentan resistencia a la inducción farmacológica de este tipo de muerte, debido a que utilizan los "lipid droplet" como organelo amortiguador para el almacenamiento seguro de lípidos. Aquí, utilizando análisis farmacológicos acoplados a cinética de muerte celular de alto contenido y microscopía de superresolución en tiempo real, identificamos que el co-tratamiento entre el inductor de ferroptosis imidazole ketone erastin (IKE), y la forma oxidada de la vitamina C, ácido deshidroascórbico (DHA), son una poderosa terapia inductora de ferroptosis en células tumorales previamente resistentes a este tipo de muerte. Inesperadamente, determinamos que el tratamiento de IKE+DHA induce específicamente peroxidación de lipid droplets, evento suficiente para la ejecución de ferroptosis. Más aún, in vivo demostramos que IKE+DHA presenta una gran eficacia para erradicar tumores altamente agresivos como el glioblastoma. Así, el uso de IKE+DHA podría ser una terapia eficiente y segura para la erradicación de cánceres difíciles de tratar.

Financing: Fondecyt Inicio: 11200335 Fondecyt Postdoctorado: 3210076 Fondecyt: 1221147 NCI grant R35CA209896

Nephropathy Hypertensive: unveiling the possible involvement of Hemichannels and Pannexons.

Nefropatía Hipertensiva: Develando la posible implicación de Hemicanales y Panexones.

Gonzalo Ignacio Gómez Ordenes¹, Claudia María José Lucero Mariqueo¹, Lucas Pablo Marambio Ruiz¹, Marcelo León Olivares¹

(1) Instituto de Ciencias Biomédicas, Facultad de Ciencias de la Salud, Universidad Autónoma de Chile, El Llano Subercaseaux #2801, Santiago 8910060, Chile;

Hypertension is one of the most common risk factors for developing chronic cardiovascular diseases, including hypertensive nephropathy. The increase of the intraglomerular pressure leads mesangial, epithelial, and podocytes cells damaged, which in turn enhances production of vasoactive as well as pro-inflammatory agents. Inflammation is a complex process, and it has recently been related to disorders in intercellular communication mediated by connexin gap junctions and hemichannels as well as pannexin channels. In this sense, those responses might be enough to activate connexin 43 (Cx43) hemichannels and Pannexin1 (Pnx1) channels, which are associated to an increase of ATP release and subsequent activation of purinergic receptors. This process could elicit an uncontrolled Ca^{2+} entry and constitute a feedforward mechanism conducting to kidney damage. On the other hand, the AT1 receptor activated by the Angiotensin II (AngII) also contributes to the pathogenesis of renal damage in where the dysfunction of Ca^{2+} signaling seems to be crucial. It because, an increase of intracellular Ca^{2+} has been strongly associated to podocyte cytoskeletal disorganization, foot process effacement, disruption of the slit diaphragm, and proteinuria. Interestingly, AngII seems to amplify the inflammatory and oxidative responses in the kidney through activation of Cx43 hemichannels and Pnx1 channels. All these cellular changes can cause a reduction in renal blood flow, alterations in the filtration barrier permeability, and finally, in the glomerular filtration. Therefore, in this review, we are going to analyze the role of connexin and pannexin channels in renal failure.

Financing: FONDECYT INICIACIÓN grant number 11200584

Patagonian bacterium *Janthinobacterium* sp. BmR6b synthesizes polyhydroxybutyrate bioplastic and violacein pigment useful for biorefinery processes

Michael Seeger Pfeiffer¹, Mario Sepulveda Mardones¹, Loreto Sáez Ortega², Daniela Castillo Parra², Guillermo Bravo Cortes¹, Paulina Vega Celedón¹, Alejandra Urtubia²

(1) Universidad Técnica Federico Santa María, Departamento de Química & Centro de Biotecnología, Avenida España 1680, Valparaíso, Chile

(2) Universidad Técnica Federico Santa María, Departamento de Ingeniería Química y Ambiental, Avenida España 1680, Valparaíso, Chile

The bacterium *Janthinobacterium* sp. BmR6b was isolated from the rhizosphere of a calafate (*Berberis microphylla*) shrub in Magallanes and Antártica Region. Strain BmR6b synthesizes the bioplastic polyhydroxybutyrate (PHB) and the violet pigment violacein with antibiotic properties. The aim of this study was to determine the cell biorefinery potential of BmR6b cells through the production of PHB and violacein from conventional and non-conventional carbon sources. Strain BmR6b was grown on different carbon sources (e.g. carbohydrates, organic acids, grape pomaces) under shaking flask and bioreactor conditions. Cell growth, PHB and violacein content were determined through dry weight (DW), HPLC, and spectrophotometry. Strain BmR6b grown on sucrose, mannitol, glucose, fructose and glycerol accumulated high PHB content, whereas lower values were observed with arabinose, xylose, acetate, valerate, hexanoate and urea. BmR6b cells grown on grape pomaces accumulated up to 50% PHB. Violacein was observed during growth on sucrose, fructose and glycerol in shaking flasks. In bioreactor conditions, *Janthinobacterium* sp. BmR6b grown on sucrose as sole carbon source showed high growth (10 g DW/L), PHB and violacein co-production. The differences in PHB and violacein production using diverse substrates may be related to its genome-predicted central metabolism traits. In conclusion, *Janthinobacterium* sp. BmR6b possesses the metabolic potential for cell biorefinery of biotechnological products with added-value that are efficiently obtained from diverse nutrient sources.

Financing: Acknowledgements: ANID PhD & Operational expenses (MSM,PV-C) fellowships, FONDECYT 1200756 (MS,LSO,DCP,GBC), PIA Ring GAMBIO ACT172128 (MS,PV-C,GBC), Fondecup EQM 170194 (GBC,MS) & FONDEF ID1910340 (AU) grants.

Recovery of carbonized soils with a chemical catalyst, in vitro studies for application development.

Recuperación de suelos carbonizados con un catalizador químico, estudios in vitro para su desarrollo de aplicaciones

Jorge Parodi^{1,2}, Ivan Vega¹, Viviana Chavez²

(1) Tequia corp, Pucon, Chile

(2) Tonalli Ltda, Temuco, Chile

Forest fires and burns generate high temperatures in soils, which cause organic matter to mineralize and become trapped in the form of charcoal. Using a system that catalyzes its release in the absence of bacteria is a technological innovation that accelerates the recovery of these soils. We have evaluated nitrogen, potassium and phosphorus parameters in wood ashes, charcoal and burnt soil. We observed that using the TCAS-CATA catalyst at 1% in V/V solution generated a 3-fold increase in the concentration of NPK parameters in the solutions. In addition, using this solution on lean soils increased the organic richness of the soil, as measured by an increase of NPK by more than 3 times the basal value. These data would indicate that using this TCAS-CATA allows the recovery of nutrients from carbonized material, improving soils and allowing their recovery in less time.

Financing: Fondos internos, del grupo de investigación

Implementation of a spatial learning and memory task through immersive virtual reality in the elderly

Implementación de una tarea de aprendizaje y memoria espacial mediante realidad virtual inmersiva en personas mayores

Bernardo Burgos¹, Luz Gómez¹, Alvaro Navarro¹, Diego Oyarzún¹, Emilia Soto¹, Alvaro I. Langer^{2,3}, Rodrigo Montefusco^{1,3}

(1) Universidad Austral de Chile, Instituto de Aparato Locomotor y Rehabilitación, Facultad de Medicina, Rudloff 1650, Valdivia, Chile

(2) Universidad Austral de Chile, Instituto de Estudios Psicológicos, Facultad de Medicina, Isla Teja s/n, Valdivia, Chile

(3) Universidad Austral de Chile, Centro Interdisciplinario de Estudios del Sistema Nervioso Central (CISNe), Isla Teja s/n, Valdivia, Chile

Abstract

Understanding and characterizing cognitive functions through aging is relevant since it enables the differentiation between pathological and non-pathological progress. A concurrent limitation has been the impossibility of positioning the patient in contexts close to the real ones, which allows his nervous system to be challenged to function as it does in daily life. The use of Immersive Virtual Reality (IVR) is positioned as a tool where it is possible to evaluate different cognitive domains in realistic contexts with interest both in clinical practice and in research, allowing the study of the physiological mechanisms that support them.

Numerous neurodegenerative conditions are characterized by alterations in spatial navigation beyond the normal deterioration found during the life cycle. The objective of this work is to develop a protocol that allows evaluating spatial learning and memory, through an RVI system using "The Boxes Room Task" in older people.

Twelve volunteers over 60 years of age were recruited from the University Rehabilitation Center of the Austral University of Chile. The limitations observed and referred by the subjects that restricted their participation in the task, as well as the variables that favored their performance, will be reported. Preliminary results show a good acceptance of the RVI modality by the volunteers. RVI could be a relevant tool for the evaluation of spatial memory in older people, contributing to an early and predictive diagnosis of cognitive impairment.

“Post-fire survival and growth of *Araucaria araucana*: the case of China Muerta National Reserve after 2015 wildfire”.

“Supervivencia y crecimiento de *Araucaria araucana* post-fuego: el caso de la Reserva Nacional China Muerta luego del incendio de 2015”

Bernardita Belén Díaz Mons^{1,2}, Andrés Fuentes Ramírez^{1,2}

(1) Universidad de La Frontera, Laboratorio de Biometría, Facultad de Ciencias Agropecuarias y Medioambiente, Francisco Salazar 1145, Temuco, Chile

(2) Pontífice Universidad Católica, Centro Nacional para la Industria de la Madera, Avda. Libertador Bernardo O'Higgins 340, Casa Central, Santiago., Santiago, Chile

The China Muerta National Reserve was affected by a wildfire in 2015 which burned ca. 3,765 ha of *Araucaria-Lenga* forests. After the fire, an initial restoration action was established by planting seedlings of *Araucaria araucana* in burned areas, considering the presence/absence of biological legacies. In both, areas excluded from livestock, as well as areas exposed to herbivory and animal browsing. A total of 180 individuals were established, distributed in areas of high and medium fire severity. Monitoring was carried out every six months and included counting the number of shoots and measuring the height of each seedling. Preliminary results have shown that both height and number of shoots tend to be greater in areas more severely affected by fire, and within this condition, the presence of biological legacies is only relevant for the height of seedlings, especially one and a half years after planting. In areas of medium severity, *A. araucana* presented a somewhat slower growth in height and without an appreciable effect of biological legacies, as well as in the number of new shoots. There is an important effect on the height of seedlings and shoots number, which is greater in conditions excluded from livestock, predominantly in areas of high fire severity. These results indicate the good post-fire response of *araucaria* when planted, being an effective strategy for the recovery and restoration of burned forests.

Financing: ANID Basal FB210015 (CENAMAD), DIUFRO Project DI20-0066

Genuine high-order interactions in brain networks and neurodegeneration

Interacciones de alto orden genuinas en redes cerebrales y neurodegeneración.

Rubén Herzog Amunátegui^{1,2}, Fernando Rosas^{2,3,4,5,6}, Robert Whelan⁷, Sol Fittipaldi¹, Hernando Santamaria¹, Josephine Cruzat^{1,2}, Agustina Birba^{8,9}, Sebastian Moguilner¹, Enzo Tagliazucchi^{1,8}, Pavel Prado¹, Agustín Ibáñez^{1,10}

(1) Latin American Brain Health (BrainLat), Universidad Adolfo Ibáñez, Santiago, Chile.

(2) Fundación para el Estudio de la Conciencia Humana (EcoH), Chile.

(3) Centre for Psychodelic Research, Department of Brain Sciences, Imperial College London, UK.

(4) Data Science Institute, Imperial College London, UK.

(5) Centre for Complexity Science, Imperial College London, UK.

(6) Department of Informatics, University of Sussex, Brighton, UK.

(7) Trinity College Institute of Neuroscience, Trinity College Dublin, Ireland.

(8) Buenos Aires Physics Institute and Physics Department, University of Buenos Aires, Buenos Aires, Argentina.

(9) Cognitive Neuroscience Center (CNC), Universidad de San Andrés & CONICET, Buenos Aires, Argentina.

(10) Global Brain Health Institute (GBHI), University of California San Francisco (UCSF), California, US.

A more complete understanding of collective dynamics in brain networks is hampered by the reliance on pairwise-based interactions. Here, we used developed a genuine (non-pairwise derived) high-order functional connectivity (HOFC) metric that captures interactions from triplets to n-plets across spatiotemporal scales. We applied HOFC to multimodal (electroencephalography and functional magnetic resonance imaging) data from patients diagnosed with behavioral variant frontotemporal dementia (bvFTD), Alzheimer's disease (AD), and healthy controls. HOFC revealed large effect sizes, surpassing standard pairwise metrics of connectivity in predictive power and parsimony. Classification accuracy was comparable with traditional dementia biomarkers and was robust against diverse confounders. The multimodal characterization of AD and bvFTD revealed an unbalanced contribution of hypo/hyperconnectivity, larger relevance of slow temporal scales, disruptions of large-scale networks, and focal effects on brain hubs. This work provides a novel method for studying genuine HOFC at multiple spatiotemporal scales, which yields new insights into brain networks in disease.

Financing: Takeda Grant CW2680521;

COMUNICACIONES LIBRES III

SOCIEDAD CHILENA DE NEUROCIENCIA

Neuronal lactate levels depend on glia-derived lactate during high brain activity in *Drosophila*

Andrés González-Gutiérrez¹, Andrés Ibacache¹, Andrés Esparza¹, Jimena Sierralta¹

(1) Universidad de Chile, Biomedical Neuroscience Institute, Medicine, Independencia 1027, Independencia, Chile

Lactate/pyruvate transport between glial cells and neurons is thought to play an important role in how brain cells sustain the high-energy demand that neuronal activity requires. However, the *in vivo* mechanisms and characteristics that underlie the transport of monocarboxylates are poorly described. In this work, we use *Drosophila* expressing genetically encoded FRET sensors to provide an *ex vivo* characterization of the transport of monocarboxylates in motor neurons and glial cells from the larval ventral nerve cord. We show that lactate/pyruvate transport in glial cells is coupled to protons and is more efficient than in neurons. Glial cells maintain higher levels of intracellular lactate generating a positive gradient toward neurons. Interestingly, during high neuronal activity, raised lactate in motor neurons is dependent on transfer from glial cells mediated in part by the previously described monocarboxylate transporter Chaski, providing support for *in vivo* glia-to-neuron lactate shuttling during neuronal activity. Now, we are focused in unraveling the role of monocarboxylate transport in the production of ATP in neurons during basal and high brain activity.

Financing: FONDECYT Iniciación 11200477 (to AGG)

Aumento de la conectividad en banda delta como marcador de deterioro de las funciones ejecutivas en población socialmente vulnerable

David Huepe Artigas¹, Andrés Canales-Johnson^{2,3}, Tristán Bekinschtein³, Álvaro Rivera-Rei¹, Fabienne dos Santos Sousa³, Pierre Musa Wessel³

(1) Universidad Adolfo Ibáñez, Centro de Neurociencia Social y Cognitiva (CSCN), Psicología, Diagonal las Torres 2640, Peñalolén, Santiago, Chile

(2) Universidad Católica del Maule, Vicerectoría de Investigación y Posgrado, Talca, Chile

(3) University of Cambridge, Department of Psychology, Psychology, Cambridge, UK

Studies investigating neurocognitive and executive functions (EF) characteristics in the general and clinical population are relatively abundant. However, very little has been described in socially vulnerable populations (people who live in conditions of social deprivation, low socioeconomic level, and chronic social stress context), being important to know its functioning for social adaptation. It is known that EF show lower performance in clinical and psychopathological risk populations. Still, less evidence exists about socially vulnerable non-clinical people. Similarly, brain markers such as connectivity in alpha, theta, delta, and beta bands are related to dysfunction in EF. Specifically, increased power in low-frequency oscillations (delta and theta) are found in subjects with mild traumatic brain injury, particularly in the 4–10 Hz range (Dunkley, et., al., 2015). According to the above, it would be expected to find such marks in socially vulnerable groups, because this population is exposed to contexts of chronic stress and disadvantages in cognitive stimulation. In a sample of 76 participants (N = 38 socially vulnerable people vs control group), we took resting-state EEG and FE measurements. Our preliminary results showed significant connectivity differences phase synchrony in delta and beta bands, as well as scores for FE in the expected direction. This study would be the first to pay attention to cognitive functions in this kind of population.

Financing: ANID/FONDECYT Regular 1201486

Self-initiated motor acts improve visual processing in the primary visual cortex of the rat

Los actos motores autoiniciados mejoran el procesamiento visual en la corteza visual primaria de la rata

Pedro Maldonado^{1,2}, Carolina Lindsay Brain¹, Samuel Madariaga Roman^{1,2}, Catalina Murua², Jose Luis Valdes¹

(1) Universidad de Chile, Neurociencia, Medicina, Independencia 1027, Santiago, Chile

(2) Centro Nacional De Inteligencia Artificial (CENIA), RL3, Independencia 1027, Santiago, Chile

Our brain constructs what we perceive. This construction depends on external stimuli, internal states, and behavior. While external sensory stimuli can be presented suddenly to a sensory surface, our motor actions are often responsible for triggering sensory stimuli. This motor-triggered perceptual process is known as Active Sensing. The primary visual cortex (V1) is the first cortical area to represent visual sensory information. Its neural activity is modulated by motor acts, favoring optimal and fast visual processing. However, the mechanisms underlying active sensing effects over V1 neural dynamics are still unknown. We hypothesize that in active sensing, the V1 evoked response to a visual stimulus triggered by a self-initiated motor act would be modulated in timing, improving input detection. To elucidate the mechanisms, we conducted behavioral and electrophysiological analysis on rats performing a visuomotor task during active or passive conditions. Behavioral tests showed better performance on the visual detection task when a motor act actively triggered the stimulus onset than in passive sensing. Through chronic multisite recordings in V1 of freely behaving rats performing the task, we observed different amplitude and timing of the stimulus-evoked potentials (EP) at each sensing condition. This study shows a motor-dependent timing modulation of V1 neural activity underlying active sensing, prompting better visual detection. Interestingly, an N300-like peak followed by a slow oscillatory activity was observed only in active sensing. Furthermore, the timing of the N300-like peak is associated with shorter reaction times in the task.

Financing: Doctoral ANID grant 21200230 and FONDECYT REGULAR 1190318

EEG whole-brain modeling and perturbational approach for understanding functional disturbances in neurodegenerative diseases

Carlos Coronel-Oliveros^{1,2}, Pavel Prado¹, Raúl González¹, Josephine Cruzat¹, Rubén Herzog¹, Patricio Orio^{2,3}, Enzo Tagliazucchi^{1,4}, Agustín Ibáñez^{1,4,5,6,7}

- (1) Latin American Brain Health Institute (BrainLat), Universidad Adolfo Ibáñez, Facultad de Psicología, Santiago, Chile
- (2) Centro Interdisciplinario de Neurociencia de Valparaíso (CINV), Universidad de Valparaíso, Facultad de Ciencias, Valparaíso, Chile
- (3) Instituto de Neurociencia, Universidad de Valparaíso, Facultad de Ciencias, Valparaíso, Chile
- (4) Buenos Aires Physics Institute and Physics Department, Universidad de Buenos Aires, Faculty of Sciences, Buenos Aires, Argentina
- (5) Cognitive Neuroscience Center (CNC), Universidad de San Andrés, Buenos Aires, Argentina
- (6) Trinity College Institute of Neuroscience, Trinity College Dublin, Dublin, Ireland
- (7) Global Brain Health Institute (GBHI), University of California San Francisco (UCSF), San Francisco, California, United States

Neuroimaging biomarkers are intensively investigated in Alzheimer disease (AD) and the behavioral variant frontotemporal dementia (bvFTD). These biomarkers are critical for the timely diagnosis and characterization of neurodegenerative diseases (NDs). However, advanced ND biomarkers are expensive and not widely available in Latin America, an underrepresented region in dementia research. EEG emerges as a promising alternative for the characterization of NDs, due to its low-cost, non-invasiveness, portability, and wide availability in clinical research. The aim of our work was to characterize the functional alterations in AD and bvFTD using a whole brain semi-empirical modeling of EEG. Demographic-matched data were collected via the Dementia Latin American Consortium (ReDLat; AD = 31, bvFTD = 18, Control = 46). Using metaconnectivity, we found specific subnetworks of brain regions compromised in AD and bvFTD, yielding a 100% of accuracy in classifying each group of patients. Brain dynamics also turned more “viscous” (uncoordinated) in patients. Next, we used a whole-brain model (Jansen & Rit model) to simulate the functional disturbances in AD and bvFTD. The model showed that reduced structural integration could be a possible cause of the changes observed in AD and bvFTD. Finally, in-silico stimulation was used to drive the AD and bvFTD models near to the operating point of healthy controls, identifying key regions involved in those transitions. Our work suggests new possible EEG biomarkers for characterizing AD and bvFTD, linking the functional disturbances in patients to alterations in the connectome, and evidencing possible anatomical targets to restore the normal brain function.

Financing: Latin American Brain Health Institute (BrainLat), Universidad Adolfo Ibáñez

A novel approach to follow functional connectivity dynamics during the development of hiPSC-derived neural networks through calcium-imaging and genetically encoded calcium indicators.

Novedoso enfoque para seguir dinámicas de conectividad funcional durante el desarrollo de redes neuronales desde hiPSC utilizando calcium imaging e indicadores de calcio genéticamente codificados

Sebastian Arizabalos Campos¹, Kris Blanchard Tapia¹, Bárbara Casas Átala¹, Magdalena Sanhueza Toha², Verónica Palma Alvarado¹

- (1) Universidad de Chile, Biología, Ciencias, Laboratorio de Células Troncales y Biología del Desarrollo, Las Encinas #3370, Santiago, Chile
- (2) Universidad de Chile, Biología, Ciencias, Laboratorio de Fisiología Celular, Las encinas #3370, Santiago, Chile

Calcium imaging experiments represent a powerful tool to study neuronal activity at different scales, from subcellular compartments to multiscale

neural networks, *in-vivo* and *in-vitro*. However, synthetic calcium indicators only allow addressing the properties of neuronal communication at a specific and fixed stage of network development.

The recent advent of genetically encoded calcium indicators (GECIs) applied to Human Induced Pluripotent Stem Cells (hiPSCs)-derived neuronal cultures allows following emerging neuronal activity from days to months. Here we present an improved methodology based on the use of the GECI GCaMP7s under the control of the hSYN (human Synapsin) promoter via AAV9 viral vector transduction in hiPSCs-derived long-term neuronal cultures.

Our results show that we can successfully study the evolution of network communication dynamics during the formation and establishment of a given network for over 20 weeks *in-vitro*. Additionally, we have designed customized software for the automatic identification of GCaMP7s expressing neurons, measurement of fluorescence transients as a function of time, detection of the onset and offset of the signals, and the determination of the network's functional connectivity and its dynamics, allowing repetitively manipulation of the system during the experiment, or further study via whole-cell electrophysiological recordings. Our results are setting the ground for future studies addressing the organization of the emergent neuronal networks during brain development and disease.

Financing: Funding: Fondecyt N° 1190083 & 1221522 (VP).

Transcriptional profiling of thermo-sensitive DRG neurons in healthy and oxaliplatin-induced neuropathic conditions

Transcriptoma de las neuronas termosensibles: caracterización molecular y funcional en condiciones fisiológicas y en la neuropatía periférica inducida por el agente quimioterapéutico oxaliplatino

Ana Gómez del Campo^{1,2}, Salvador Sala¹, Félix Viana¹, Ana Gomis¹

(1) Instituto de Neurociencias de Alicante, Universidad Miguel Hernández-CSIC, 03550, San Juan de Alicante, Spain

(2) Departamento de Biología Santiago, Facultad de Química y Biología, Universidad de Santiago de Chile, 9160000, Santiago, Chile

Most transduction mechanisms for detecting cold environment changes depending on the ion channel's transient receptor melastatin 8 (TRPM8). TRPM8 expressing neurons constitute a well-characterized small population of primary sensory neurons, which detect innocuous cooling and mostly lack nociceptive markers. Although transcriptomic studies have recently identified different molecular TRPM8(+) neurons, they fail to correlate with cold-sensitive neurons' properties studied functionally over decades. Imaging calcium experiments have described at least two thermosensory populations; low- and high-threshold cold receptors involved in innocuous or pain cold transduction, respectively.

To address this question, we used fluorescence-activated cell sorting (FACS) in a transgenic mouse line expressing EYFP under the TRPM8 promoter to purify and sequence TRPM8-expressing DRG neurons in healthy and neuropathic conditions. After validation using RNAscope and comparing with recent scRNA-Seq studies in the somatosensory system, we have molecularly identified a subset of peptidergic TRPM8(+). These neurons express lower levels of TRPM8, coherent with a lower sensitivity to cold and cooling compounds (e.g., menthol). Moreover, the genetic alterations obtained after oxaliplatin-induced peripheral neuropathy suggest their contribution to the development of cold hypersensitivity during neuropathic conditions.

Financing: Supported by the European Regional Development Fund (ERDF), the "Severo Ochoa" Program SEV-2017-0723, and the predoctoral fellowship BES-2014-070394. Sponsored by M. Pertusa and R. Madrid.

A visuo-audio-motor route for lip-reading: fMRI and tractography analyses

Maëva Michon^{1,2}, Andrés Libersona¹, Francisco Zamorano³, Pablo Billeke³, Francisco Aboitiz¹

(1) Laboratorio de Neurociencia Cognitiva y Evolutiva, Escuela de Medicina, Pontificia Universidad Católica de Chile

(2) Centro de Estudios en Neurociencia Humana y Neuropsicología, Facultad de Psicología, Universidad Diego Portales

(3) Centro de Investigación en Complejidad Social, Facultad de Gobierno, Universidad del Desarrollo

A third visual pathway (TVP) was recently identified in both human and non-human primate's right hemisphere that is proposed to support the visual processing of biological motion (eg., bodies and faces movements). The TVP projects on the lateral surface on the brain from V1 to the anterior portion of the temporal lobe via the superior temporal sulcus (STS), a region known for its role in multimodal associations. The aim of the current fMRI study is to explore the possible recruitment of the TVP for multimodal integration of speech perception. More specifically, we compared BOLD signal changes in 25 healthy participants performing a lip-reading task. In the lip-reading task, the correct identification of silently articulated words elicited a significant increase of BOLD signals in the left inferior frontal gyrus (pars opercularis and triangularis), left precentral gyrus, bilateral paracingulate gyri and interestingly in the temporal voice area, within the left STS. These results support the existence of a brain circuit in the left hemisphere that allows the recovery of auditory counterpart of the silently pronounced words. Connectometry analyses were performed on diffusion tensor images,

revealing a positive correlation ($FDR < 0.05$) between participants' lip-reading accuracy and quantitative anisotropy of two white matter tracts of interest, namely the left inferior fronto-occipital fasciculus (IFOF) and the left arcuate fasciculus (AF). The results are discussed in the frame of a trimodal network for speech perception and production.

Financing: Proyecto ANID N° 3201057

More than the sum of the parts: multi-frequency oscillations emerge from synergistic integration in canonic cortical columns

Más que la suma de las partes: las oscilaciones multi-frecuencia emergen de la integración sinérgica en las columnas corticales canónicas

Samy Castro^{1,2}, Markus Helmer³, Ruben Herzog^{4,5}, Fred Wolf⁶, Demian Battaglia^{1,2,7}

(1) Université de Strasbourg, faculté de psychologie, 12 Rue Goethe, Strasbourg, France

(2) University of Strasbourg Institute for Advanced Studies (USIAS), 5 allée du Général Rouvillois, Strasbourg, France

(3) Yale University, Connecticut, USA

(4) Universidad de Valparaíso, Ciencias, 1111 avenida Gran Bretaña, Valparaíso, Chile

(5) Universidad Adolfo Ibáñez, Psicología, Santiago, Chile

(6) MPI Dynamics & Self-Organization, Göttingen, Germany

(7) Institut de Neurosciences des Systèmes, Université Aix-Marseille, 27 Bd Jean Moulin, Marseille, France

Oscillatory coherence mediates flexible multi-frequency cortico-cortical interactions. Bottom-up and top-down influences along the cortical hierarchy rely, respectively, on faster or slower frequency bands. Besides the observation that directed functional connectivity (dFC) does exploit multiple frequencies, it is not clear why this should be the case. Simple explanations for the frequency-specificity of dFC rest in the layered organisation of the cortex. Our computational modelling suggests that inter-layer interactions are sufficient to cause deeper layers to oscillate at a slower frequency even when all interneurons are homogeneous and resonating at a fast frequency. Thus, we explore the dynamical regimes of a set of randomized canonic cortical columns and find that only 0.125% of the tested connectomes are “good” (including a phase with empiric-like frequency-specific dFC). Thus, the frequency-specific dFC emerges as a “*free lunch*” in the model when cortical layers are wired according to the empirical cortical column but not for arbitrary connectomes. We hypothesise that the wiring of the cortical column is constrained to achieve strong integration realized by synergies between different layers. We reveal that “good” connectomes are associated with maximal s-information, proportional to “high integration”; and minimal o-information, denoting a dominance of synergistic over redundant interactions. Indeed, dynamical regimes with peaks of s- and o-information co-localize with the regimes of frequency-specific dFC. The fact that frequency-specificity of dFC emerges could thus be not an aim per se but a trait of non-trivial dynamical regimes occurring only in canonic connectomes because they allow the emergence of synergistic-integrated interactions.

Financing: SC and DB have the USIAS-Fellows 20-D Battaglia.

COMUNICACIONES LIBRES IV

SOCIEDAD DE BIOLOGIA DE CHILE

Biotic interaction in leopardus guigna, niche models to assess the effects of climate change and land use

Francisca Zamora-Cornejo¹, Enrique Rodríguez-Serrano¹, Daniela Lazo-Cancino¹, Reinaldo Rivera², Cristián E. Hernández¹

(1) Universidad de Concepción, Departamento de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Barrio Universitario s/n, Concepción, Chile

(2) Instituto Milenio de Oceanografía (IMO-Chile), Departamento de Oceanografía, Facultad de Ciencias Naturales y Oceanográficas, Casilla 1313, Concepción, Chile

The güiña (*Leopardus guigna* (Molina, 1782)), a feline restricted to the Valdivian Forest and Chilean scrubland, has been considered highly vulnerable to climate change and anthropization. Several studies estimate up to 40% of its habitat loss shortly. However, recent evidence suggests it could be quite resilient to these adverse factors. The recent extension of the northern limit confirms its presence in the Coquimbo region and its dietary flexibility to exploit new resources in anthropized areas. We propose that range contractions driven by climate change and anthropogenic factors are (will be) mitigated by prey availability, allowing this felid to prevail in anthropized and climatically suboptimal scenarios. To this end, we evaluated how climate change, anthropogenic pressure, and prey availability influence the range of the güiña using ecological niche modeling. Species occurrence records, three sets of predictors (anthropogenic, biological, and climatic), and two temporal scenarios (present and future) based on the Shared Socioeconomic Pathways (SSPs26-2100 and 85-2100) were used to generate distribution models applying the method of maximum entropy distribution modeling.

Financing: FONDECYT 1220998; VRID 220.113.11-INV

Characterization of the two Main Olfactory Structures of a Native Cockroach: Antennal lobes and Mushroom Body in *Moluchia brevipennis*.

Caracterización de dos estructuras olfativas en una cucaracha Nativa: Lobulo antenal y cuerpos fungiformes de *Moluchia brevipennis*.

Violeta Sotomayor Lisboa¹, Natalia Márquez Aguayo¹, Constanza Schapheer Carrasco², Cristian Villagra Gil³, Jorge Mpodozis Marín¹

(1) Universidad de Chile, Departamento de Biología, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

(2) Universidad de Chile, Departamento de Silvicultura y Conservación de la Naturaleza, Facultad de Ciencias Forestales y Conservación., Av. Santa Rosa 11315, Santiago, Chile

(3) Universidad Metropolitana de las ciencias de la Educación, Departamento de Biología, Instituto de Entomología, Av. José Pedro Alessandri 774, Santiago, Chile

Despite that insect species share a similar nervous system, important differences in brain morphology have been associated with evolutionary history, lifestyle and trophic ecologies. Olfactory structures such as the antennal lobe (AL) and mushroom bodies (MB) are some of the structures that differ between and within species. The AL is formed by glomeruli, neuropiles where olfactory sensory neurons synapse with projection neurons (PNs), whereas MB are integrative centers receiving projections from PNs. In four insect groups, including cockroaches, the enlargement of MB and calyx duplication has been proposed to be related to a generalist feeding ecology. Most studies on cockroaches have been performed on household pests. Wild cockroaches, however, are found in diverse natural ecosystems and display a wide variety of lifestyles, making them an interesting case of study. The endemic cockroach *Moluchia brevipennis*, naturally inhabits in the sclerophyllous forest and coastal shrub land from central Chile. Only recently it has been found in eucalyptus plantations. We first determined *M. brevipennis*' trophic position, using stable isotope analysis. Then, we characterized AL and MB neuroanatomy combining immunohistochemical techniques, confocal microscopy and 3D brain reconstruction. We found that the wild cockroaches are detritivores, and have ~95 glomeruli, less than half reported for the omnivorous pest cockroaches. We propose that the neuroanatomical differences between these species are caused by the contrasting diets and might result in unique olfactory perception. This study is the first approach to evaluate structural changes in populations of Chilean cockroaches from natural and perturbed habitats.

Financing: Proyecto Fondecyt: 11210069. Jorge Mpodozis Marín. Proyecto Rufford: 29177-B. Constanza Schapheer Carrasco. National Geographic Grant: WW-061R-17. Cristian Villagra.

Environmental and anthropogenic factors determining the functional, phylogenetic and taxonomic α -diversity of the perennial flora in the aridity gradient of Chile

Factores ambientales y antrópicas determinantes de la diversidad α funcional, filogenética y taxonómica de la flora perenne en el gradiente de aridez de Chile

Paola Poch¹, Luis Felipe Hinojosa¹, Elie Poulin¹

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile.

Assessing the effect of environmental factors on the distribution of α -diversity (functional, phylogenetic, and taxonomic) of the perennial flora in arid and semi-arid areas of Chile is important for formulating more effective strategies for long-term conservation. In this research, we ask which environmental variables are most predictive of α -diversity patterns (functional, phylogenetic, and taxonomic)? What kind of relationship exists between spatial patterns of α -diversity and its main explanatory factors?

Geographical patterns of taxonomic (TD), phylogenetic (PD), and functional (FD) diversity, as well as taxonomic (WE), phylogenetic (PE), and functional (FE) endemism of perennial flora from the regions of Arica-Parinacota to Coquimbo were evaluated. Environmental factors (climate and soils) were derived from 54 raster variables. We applied Random Forest (RF) methods to determine the variables of importance predicting the different dimensions of diversity α and Local Bivariate Relationships (LBR) were used to assess the type of relationship (positive, negative, concave, or convex).

The main results indicate that the three dimensions of diversity (TD, PD, and FD) have a high association ($r^2 > 0.87$). In contrast, WE have a low association with PE and EF ($r^2 < 0.16$). In general, the most important variables in explaining diversity and endemism are current and historical climate (stability in precipitation from the LGM to the Anthropocene), spatial variability of cloud cover, and soil cover (pH100 m) with a generally positive relationship.

Financing: Acknowledges: FBN 023/2017, FONDECYT 1221214; 1211765

The “Brown World Hypothesis” – revisiting the importance of microbially mediated energy flow

Philip Manlick², Alexi Besser¹, **Seth Newsome¹**

(1) University of New Mexico, Biology Department, Albuquerque, NM, USA

(2) United States Forest Service, Pacific Northwest Research Station, Juneau, AK, USA

Hairston et al.'s (1960) “green world hypothesis” famously proposed that ecosystems are green due to top-down predation that limits herbivory and regulates trophic structure. As the ecology of predation and its influence on food webs has progressed, earlier hypotheses like Lindeman's (1942) “trophodynamics” – where food webs are regulated via bottom-up processes like microbial decomposition and the thermodynamics of energy transfer – are often overlooked. However, increasing evidence suggests microbial decomposers in so-called “brown” food webs are key to regulating energy flow in many ecosystems by transforming recalcitrant plant matter (e.g., cellulose) into digestible, and in some cases essential, nutrients like amino and fatty acids. In this perspective, we will propose a new “Brown Energy Hypothesis” that illustrates the importance of microbial energy for food web structure. Emerging techniques like compound-specific stable isotope analyses and DNA metabarcoding now provide insights on foraging and energy flow at unprecedented spatiotemporal scales, and we will develop novel insights from these advances to show that brown energy structures food webs. We will highlight the importance of microbially mediated energy in shaping ecological and physiological processes across levels of biological organization, including empirical examples from gut microbiomes, trophic niche partitioning, and food chain length. Lastly, we will explore the impact of global change and demonstrate how anthropogenic disturbances like climate change, antibiotic pollution, and agricultural intensification are likely altering the microbially mediated flow of energy across ecosystems, with consequences for community and food web structure.

Financing: Dr. Manlick was an National Science Foundation Postdoctoral Fellow studying the impact of brown energy on alpine and arctic food webs (DBI-2010712)

Individual specialization and trophic niche variation in two sympatric cormorants during the breeding season

Especialización individual y variación de nicho trófico en dos cormoranes simpátricos durante la época reproductiva

Gabriela Piriz¹, Edwin Niklitschek², Karin Maldonado³

(1) Universidad de Los Lagos, Programa de Doctorado en Ciencias, mención Conservación y Manejo de Recursos Naturales., Chiquihue km. 6, Puerto Montt, Chile

(2) Universidad de Los Lagos, Centro i-mar, Chiquihue km. 6, Puerto Montt, Chile

(3) Universidad Adolfo Ibáñez, Departamento de Ciencias, Facultad de Artes Liberales., Diagonal Las Torres 2640, Santiago, Chile

La teoría del nicho predice que especies similares que viven en simpatria deberían diferenciarse en algunos de los ejes del hipervolumen de n-dimensiones que conforma su nicho ecológico. Similarmente, es posible que la diferenciación de nicho ocurra a nivel individual dentro de las poblaciones. Esta especialización individual (EI) ocurre cuando los individuos utilizan un subconjunto de los recursos de la población por razones no atribuibles al sexo, la clase de edad o morfotipo. El objetivo fue determinar la variación de nicho trófico a nivel individual y poblacional, en dos especies de cormoranes simpátricos durante la época reproductiva. Para llevar a cabo esto, se midió y comparó el nicho isotópico individual y poblacional de las especies *Poikilocarbo gaimardi* y *Leucocarbo atriceps*, utilizando la composición relativa de los isótopos estables ¹⁵N y ¹³C en tejidos con diferentes tasas de recambio. Se observó que *L. atriceps* tiene una amplitud de nicho mayor que *P. gaimardi*, y la sobreposición de nicho fue casi completa, existiendo una mayor proporción de nicho utilizado solo por *L. atriceps*. Dentro de las especies no se encontró EI, siendo *L. atriceps* una población con individuos más generalistas que *P. gaimardi*. Esto puede ser explicado por la teoría del forrajeo óptimo, que sugiere que,

con menos recursos disponibles, la amplitud del nicho aumenta. Así, en ambientes altamente productivos pero variables en el espacio-tiempo, ser un generalista puede ser clave para encontrar presas móviles, aunque esto aumenta el potencial de competencia dentro y entre especies simpátricas.

Financing: Beca ANID Doctorado Nacional #21211645

The role of climate stability in the origin and maintenance of caviomorph rodent's richness patterns

El rol de la estabilidad climática en el origen y mantención de los patrones de riqueza de los roedores caviomorfos

Paula Roa Martínez¹, Reinaldo Rivera Jara¹, Cristián Hernández Ulloa¹

(1) Universidad de Concepción, Zoología, Ciencias Naturales y Oceanográficas, Víctor Lamas 1290, Concepción, Chile

In this study, we test the predictions of the historical climate stability hypothesis using the geographic records of caviomorph rodents, one of the most diverse groups of rodents in the Neotropics. We first evaluate the species richness patterns (Hot spot, Cold spot and LGD); and based on the precipitation and temperature stability of present and historical climate data (from 20 to 2 thousand years BP) we evaluate its effect on species richness using multiple regression models (e.g. SAR) selected through the Akaike information criterion. The results show areas of high and low specific richness, but not supporting the classical LDG. Regarding the climatic stability hypothesis, the analyzes suggest a joint effect of climatic variables of the present and historical climatic stability on the observed diversity (p value less than 0.01 of the selected model). Most of the variability in the model is explained by the bioclimatic variables of the present, climate stability variables were not significant alone (p value greater than 0.05). We don't support the historical climate stability hypothesis, but it is likely that the variables analyzed have a synergistic effect with other variables not included in this study and other processes are driven the distribution of species richness in this group.

Financing: FONDECYT 1201506

COMUNICACIONES LIBRES V

SOCIEDAD DE ECOLOGIA DE CHILE

Ecological interactions between guanacos and sheep in the patagonian steppe: implications for animal production and conservation of biodiversity

Interacciones ecológicas entre guanacos y ovejas en la estepa patagónica: implicancias para la producción y conservación de la biodiversidad

Paulo Corti¹, Sergio Radic-Schilling², Miguel Salgado³, Alex Lancaster⁴, Achaz von Hardenberg⁴, Claudio Moraga⁵, Manuel Ruiz-Aravena⁶

(1) Universidad Austral de Chile, Laboratorio de Manejo y Conservación de Vida Silvestre, Instituto de Ciencia Animal, Facultad de Ciencias Veterinarias, Valdivia, Chile

(2) Universidad de Magallanes, Departamento de Ciencias Agropecuarias y Acuícolas, Facultad de Ciencias, Punta Arenas, Chile

(3) Universidad Austral de Chile, Instituto de Medicina Preventiva Veterinaria, Facultad de Ciencias Veterinarias, Valdivia, Chile

(4) University of Chester, Conservation Biology Research Group, Department of Biological Sciences, Faculty of Medicine and Life Sciences, Chester, United Kingdom

(5) Centro de Estudios del Cuaternario de Fuego-Patagonia y Antártica (Fundación CEQUA), Punta Arenas, Chile

(6) Cornell University, Department of Public and Ecosystem Health, College of Veterinary Medicine, Ithaca, NY, United States of America

Livestock production is one of the most important land uses in the world and its intensity affects the environment and wild herbivores in co-grazing. Wild herbivores are considered competitors for using the same forage resources, being the most recurrent interaction. Therefore, this research evaluated interactions between guanacos (*Lama guanicoe*) and sheep in the Patagonian steppe. We estimated a high diet overlap between species (~97%), but with low item variability. Sheep did not modify their trophic niches, but guanacos in co-grazing did. Sheep were behaviorally affected by their own density, seasonality, and food availability, but not by guanaco density. Guanacos increased foraging in areas without sheep and moved less without them, suggesting less forage selectivity in shared areas. Sanitarily, the pathogen *Mycobacterium avium paratuberculosis*, present in feces of both species, had 5.0-92.5% prevalence, with variations between species, seasons, and shared or unshared sites. Although this bacterium circulates in

both populations with self-sustained transmission, its excretion was higher in sheep sites, suggesting sheep as the main infection source. Intraspecific competition seemed more important in sheep production than the presence of guanacos. These results contribute to the growing knowledge for resolving wildlife-livestock herbivore conflicts globally.

Financing: FONDECYT 1171039, Facultad de Ciencias Veterinarias Universidad Austral de Chile, VIDCA Universidad Austral de Chile

How do protected areas contribute to human well-being?: perspectives of the local stakeholders

¿Cómo contribuyen las áreas protegidas al bienestar humano?: perspectivas desde los actores claves del territorio

Francisco Zorondo-Rodríguez¹, Gloria Rodríguez-Gómez¹, Kattia Mendoza¹, Jose Luis Llanos-Ascencio¹, Loreto F. Fuenzalida³, Maria Jesus Diaz¹, Marco Cornejo¹, Fernando Campos², Carla Louit², Paula Martínez², Katerina Varas², Renzo Vargas², Jorge Zamorano⁴

(1) Universidad de Santiago de Chile, Departamento de Gestión Agraria, Facultad Tecnológica, Santiago, Chile

(2) Corporación Nacional Forestal, Chile

(3) Universidad Autónoma de Chile, Instituto de Ciencias Biomédicas, Facultad de Ciencias de la Salud, Santiago, Chile

(4) Universidad de Playa Ancha, Departamento de Ciencias y Geografía, Facultad de Ciencias Naturales y Exactas, Valparaíso, Chile

Las áreas protegidas (APs) pueden ser tan efectivas en apoyar al bienestar humano como para conservar biodiversidad. Analizamos los mecanismos sobre cómo las APs aportan al bienestar humano de comunidades locales, desde las perspectivas de actores sociales. Se analizan los casos del Parque Nacional Bosque Fray Jorge, Reserva Nacional Federico Albert, RN Los Ruiles, y RN Los Queules. Un análisis de contenido de entrevistas semi-estructuradas a más de 60 actores claves sugirió tipos de contribuciones de la naturaleza (NCP, tanto materiales, inmateriales, y regulación) aportadas por APs y dimensiones del bienestar satisfechas por APs. Mientras las contribuciones de regulación tienen >60% de menciones en PN Bosque Fray Jorge, RN Los Ruiles y RN Los Queules, las contribuciones inmateriales recibieron un 75% de menciones en RN Federico Albert. Por su parte, bienestar subjetivo, educación, y participación fueron las dimensiones del bienestar con mayor frecuencia de mención (>70% en conjunto) en las cuatro APs. El aporte a dimensión de salud (15% de mención) y espiritual (30%) fueron relevantes en PN Bosque Fray Jorge y RN Los Queules, respectivamente. Un análisis de co-ocurrencia sugiere que los principales mecanismos entre APs y bienestar se estructurarían entre mantención del hábitat con las dimensiones de bienestar subjetivo, educación, y participación. La NCP sobre aprendizaje e inspiración también es vinculado a las dimensiones de bienestar subjetivo, educación, y participación. Además del avance en conocimiento científico, los resultados ofrecen evidencia empírica para el diseño adaptativo de planes de manejo y procesos de toma de decisión.

Financing: DICYT-USACH 032075ZR.

Exploring the socio-environmental factors that affect the diversity of native birds in the city of Santiago.

Explorando los factores socioambientales que inciden en la diversidad de aves nativas en la ciudad de Santiago.

Catalina B. Muñoz-Pacheco^{1,2}, Nélida R. Villaseñor^{3,4}

(1) Universidad de Chile, Magíster Áreas Silvestres y Conservación de la Naturaleza, Facultad de Ciencias Forestales y de la Conservación de la Naturaleza, Av. Santa Rosa 11315, La Pintana, Santiago, Chile

(2) Universidad Central de Chile, Escuela de Arquitectura del Paisaje, Av. Toesca 1783, Santiago, Chile

(3) Universidad de Chile, Departamento de Gestión Forestal y su Medio Ambiente, Facultad de Ciencias Forestales y de la Conservación de la Naturaleza, Av. Santa Rosa 11315, La Pintana, Santiago, Chile

(4) Universidad Bernardo O'Higgins, Departamento de Ciencias Químicas y Biológicas, Av. Viel 1497, Santiago, Chile

In urban ecosystems, biodiversity may depend not only on environmental variables but also on social factors. In this study we explore the socio-environmental factors that affect the diversity of native birds in Santiago based on two causal hypotheses: 1) The socioeconomic level has an indirect effect on the biodiversity of birds through vegetation cover; 2) In addition to this indirect effect, socioeconomic status has a direct effect on birds. To do this, we sampled 120 sites over four seasons. At each sampling site, we recorded birds using 50m radius point counts and measured habitat variables using 11m and 50m radius plots. Hypothesis tests were carried out using Structural Equation Models, which involved native bird biodiversity (richness, abundance, and diversity), plant cover (woody cover at 50m, tree, shrub, and herbaceous cover), presence of pets (abundance of dogs and cats) as latent variables and socioeconomic factors as observed variable. We found that the second model better explains the diversity of birds in Santiago, where socioeconomic level indirectly influenced the diversity of native birds through vegetation cover (wood cover at 50m and tree cover), but also directly. Richer neighborhoods have greater vegetation cover and a greater diversity of birds than poorer neighborhoods. We didn't find a significant effect between the presence of pets and the diversity of birds. Therefore, variables closely related to humans would influence the diversity of birds. To

have a greater influence on urban planning and policies, human socioeconomic factors must be integrated into research on diversity in urban areas.

Financing: FONDECYT de Iniciación N° 11201045 "Understanding the relationship between socioeconomic status and biodiversity to promote an ecologically just city", Dra. Nélida Villaseñor

Adapting the “Global guidelines for the sustainable use of non-native trees” for their socialization with Stakeholders in South-Central Chile.

Adaptación de las “Recomendaciones globales para el uso sustentable de árboles no-nativos” para su socialización con partes interesadas en el Centro-Sur de Chile.

Barbara Andrea Langdon Fornet^{1,2}, Aníbal Pauchard Cortés^{1,2}, Ramiro Bustamante^{2,3}, Giuseppe Brundu⁴

(1) Universidad de Concepción, Laboratorio de Invasiones Biológicas, Facultad de Ciencias Forestales, Victoria 631, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Chile

There are several initiatives which propose forest recovery aiming to fight, for example, climate change, soil degradation, and restoration of highly disturbed landscapes. This is in addition to the traditional uses these species have in forestry, horticulture, or as ornamental species. Despite the good intentions, the possibility exists that negative impacts occur when the wrong species are planted in wrong places, risking ecosystems and society. In this context that the “Global Guidelines for the sustainable use of non-native trees to prevent tree invasions and mitigate their negative impacts” were developed by Brundu et al. in 2020. Our aim is to adapt and present these guidelines for their socialization with main stakeholders working with non-native trees in South-Central Chile. To complement these recommendations, we are making available, the potential distribution of 25 non-native common tree species in South-Central Chile, based on global data of their climatic niches. All developed models present good or excellent fitting, based literature standards, making them a reliable source of information when planning for naturalized or invasive species management options. Furthermore, we present the invasion stage of 18 of the species based on their global and regional niches. We hope this work will contribute to the decision-making process and planning for the management of those species already negatively impacting our communities and ecosystems.

Financing: NERC-ANID NE/S011641/1, FONDECYT 31602444, ANID FB210006 y FB210018.

Co-production of a nature-based solution for the restoration of the Chilean intertidal to climate change

Co-producción de una solución basada en la naturaleza para la restauración del intermareal de Chile frente al cambio climático

Milen Duarte^{1,2}, Paula Miranda⁴, Marcelo Olivares⁵, Fabiola Miranda⁶, Rocío Ramírez¹, Fadia Tala³, Julio Vásquez³, Alejandra González¹

(1) Departamento de Ciencias Ecológicas, Facultad de Ciencias, Universidad de Chile.

(2) Instituto de Ecología y Biodiversidad, Facultad de Ciencias, Universidad Austral de Chile. Campus Isla Teja. Valdivia.

(3) Departamento de Biología Marina, Centro de Investigación y Desarrollo Tecnológico en Algas (CIDTA), Instituto Milenio en Socioecología Costera (SECOS), Facultad de Ciencias del Mar, Universidad Católica del Norte.

(4) ACUAIM, Chile.

(5) Instituto de Políticas Públicas, Universidad Católica del Norte

(6) Universidad Católica del Norte, Grupo de Ecología y Manejo de Recursos Departamento de Biología Marina, Larrondo 1281, Coquimbo, Chile

Para promover la restauración ecológica de macroalgas intermareales “Huiro”, este trabajo puso en práctica la metodología de enfoque ecosistémico: “co-producción de soluciones basadas en la naturaleza”. Para ello, se trabajó en 4 AMERBS de Chile central, que extraen y comercializan el “huiro” o *Lessonia spicata* (Chigualoco, M. de Talca) y *L. berteriana* (Toralillo Norte y Chigualoco). En ellas, se realizaron talleres utilizando metodologías participativas mixtas, enmarcados en el arte de liderar participativamente y la investigación acción participativa. Ambas permiten dar paso a la creación colectiva, aplicadas para generar una solución y a su vez generar compromiso de las personas sobre la restauración. La primera etapa de co-producción consistió en reconocer la sabiduría local asociada al manejo tradicional del “huiro”, resultado de ensayo/error de comunidades, los servicios ecosistémicos que ellos proveen y problemas ambientales. La segunda etapa, consistió en incorporar la tecnología basada en la naturaleza, en este caso macroalgas quiméricas para repoblamiento (Patente CL201701827), a partir del conocimiento técnico-científico, generando una sinergia de conocimientos, permitiendo la co-producción de la solución y mejoras en la actividad de restauración. Mientras que en la tercera etapa, se está poniendo en valor la solución co-producida, promovida para su replicación y escalamiento, y se generará un modelo de solución basada en la naturaleza, evaluado y consensado en un taller final.

Con este proceso pretendemos ser pioneros en generar impactos positivos en la restauración del “Huiro”, con nuevas tecnologías y manejo resiliente para enfrentar el cambio climático y la presión antrópica sobre este sistema natural.

Financing: Financiamiento: FONDEF ID20I10167, Packard 2021- 73304Agradecimientos: Proyecto ANID/BASAL FB210006

Diagnosis of the quality of primary biodiversity data published in GBIF-Chile

Diagnóstico de la calidad de datos primarios de biodiversidad publicados en GBIF-Chile

Marcelo Oyaneder¹, Paulette I. Naulin Gysling¹

(1) Universidad de Chile, Laboratorio de Biología de Plantas, Facultad de Ciencias Forestales y de Conservación de la Naturaleza, Santiago, Chile

Durante años se ha recopilado información sobre biodiversidad en diversas fuentes y formatos. El cambio climático, sobreexplotación, especies invasoras, enfermedades y otras situaciones amenazan la salud de los ecosistemas y el desarrollo humano. Es necesario contar con datos de biodiversidad confiables y accesibles. Si bien estos datos tienen una gran relevancia, la realidad es que datos de alto nivel científico no se les da la importancia necesaria en su procesamiento curatorial. Desde esto surgen conceptos interesantes como la calidad, la cual según GBIF, se define en base al cumplimiento de criterios y necesidades del usuario de una base de datos determinada. La calidad de datos primarios de biodiversidad en Chile fue analizada con todos los datos publicados por instituciones chilenas en GBIF-Chile hasta el 2020, basados en el análisis de calidad propuesto por GBIF. Los resultados muestran falencias en la georreferenciación de los datos (20%), la identificación de la colección o institución curadora de los datos (61%), en el reporte de origen geográfico de la especie (91%) e incompletitud o heterogeneidad de formato del reporte. Los datos pueden aumentar su calidad estandarizándolos, sin embargo, hay un conjunto de información que debe ser relevada desde la toma primaria de la observación y/o muestreo que maximiza su usabilidad y por ende su calidad de dato de biodiversidad. Un muestreo estandarizado y completo permite ahorrar tiempo y recursos en la gestión de datos, mejorando su calidad y por ende su usabilidad en la toma de decisiones de conservación.

¿Pueden los paisajes de uso mixto cumplir con los objetivos no alcanzados por las áreas protegidas? Desafíos y perspectivas desde Chile

Monica Ortiz¹, Eugenia Gayo^{1,2}, Aníbal Pauchard^{1,3}

(1) Instituto de Ecología y Biodiversidad, Facultad de Ciencias Forestales, Universidad de Concepción, Concepción, Chile

(2) Centro de Ciencia del Clima y la Resiliencia (CR)2, Santiago, Chile

(3) Laboratorio de Invasiones Biológicas (LIB), Facultad de Ciencias Forestales, Universidad de Concepción, Concepción, Chile

Chile es un país alto en biodiversidad. Esta biodiversidad es esencial para la provisión de servicios ecosistémicos, los aportes de la naturaleza a la cultura, la identidad y el bienestar de las personas. Para proteger esta biodiversidad, Chile cuenta con numerosas políticas, instrumentos y mecanismos legales para la conservación de la naturaleza. Las estrategias incluyen áreas protegidas del estado y áreas protegidas privadas. Sin embargo, una evaluación reciente de áreas protegidas muestra que aunque Chile cumple con el 17% de protección de ecosistemas de la Meta de Aichi, varios ecosistemas no están bien representados. Muchos de estos ecosistemas se encuentran en paisajes dominados por la agricultura y la silvicultura. La compatibilidad de las actividades humanas con la conservación aún no se comprende bien en la práctica, además que los incentivos para los propietarios privados son bajos. Aquí analizamos datos de uso de tierra para identificar áreas con potencial de “paisaje de uso mixto”, para lograr objetivos tanto para las personas como para la naturaleza. Con base en una revisión crítica y entrevistas con informantes clave, describimos los desafíos en estas regiones e identificamos áreas que necesitan más investigación para desarrollar y brindar intervenciones. Argumentamos que los paisajes agrícolas y forestales mixtos pueden apoyar la conservación y pueden llenar un vacío importante donde las áreas protegidas nacionales y privadas no amplían su cobertura. Sin embargo, se necesita urgentemente más apoyo e interés para realizar el potencial de estos paisajes mixtos para la conservación en el centro-sur de Chile.

Financing: Proyecto ANID/BASAL FB210006

Multiscale spatial analysis of headwater vulnerability in South-Central Chile reveals a high threat due to deforestation and climate change

Alberto Alaniz^{1,2}, Cecilia Smith-Ramírez^{3,4,5}, **Adriana Rendón-Funes Proyecto FB210006**^{3,4,6}, Claudia Hidalgo-Corrotea⁷, Mario Carvajal^{2,8}, Pablo Vergara⁸, Norka Fuentes Gonzalez⁹

- (1) Universidad de Santiago de Chile, Departamento de Ingeniería Geográfica, Facultad de Ingeniería, ., ., Chile.
(2) Pontificia Universidad Católica de Chile, ., Facultad de Ciencias Biológicas, ., Santiago, Chile.
(3) Universidad de Los Lagos, Departamento de Ciencias Biológicas y Biodiversidad, 1305 Av. Fuchslocher, Osorno, Chile.
(4) Instituto de Ecología y Biodiversidad-Chile (IEB), ., ., Las Palmeras 3425, Santiago, Chile.
(5) Universidad Austral de Chile, Instituto de Conservación Biodiversidad y Territorio, Facultad de Ciencias Forestales y Recursos Naturales, Isla Teja s/n, Valdivia, Chile.
(6) Museo de Historia Natural Alcide d'Orbigny, Área de Ecología, ., 1458 Av. Potosí, Cochabamba, Bolivia.
(7) Universidad de la Frontera, ., Facultad de Ciencias Agropecuarias y Medioambiente, ., Temuco, Chile.
(8) Universidad de Santiago de Chile, Departamento de Gestión Agraria, Facultad Tecnológica, ., Santiago, Chile.
(9) Universidad de Los Lagos, Departamento de Acuicultura y Recursos Agroalimentarios, ., Av. Fuchslocher 1305, Osorno, Chile.

Headwaters represent an essential component of hydrological, ecological, and socio-economic systems, by providing a constant source of water to the entire basin. However, there is a deficit of vulnerability assessments worldwide. Here, we assess the vulnerability of 2292 headwaters in South-Central Chile, at five spatial scales. We utilized remote sensing data related to Land Use and Cover Change (LUCC), using human disturbances, vegetation cover, climate change, potential water demand, and physiography as variables. We generated an index of vulnerability by integrating all the variables, which allowed us to map the spatial distribution of vulnerability within the headwaters. Finally, in order to estimate the main drivers of degradation, we performed a Principal Components Analysis with an Agglomerative Hierarchical Clustering, to group headwaters in clusters. The largest proportion of especially vulnerable headwaters are located in the northern part of our study area (Araucanía Region) with 48.1%, 62.1%, and 28.1% of headwaters classified as highly vulnerable at 0, 10, and 30 m scale, respectively. Climate Change (63.66%) and LUCC (23.02%) affect the greatest proportion of headwaters across all scales. We identified three clusters, where the northern cluster is primarily affected by LUCC, while the Andean and Coastal clusters are more affected by climate change. Our results and methods present an informative characterization of the current vulnerabilities within the studied headwaters, identifying spatial patterns and drivers at multiple scales. The approach developed in this study will be useful in the promotion of headwater restoration and conservation worldwide.

Financing: Thanks to ANID-PFCHA/Doctorado Nacional 2020-21201496 and 202021201494. This project was funded by API3 (Universidad de Los Lagos), AFB210006 from ANID and Grant ANID/BASAL FB210006.

Extinction selectivity of marine gastropods of the Southwestern America during the Pliocene-Pleistocene transition

Extinción selectiva de los gasterópodos marinos de América Suroeste durante la transición Plioceno-Pleistoceno

Héctor Ramos-Rojas^{1,2}, Marcelo Rivadeneira^{1,2}

- (1) Universidad Católica del Norte, Departamento de Biología Marina, Facultad de Ciencias del Mar, Larrondo 1281, Coquimbo, Chile
(2) Laboratorio de Paleobiología, Centro de Estudios Avanzados en Zonas Áridas (CEAZA), Avenida Ossandón 877, Coquimbo, Chile

Extinction is a major force driving the diversification of biotas. Understanding the biological traits than promote the survival/extinction of taxa in the fossil record may help anticipate the extinction risk of modern forms. The Neogene of South America's western coast is an excellent system to put these ideas to the test because many taxa showed great extinction rates associated with multiple paleoenvironmental changes. While previous studies have reported that a high percentage of gastropod species (61-76%) went extinct during the Pliocene-Pleistocene transition (ca. 3-2 Ma), whether this extinction was selective to biological traits remains unanswered. Here we modeled the extinction of 99 species of gastropods in Pliocene fossiliferous outcrops of Peru and Chile. We used a random forest machine-learning approach to relate extinction risk with ten biological traits (i.e., body size, bathymetry, latitudinal midpoint, family, life habit, larval mode, latitudinal range, diet, attachment and locomotion). The model predicted the extinction with great accuracy (pseudo-R²= 0.7), and showed that only three variables were significant (body size, latitudinal midpoint, and bathymetry). The extinction was higher in species with intermediate body sizes, with a latitudinal midpoint of distribution in northern Peru and southern Chile, and with eurybathic distributions. These responses may reflect the interplay of ecological traits to different paleoenvironmental forces along the latitudinal gradient, i.e., the activation of the Humboldt Current System in Peru and north-central Chile and the coastal destruction due to the advance of glacial lobes during the late Pliocene-Pleistocene.

Financing: Financiamiento: ANID-FONDECYT 1200843, ANID-CENTROS REGIONALES R20F0008, and ANID- Millennium Science Initiative Program-NCN19_153 (UPWEL)



COMUNICACIONES LIBRES VI

SOCIEDAD CHILENA DE NEUROCIENCIA

Learning how to detach protein-protein interactions

David Naranjo², **Francisca Salas**¹, Nieves Navarro Quezada², Horacio Poblete³

(1) Universidad de Talca, Escuela de Ingeniería Civil en Bioinformática, Ingeniería, Talca, Chile

(2) Universidad de Valparaíso, Instituto de Neurociencia, Ciencias, Pasaje Harrington 287, Valparaíso, Chile

(3) Universidad de Talca, Center for Bioinformatics, Simulation and Modeling (CBSM), Núcleo Milenio MiNICAD, Talca, Chile

Every process in living beings depends on physical interactions between proteins. Biochemical reactions, neuronal excitability, and body homeostasis depend on protein-protein recognition and complex-stability. While protein-protein association rate has been in the spotlight of experimental and computational chemists, we lack a molecular understanding of the events leading to the complex dissociation. Here, we report insights on the dissociation pathway of an exceptionally simple protein-protein interaction between a scorpion peptide toxin and a voltage-gated ion channel. A classic illustration of a complementary lock-key binding mechanism is Charybdotoxin (CTX) binding to the external pore entrance of voltage-gated potassium channels (KvC), which only prevents ion flow without having a significant conformational impact on either protein. The CTX-KvC dissociation is modulated by external and internal K⁺-ions and by the transmembrane potential. In tandem with MD simulations, we have investigated the effects of K⁺ ions and the electric field in the events leading to the CTX-KvC dissociation in heterologously expressed KvC in *Xenopus* oocytes. Positive internal voltages cause CTX-wobbling as well as individual permeation events across the toxin-blocked channels, which are novel findings compatible with the observed external K⁺ sensitivity. These results are consistent with the ancient hypothesis that the electric field can force potassium ions within the pore in the direction of the external entry, electrostatically destabilizing CTX.

Financing: Fondecyt 1211366 to DN

Ultradian organization of the sleep-wake cycle in the *Octodon degus*: properties of the post-REM sleep refractory period.

Adrián Pedro Ocampo Garcés¹, Alejandro Bassi¹, Jorge Estrada¹

(1) Universidad de Chile, Programa de Fisiología y Biofísica, Instituto de Ciencias Biomédicas, Facultad de Medicina, Independencia 1027, Santiago, Chile

The atomic building block of the sleep-wake cycle of mammals is the ultradian sleep cycle, a binary structure composed of a REM sleep episode (REMEp) and the adjacent interval without REM sleep (INT) that contains variable amounts of wakefulness and NREM sleep. A short-term REM sleep refractory period (RSRP) has been proposed to impede the reentry into REM sleep at the beginning of INT, permitting the occurrence of NREM sleep and wakefulness. Here we explore the properties of the RSRP in the *Octodon degus*. Data were obtained in chronically implanted *degus* (n=15, 60 recording days) maintained under a 12:12 LD cycle. Sleep was manually scored and REMep and INT were identified. A total of 2734 ultradian cycles (REMEp+INT) was obtained. There are two separate interval populations (short and long) associated with two different REMep categories (sequential and single episodes). Single REM sleep episodes are immediately followed by an interlude during which REM sleep transitions are almost absent. The duration of the interlude without REM sleep transitions (putative RSRP) increases in relation to the duration of preceding REMep. The probability to reenter REM sleep at the beginning of INT depends on concurrent cumulated NREM sleep time. The direct relationship between single REMep duration and the cumulated NREM sleep at the beginning of INT is consistent with the existence of a bistable REM-NREM hourglass type mechanism underlying the RSRP mechanism in the *O. degus*.

Financing: Research Supported by Guillermo Puelma Foundation, Universidad de Chile

Role of RVLM-C1 neurons on altered sleep function in heart failure rats

Rol de las neuronas RVLM-C1 en alteraciones del sueño en ratas con insuficiencia cardíaca

Ignacio Bernal^{1,2}, Camilo Toledo¹, Esteban Díaz¹, Rodrigo del Río^{1,3}

(1) Pontificia Universidad Católica de Chile, Departamento de Fisiología, Facultad de Ciencias Biológicas, Marcoleta 49, Santiago, Región Metropolitana, Santiago, Chile

(2) Universidad de Santiago de Chile, Departamento de Biología, Facultad de Química y Biología, Av. Libertador Bernardo O'Higgins 3363, Santiago, Estación Central, Región Metropolitana, Santiago, Chile

(3) Universidad de Magallanes, Facultad de Ciencias Biológicas, Punta Arenas, Chile

Sleep-disordered breathing (SDB) and sleep fragmentation (SF) are reported in heart failure patients (HF) and are linked to disease progression and poor prognosis. Previous studies support a role for C1 neurons of the rostral ventrolateral medulla (RVLM) on the generation of breathing disorders in HF rats. The contribution of RVLM-C1 neurons on SDB and SF in the setting of HF has not been previously studied. We aimed to determine the contribution of RVLM-C1 neurons on sleep architecture in volume-overloaded HF rats. D β H-saporin toxin was injected bilaterally into the RVLM of Sham and HF rats to selectively destroy C1 neurons. No differences in total sleep times were found between Sham and HF rats. However, in HF rats nREM epoch duration was significantly lower compared to Sham rats (3.4 ± 0.3 vs. 2.2 ± 0.2 min, $p < 0.05$). Furthermore, HF rats showed loss of ventilatory stability only in nREM sleep (Irregularity score: 1.21 ± 2.0 vs. $15.9 \pm 1.8\%$; REM: 22.9 ± 2.0 vs. $24.1 \pm 3.2\%$; Sham vs. HF, respectively). Interestingly, breathing-triggered arousals from sleep were higher in HF animals compared to Sham being the outcome a decreased sleep probability in HF. Remarkably, partial ablation of RVLM-C1 neurons with D β H-Saporin in HF improved nREM breathing regularity, restored normal nREM sleep duration and decreased sigh-triggered arousals by ~45%. Our data shows that irregular breathing is related to altered sleep in HF rats and support the role of RVLM-C1 neurons in sleep regulation in the setting of HF.

Financing: Supported by Fondecyt1220950

Towards fully embedded biologically inspired deep learning on neuromorphic hardware

Ismael Jaras^{1,2,5}, Ben von Hünérbein³, Laura Kriener³, Jakob Jordan³, Walter Senn³, Mihai A. Petrovici^{3,4}, Pedro Maldonado^{2,5}

(1) University of Chile, Department of Electrical Engineering, Santiago, Chile

(2) University of Chile, Neurosystems Laboratory, Biomedical Neuroscience Institute, Santiago, Chile

(3) University of Bern, Department of Physiology, Bern, Switzerland

(4) Heidelberg University, Kirchhoff Institute for Physics, Heidelberg, Germany

(5) National Center for Artificial Intelligence, Santiago, Chile

Our brains can efficiently process and learn from the vast amount of information our senses provide about our environment. Understanding the computational principles underlying this unparalleled computational capacity is not only important for basic neuroscience research but also for advancing artificial intelligence. Neuromorphic engineering, in particular, tries to replicate the brain's fundamental principles in new novel hardware to overcome the constraints present in classical architectures. Conversely, error backpropagation, the basis of deep learning algorithms, can serve as inspiration to neuroscientific models about how complex tasks may be learned in the brain. However, naive implementations of backpropagation are at odds with neurobiology. Thus, there is an effort in computational neuroscience to devise models that leverage the strength of credit assignment via backpropagation in a biologically plausible way.

One approximation of backpropagation which incorporates constraints from biological systems (Sacramento et al. 2018), consists of a hierarchical architecture of microcircuits composed of multicompartiment inter- and pyramidal neurons. In particular, unlike classical deep learning models, this model does not rely on separate forward and backward phases, avoids the weight transport problem by using random feedback weights, and the learning of synaptic weights depends on a local, plausible plasticity model.

In this study, we aim to make the model by Sacramento et al. compatible with a range of neuromorphic hardware platforms by moving from a rate-based to a spike-based implementation. We demonstrate that our spiking version of the model preserves the functional principles allowing the original rate-based model to learn.

Financing: - EU grant agreements 604102, 720270, 785907, 945539 (HBP)- Manfred Stärk Foundation- ANID grant PFCHA/Doctorado Nacional/2019-21190330- Fenix Infrastructure resources

PANX1 modulation of retinal ganglion cell activity during natural ageing

Paloma Harcha Soazo¹, Jaime Maripillán¹, David Neira¹, Joaquín Araya², Pablo Reyes³, María José Escobar³, Jean-Gabriel Minozino⁴, Agustín Martínez¹, Adrian Palacios Vargas^{1,5}

(1) Universidad de Valparaíso, Instituto de Neurociencias y Centro Interdisciplinario de Neurociencia de Valparaíso, Facultad de Ciencias, Gran Bretaña 1111, Valparaíso, Chile

(2) Universidad Santo Tomás, Escuela de Tecnología Médica, Facultad de Salud, Chile

(3) Universidad Técnica Federico Santa María, Departamento de Ingeniería Electrónica, Valparaíso, Chile

(4) Universidad de Valparaíso, Escuela de Ingeniería Informática, Centro de Investigación y Desarrollo en Ingeniería en Salud, Valparaíso, Chile

(5) Instituto de Sistemas Complejos de Valparaíso, Valparaíso, Chile

Ageing is a chronic degenerative process developed through life. In the retina ageing decrease photoreceptors and retinal ganglion cell (RGCs) numbers, together with low-grade chronic inflammation. Since pannexin-1 (PANX1) channels have been related to several age-related inflammatory conditions and are expressed in the retina, we hypothesized that PANX1 alterations could also affect RGCs function during aging.

Using western blot and immunostaining we detected increased levels of PANX1 on aged retinas (from 5- to 14-month-old) respect younger animals (1-2-month-old), particularly on the RGC layer. To study channel activity, dye uptake assays (4',6-diamidino-2-phenylindole) induced by picrotoxin (100µM) in aged retinas showed higher dye uptake than younger retinas, which was prevented by both PANX1 and connexin inhibitors.

During different light pattern conditions [scotopic, photopic, white noise, and flashes protocol], RGCs activity was recorded before and after probenecid and ¹⁰Panx1 mimetic peptide treatment. PANX1 inhibition in both cases significantly increased the neuronal firing rate respect untreated conditions in a selected RGC population of both young and aged retinas. Further characterization of this population, showed that PANX1 inhibition decrease the latency and the transient response, increasing the speed and sustained response of RGCs. Although these properties were also observed in aged retinas, induced RGC activity was significantly lower in all light protocols used respect younger retinas.

Together these data suggest that there is a loss on PANX1 modulation of RGC activity during ageing, inviting us to further think about future developments to approach functional restorative treatments to compensate for this loss.

Financing: Fondecyt Postdoctoral n°3200342, Fondecyt Regular n°1200880, Fondecyt Regular n°1201311, MILENIO ICM-ANID P09-022-F & AFOSR (FA9550-19-1-0002).

Assessing the role of interhemispheric GABAergic neurons in sensory cortex

Evaluación del rol de las neuronas GABAérgicas interhemisféricas en la corteza sensorial

Jocelyn Urrutia-Piñones¹, Camila Morales-Moraga⁴, Ignacio Negrón-Oyarzo^{3,5}, Chiayu Chiu Q.^{2,4}

(1) Universidad de Valparaíso, Programa de Doctorado en Ciencias, mención neurociencia., Facultad de Ciencias, Valparaíso, Chile

(2) Universidad de Valparaíso, Instituto de Neurociencias, Ciencias, Valparaíso, Chile

(3) Universidad de Valparaíso, Instituto de Fisiología, Ciencias, Valparaíso, Chile

(4) Centro Interdisciplinario de Neurociencias (CINV), Valparaíso, Chile

(5) Centro de Neurobiología y Fisiopatología Integrativa (CENFI), Valparaíso, Chile

Inhibitory neurons play an important role in cortical computation and brain synchronization, but thus far have been studied mainly with respect to their local synaptic interactions. Therefore, the role of long-range inhibitory connections in the regulation of interhemispheric cortical communication is less understood. We focused on the study of a sub-type of neocortical long-range inhibitory neurons recently described: interhemispheric long-range GABAergic neurons (Int-LRGNs) connecting the auditory cortex and visual cortex with their contralateral cortical region. Although it has been shown that they co-express parvalbumin and are classified as fast-spiking neurons, how these neurons affect the dynamics of cortical activity is unknown. For this reason, we propose to study how Int-LRGNs shape the activity of the contralateral cortex and impact interhemispheric synchronization. We take the advantage of cell type-specific optogenetic manipulations *in vivo*, i.e., injection Adeno-Associated Virus (AAV) expressing ChR2 (ChR2) in transgenic mice (PV-Cre), and chronic implantation of custom-made Optrode (array of optical fibers and microelectrodes) to specifically activate these neurons in freely moving mice. To date, we have been able to label these neurons and observed that they are present in different areas of the auditory and visual cortices, including secondary areas. Furthermore, optogenetic stimulation of Int-LRGNs in freely moving animals induces synchronized activity, suggesting a role in large-scale interhemispheric coupling. We hope that with the results we are obtaining we can shed light on the role of these neurons in the interhemispheric coordination of neural activity in the sensory cortex.

Financing: Este trabajo fue financiado con becas otorgadas por ANID (Beca Doctorado 21192112; Instituto milenio P09-022F y ACE210014) y de la Universidad de Valparaíso.

Depression as an astroglial gliotransmitter disease

Depresión como una enfermedad de gliotransmisión astroglial

Jimmy Stehberg¹

(1) Universidad Andrés Bello, Instituto de Ciencias Biomédicas, Medicina y Ciencias de la Vida, República 330, Santiago, Chile

Astrocytes are abundant glial brain cells that have a critical role in glutamatergic synaptic transmission, by recycling glutamate, and releasing gliotransmitters, such as glutamate, D-serine and ATP, into glutamatergic synapses. Recent studies have shown that astroglial release of both glutamate and D-serine, through connexin 43 hemichannels (Cx43 hemichannels), regulates postsynaptic NMDAR activity and is required for the formation of short- and long-term memory fear memories in the amygdala. We had previously shown that after chronic restraint stress, -a commonly used model for depression in rodents-, astrocytes show a strong increase in Cx43 hemichannel activity in the ventral hippocampus, associated to increased release of glutamate. Here we show that depressive symptoms appear as a result of the excessive activation of Cx43 hemichannels and release of glutamate and D-serine during chronic stress, leading to the overactivation of postsynaptic NMDAR receptors. In fact, the chronic microinfusion of combined glutamate and D-serine into the hippocampus using osmotic pumps, is sufficient to induce depressive-like symptoms in the absence of stress. We also show that astroglial Cx43 hemichannels can be targeted for the development of fast acting antidepressants, affecting the astroglial release of glutamate and D-serine, hence, decreasing postsynaptic NMDAR overactivation and reducing depressive-like symptoms in the chronic restraint stress model of depression in rats. Financing: Funded by Fondecyt 1200452.

The role of calcium in ferroptosis-mediated neuronal death

El rol de calcio en la muerte neuronal mediada por ferroptosis

Silvia Gleitze¹, Pedro Lobos¹, Marco Tulio Núñez², Andrea Paula-Lima^{1,3,4}, Cecilia Hidalgo^{1,4,5}

(1) Universidad de Chile, Instituto de Neurociencia Biomédica, Facultad de Medicina, Avenida Independencia 1027, Santiago, Chile

(2) Universidad de Chile, Departamento de Biología, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

(3) Universidad de Chile, Instituto de Ciencias Odontológicas, Facultad de Odontología, Olivos 943, Santiago, Chile

(4) Universidad de Chile, Departamento de Neurociencia, Facultad de Medicina, Avenida Independencia 1027, Santiago, Chile

(5) Universidad de Chile, Programa de Fisiología y Biofísica Instituto de Ciencias Biomédicas, Facultad de Medicina, Avenida Independencia 1027, Santiago, Chile

Introduction: Neuronal death is an important event in neurodegenerative diseases; however, the exact mechanisms that are involved are unclear. Ferroptosis, a regulated form of cell death identified in 2012, is characterized by iron-dependent lipid peroxidation, altered mitochondrial morphology, and decreased levels of the antioxidant glutathione. Inhibiting glutathione peroxidase 4 (Gpx4), a key antioxidant regulatory enzyme, promotes ferroptosis in different cell types. However, in primary hippocampal neurons, the specific mechanisms of ferroptosis and the role of calcium are poorly defined.

Hypothesis: Gpx4 inhibition induces ferroptosis in primary hippocampal neurons, involving abnormal calcium signaling mediated by the ryanodine receptor (RyR) channel.

Methods: Primary hippocampal cultures were treated with RSL3, a selective inhibitor of Gpx4. Ferroptosis was characterized by analyzing cell viability, cell morphology, and lipid peroxidation. To assess the contribution of RyR-mediated calcium release, RyR activity was suppressed by 20 μ M ryanodine.

Results: RSL3 treatment induced cell death, dendritic damage and lipid peroxidation, which was reduced by previous incubation with the iron chelator deferoxamine (DFO). Suppression of RyR activity offered partial protection against RSL3-induced cell death.

Conclusion: Gpx4 inhibition induced ferroptosis in primary hippocampal cultures. Suppressing RyR activity mitigated cell death, indicating that calcium contributes to ferroptosis - a result with possible implications for neurodegenerative diseases.

Financing: Acknowledgements: CONICYT-PFCHA/Doctorado Nacional/2020-21200346, BNI ICM09_015, BMBF 180051.

COMUNICACIONES LIBRES VII

SOCIEDAD DE ECOLOGIA DE CHILE

Identifying collaborative research priorities and emerging issues for the highly threatened sclerophyllous forest ecosystem of southern South America

Cristian Delpiano^{1,2}, Solange Vargas^{2,3,4}, Juan Ovalle^{4,5}, Catalina Cáceres⁵, Alejandro Miranda³, Nélida Pohl², Claudia Rojas^{4,6}, Francisco Zorondo⁷, Francisco Squeo^{1,2}

(1) Universidad de La Serena, Biología, Ciencias, Raúl Bitrán 1305, La Serena, Chile

(2) Instituto de Ecología y Biodiversidad (IEB)

(3) Centro de Ciencia del Clima y la Resiliencia (CR2)

(4) Centro de Ecología Aplicada y Sustentabilidad (CAPES)

(5) Universidad de Chile, Silvicultura y Conservación de la Naturaleza, Ciencias Forestales y de la Conservación de la Naturaleza, Av. Santa Rosa 11315, Santiago, Chile

(6) Universidad de O'Higgins, Instituto de Ciencias Agroalimentarias, Animales y Ambientales, Ruta 90 km 3, San Fernando, Chile

(7) Universidad de Santiago de Chile, Departamento Gestión Agraria, Facultad Tecnológica, Avenida Ecuador N° 3769, Santiago, Chile

The sclerophyllous forest (SF) in Central is increasingly threatened by a decade-long mega-drought (MG). Given the intensity and duration of this MG, in the summer of 2019 extensive areas of the forest turned abruptly brown and suffered a significant reduction in their productivity. In consequence, there is an urgent need to understand what is occurring behind the massive forest browning, and determine its possible socio-ecological impacts. However, given the state of our knowledge about the SF, which specific areas of research areas to prioritize to face these challenges is still unclear. We conducted an interdisciplinary workshop to define research priority areas, and carried out a systematic review of the scientific literature on the sclerophyllous forest's current status. We identified collaborative research priorities and research questions to address in the context of global change and likely ecosystem collapse. Our results suggest that scientific research and conservation efforts in the SF ecosystem have typically focused on plant dynamics and ecological processes. A marked imbalance between research topics was evidenced, as social issues, soil traits and microbiota, had a lower representation in the scientific literature. We need integrative science to increase our understanding of the impacts global change has on this ecosystem's resilience. This information could be a starting point to increase collaboration between scientists from different fields and government agencies, in order to apply forest adaptive management against the current socio-environmental drivers of global change.

Financing: FB 210006

Influence of global change in Mediterranean forests of Chile: comparing the resilience of sclerophyllous vs deciduous forest

Influencia del cambio global en los bosques mediterráneos de Chile: comparando la resiliencia del bosque esclerófilo vs bosque caducifolio

Stephanie Gibson-Carpintero¹, Alejandro Venegas-González¹

(1) Hémera-Centro de Observación de la Tierra, Vicerrectoría de Investigación, Universidad Mayor, Santiago, Chile

Recientemente se ha visto una degradación a nivel mundial de ecosistemas mediterráneos, siendo la región central de Chile una de las más vulnerables. Esta pertenece a una de las cinco ecorregiones mediterráneas a nivel mundial, y por su alto nivel de endemismo ha sido declarada *hotspot* de biodiversidad. Este estudio evaluará la influencia del cambio global en dos tipos de bosques mediterráneos de Chile central: caducifolio y esclerófilo, bajo un enfoque dendroecológico e hidroclimático. Se utilizaron cronologías de anillos de crecimiento de cinco especies endémicas entre la región de Valparaíso y Maule. Se destaca la primera cronología para la especie *Nothofagus Alessandri*. Se colectaron más de 700 árboles y se midieron más de 1 millón de anillos para estudiar: (i) la influencia climática en los patrones de crecimiento y (ii) la resiliencia de los árboles a sequías extremas. Los principales resultados muestran una alta sensibilidad climática a lluvias de invierno y a altas temperaturas de noviembre-diciembre en la mayoría de las poblaciones estudiadas. Presentando un decaimiento persistente en su crecimiento debido principalmente al incremento de las temperaturas de primavera-verano posterior a la década de 1980 y a la reducción histórica de las precipitaciones desde 2010. Por otra parte, se observa que los bosques caducifolios son más sensibles a sequías extremas, pero se recuperan más rápido que especies esclerófilas.

Conduciendo a un escenario crítico de adaptación de los bosques mediterráneos frente al cambio global, por lo que urge tomar decisiones para su conservación y recuperación.

Financing: Fondecyt N° 1221707

Variable Environments in an Upwelling System Trigger Differential Thermal Sensitivity and metabolism in intertidal molluscs

Ambientes variables en una zona de surgencia gatillan sensibilidad térmica y metabolismo diferencial entre poblaciones de moluscos intermareales

Marco Lardies¹, Leonardo Bacigalupe², Paz Caballero¹

(1) Universidad Adolfo Ibáñez, Ciencias, Artes Liberales, Diagonal Las Torres 2700, Santiago, Chile

(2) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Ciencias, Campus Isla Teja, Valdivia, Chile

Environmental variability in coastal oceans associated with upwelling dynamics probably is one of the most pervasive forces affecting the physiological performance of marine life. As the environmental temperature is the abiotic factor with the major incidence in the physiology and ecology of marine ectotherms, the abrupt temperature changes in upwelling systems could generate important variations in these organisms' functional processes. The relationship between ambient temperature and physiological performance can be described through a thermal performance curve (TPC). We compared the parameters of the TPC and the metabolic rate of several populations of chitons and limpets, one found in high semi-permanent upwelling (Talcaruca), while others situated in an adjacent area with seasonal upwelling (Los Molles and Quintay) and therefore more stable environmental conditions. Our results show that: (1) oxygen consumption increases with body size and this effect are more significant in individuals from the Talcaruca population, (2) optimal temperature, thermal breadth, upper critical limit, and maximum performance were higher in the population located in the area of high environmental heterogeneity and (3) individuals from Talcaruca showed greater variance in optimal temperature, thermal breadth, upper critical limit. Although it is clear that a variable environment affects the thermal physiology of organisms, expanding their tolerance ranges and generating energy costs in the performance of individuals, it is relevant to note that upwelling systems are multifactorial phenomena where the rise of water masses modifies not only temperature, but also decreases O₂, pH, and increases pCO₂ which in turn could modify metabolism and TPC.

Financing: FONDECYT 1190444

Metabolic and biochemical responses of the african clawed frog (*Xenopus laevis*) to simultaneous chronic exposure to salt and pesticide Chlorpyrifos

Respuesta bioquímica y metabólica en la rana africana de uñas (*Xenopus laevis*) ante la exposición crónica a la sal y al pesticida Clorpirifós

Felipe Alvarez-Vergara^{1,3}, Juan Carlos Sanchez-Hernandez², Pablo Sabat^{1,3}

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las palmeras 3425, Ñuñoa, Santiago, Chile

(2) Universidad de Castilla-La Mancha, Laboratorio de Ecotoxicología, Instituto de Ciencias Ambientales, 45071, Toledo, España

(3) Pontificia Universidad Católica de Chile, Center of Applied Ecology and Sustainability (CAPES)

Salinization and pollution are two main environmental stressors leading deterioration to water quality and degradation of aquatic ecosystems. Amphibians are a highly sensitive group of vertebrates to environmental disturbance of aquatic ecosystems. However, studies on the combined effect of salinization and pollution on the physiology of amphibians are limited. In this study, we measured the standard metabolic rate (SMR) and biochemical parameters of adult males of the invasive frog *Xenopus laevis* after 45 days of exposure to contrasting salinity environments (150 and 400 mOsm NaCl) with either 1.0 µg/L of the organophosphate pesticide chlorpyrifos (CPF) or pesticide-free medium. Our results revealed a decrease in SMR of animals exposed to the pesticide and in the ability to concentrate the plasma in animals exposed simultaneously to both stressors. The lack of ability to increase plasma concentration in animals exposed to both salt water and CPF, suggests that osmoregulatory response is decreased by pesticide exposure. Likewise, the liver acetylcholinesterase (AChE) activity decreased by 50% in frogs exposed to salt water and CPF and 40% in those exposed only to CPF, which suggest an additive effect of salinity on inhibition of AChE. Finally, oxidative stress increased as shown by the higher lipid peroxidation and concentration of aqueous peroxides found in the group exposed to salt water and CPF. Thus, our results revealed that *X. laevis* physiology is compromised by salinization and pesticide exposure.

Financing: ANID PIA/BASAL FB0002FONDECYT REGULAR N° 1200386Fundación María Ghilardi Venegas

Drought resistance explains differences in branch flammability across Mediterranean woody species: a functional trait approach

La resistencia a la sequía explica las diferencias en la inflamabilidad de las ramas de las especies leñosas mediterráneas: un enfoque de rasgos funcionales

Susana Paula^{1,2,3}, **Luisa Parra-Darmendrail**^{1,3}, Korina Ocampo-Zuleta^{1,2,3,4}, Camila Riedemann², Diego Ramírez^{1,2,3,5}, Roke Rojas^{1,3}

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Ciencias, Avda. Rector Eduardo Morales Miranda. Edificio Pugin, 3er piso, Valdivia, Chile

(2) Universidad Austral de Chile, Centro del Fuego y Sistemas Socioecológicos (FireSES), Campus Isla Teja, Valdivia, Chile

(3) Instituto de Ecología y Biodiversidad (IEB), Victoria 631, Barrio Universitario, Concepción, Chile

(4) Universidad Austral de Chile, Programa de Doctorado en Ciencias mención Ecología y Evolución, Escuela de Graduados, Ciencias, Campus Isla Teja, Valdivia, Chile

(5) Universidad Austral de Chile, Programa de Magíster en Ecología Aplicada, Escuela de Graduados, Ciencias, Campus Isla Teja, Valdivia, Chile

Globally, most wildfires occur in seasonal and productive ecosystems, as in Mediterranean regions, where vegetation dries in summers, thus favoring fires to initiate and spread. Beyond the effect of climate on fuel humidity, the high flammability of those plants might be a by product of their resistance to drought. We hypothesized that traits conferring drought resistance increase plant flammability. With this aim, we first quantified the decay of the woody species of a Mediterranean forest in La Campana N.P. (central Chile) after c. 15 years of successive drought. The decay of the trees across a 1 km track was assessed by an index that combines the crown defoliation degree and the browning of the remaining leaves. Then, for 11 species that comprised contrasting levels of decline, we quantified morpho-chemical and flammability traits. We found that the facility of branches to ignite (ignitability) was independent of the traits indicating how intensely they burn (combustibility), how much they burn (consumability), and for how long they burn (sustainability). The least defoliated species were the most flammable in terms of combustibility, consumability and sustainability. These species had high $\delta^{18}\text{O}$ and low leaf nitrogen content. In summary, our results suggest that the more flammable species were those able to resist prolonged and intense droughts by decreasing transpiration, thus requiring less N-rich osmolytes. The nutrient poverty of these tissues explain their higher flammability as reported for previous studies. These results provide the ecophysiological basis for the synergy between drought and wildfires in a changing world. Financing: Funding: ANID FONDECYT1190999, ANID PIA/BASAL FB210006, ANID 21190817/2019, VIDCA TD-2021-01

Photosynthesis and its limitations in plants of high Andean peatlands (bofedales) of central Chile

Fotosíntesis y sus limitaciones en plantas de bofedales altoandinos de Chile central

Rodrigo Viveros Ahumada^{1,2}, **Claudio Alarcón Cabezas**^{1,2}, Noemí Labra Oróstica^{1,2}, Patricia Saez Delgado³, Lohengrin A. Cavieres González^{1,2}

(1) Universidad de Concepción, Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Barrio Universitario, Concepción, Chile

(2) Instituto de ecología y biodiversidad (IEB), Concepción, Chile

(3) Universidad de Concepción, Laboratorio de Tejidos Vegetales, Departamento de Silvicultura, Facultad de Ciencias Forestales, Barrio Universitario, Concepción, Chile

High Andean peatlands or bofedales are located at high elevations along the Andes. The Andes of Central Chile are influenced by the Mediterranean-type climate producing that lower elevations of the alpine zone are dry, especially at the end of the growing season. In contrast, due to convective precipitations, higher elevation areas tend to receive water during the summer, but have lower temperatures. The different stressors present along the altitudinal gradient, and their changes during the growing season, could generate variations in the factors limiting the photosynthetic process, opening question regarding how is photosynthesis in High Andean peatland species of central Chile? and how do the stomatal and mesophyll limitations vary at different elevations and during the growing season? We studied three native plant species, with wide altitudinal distribution in bofedales of central Chile: *Colobanthus quitensis* (Caryophyllaceae), *Patosia clandestina* (Juncaceae) and *Plantago barbata* (Plantaginaceae). For each species, photosynthesis measurements were made at 2600 m a.s.l. and 3400 m a.s.l. both early and late in the growing season. The results showed that low elevation environments had greater decreases in photosynthesis during the growing season, while at high elevation photosynthesis was in some cases lower, but more stable during the summer. Regarding the limitations to photosynthesis, we found a greater importance of mesophyll conductance at both elevations, especially at the end of the growing season.

Financing: FONDECYT 1211197, ACT-210038, FB-210006 y Beca de Doctorado Nacional ANID folio 21202234.

Contrasting soil respiration between orchards and forests in Central Chile

Pedro Mondaca¹, Alexis Velasquez¹, Josefa Aravena¹, Felipe Figueroa¹, Aurora Gaxiola^{1,2}

(1) Pontificia Universidad Católica de Chile, Department of Ecology, Alameda 340, Santiago, Chile

(2) Instituto de Ecología y Biodiversidad, Alameda 340, Santiago, Chile

Soil is the primary terrestrial carbon (C) reservoir; thus, slight changes in soil C lead to significant changes in atmospheric CO₂. Thus, policies promote soil organic C (SOC) sequestration in agricultural soils to mitigate climate change. However, the following questions arise: (1) What are the characteristics of SOC from orchards and that from forests? (2) How is SOC's temperature sensitivity in both land-uses? (3) Is it valid to counterpart SOC from orchards to that from forests? We assessed soils from Central Chile in six latitudinal quadrants from Valparaíso to Biobío regions. Each quadrant sampled six soils under an agricultural intensification gradient and two forest soils. Soils were characterized for biogeochemical properties and microbiology. All soils were incubated in growth chamber at contrasting temperatures (20, 30, and 40°C) to assess the effect of warming on carbon balance. Results were compared as total respiration and through the Q10 index. Soil total carbon was about half in orchard soils compared to forest soils. The respiration of CO₂ to 20 and 30°C was similar between orchard and forest soils. However, respiration at 40°C is significantly lesser in forest soils despite doubling the total C stock. Analysis of Q10 shows a linear fit between air temperature and soil respiration while logarithmic in forest soils. Influence of soil microbiome and SOC fractionation on soil respiration is under assessment. At the moment, our results suggest SOC differ between orchards and forests, so they should not be taken as equivalent in subsidiary programs to mitigate climate change.

Financing: ANID/PIA/ACT192027 and IEB (FB210006)

Effect of megadrought in the sclerophyllous forest of Chile through the use of remote sensing systems.

Efecto de la megasequía en el bosque esclerófilo de Chile mediante el uso de sistemas de teledetección.

Sebastián Godoy Núñez¹, Paola Poch Jimenez^{3,4}, Carmen Gloria Ossa^{1,2}

(1) Universidad de Valparaíso, Instituto de Biología, Facultad de Ciencias, Gran Bretaña, 1111, Playa Ancha, Valparaíso, Chile

(2) Universidad de Valparaíso, Centro de Investigación y Gestión de recursos naturales, Facultad de Ciencias, Gran Bretaña 1111, Playa Ancha, Valparaíso, Chile

(3) Universidad de Chile, Departamento de Ciencias ecológicas, Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Santiago, Chile

(4) Universidad de Santiago de Chile, Departamento de Ingeniería Geoespacial y Ambiental, Facultad de Ingeniería, Enrique Kirberg Baltiansky 03, Estación Central, Santiago, Chile

In recent decades, considerable interest has developed in the use of remote sensing instruments to understand the distribution, biophysical and structural characteristics of vegetation given its sensitivity to changes in climatic variables. In a context of climate change, the response of plant formations to environmental variability is diverse and complex, for example, during water stress the response of vegetation can range from slower growth, loss of biomass and increased mortality of individuals. Google Earth Engine (GEE) was used together with Landsat 5/8 images to visualize the vegetation trend during the current mega-drought (1999-2021) in the sclerophyllous forest of Chile. The improved vegetation index was calculated to evaluate photosynthetic productivity (EVI) and the leaf area index (LAI) to estimate changes in leaf cover. The results show a progressive deterioration of the productivity and foliar cover of the forest in the northern zone of its distribution, therefore, the mega-drought would be causing browning and the death of different species at the longitudinal and latitudinal levels in an ecosystem little studied and little represented in the system of protected areas. The study, currently in progress, will determine the conditions of the patches in the southern part of its distribution, contrasting them with its southern distribution, which, living in more humid climatic conditions, could become refuges for species with greater water requirements and less resistant to weather conditions. aridification.

Financing: Fondecyt 11190305



COMUNICACIONES LIBRES VIII

SOCIEDAD DE BIOLOGIA DE CHILE

Climatic Niche reconstruction and modern analog for the Lauca Formation Flora (6.2 to 5.2 Ma)

Reconstrucción del Nicho Climático y Análogo Moderno para la Flora de Formación Lauca (6.2 to 5.2 Ma)

Nataly Glade¹, Luis Felipe Hinojosa Opazo¹

(1) Universidad de Chile, Ciencias Ecológicas, Ciencias, Las Palmeras 3425, Ñuñoa., Santiago, Chile

The Lauca basin is in the extreme north of Chile, at 18°S and 4.000 masl. Climatically, the region is dominated by summer precipitation, with annual rainfall of > 300 mm. Currently the flora is distributed stratified by elevation, from 2.600 masl there is a pre-Puna flora, characterized by shrubs (*Ambrosia* and *Atriplex*) and columnar cacti (*Browningia* and *Corryocactus*). From 3.200 masl there is a Puna flora, characterized by resinous shrubs of Asteraceae (*Parastrephia* and *Chuquiraga*), accompanied by *Acantholippia* and *Junellia* (Verbenaceae) and *Fabiana* (Solanaceae). Above 4.000 masl, the high Andean flora is characterized by grasslands (*Festuca* and *Stipa*), accompanied by cushion plants (*Azorella* and *Pycnophyllum*).

Within this basin there is the Lauca Formation, which contains fluvio-lacustrine deposits dating from the Miocene to Pliocene, which contains plant fossil records (leaf and pollen). Previous studies have estimated conditions of higher humidity for the basal section of the Lauca Fm, describing the presence of a vegetation like a subtropical forest, and that this would have been replaced by a vegetation dominated by grasslands, associated with the establishment of a more arid climate during the Pliocene.

In the present work we evaluated the community present in the basal section of Lauca Formation, reconstructing the climatic niche and asking: Does an analog of climatic niche estimated for the range 6.2 to 5.2 Ma in the Lauca Formation currently exist in South America? Hypothesizing that, if such analogue exists, it should be like the Yungas of Bolivia and Argentina.

Financing: FONDECYT REGULAR 1221214/FONDECYT REGULAR 1211765

“Guane: A flexible web platform for learning, teaching, and analysis in phylogenetic comparative biology”

“Guane: Una plataforma web flexible para aprender, enseñar y generar análisis en biología comparada”

Leidy Viviana Romero Alarcon¹, Liam James Revell²

(1) Universidad Católica de la Santísima Concepción, Biología, Ciencias, Av Alfonso de Ribera 2850, Concepción, Chile

(2) University of Massachusetts, Biology, Science, 100 William T Morrissey Blvd, Boston, USA

Phylogenetic analysis has become integral in evolutionary research. Numerous computational methods have been developed in recent decades to analyze comparative data in the context of a phylogeny, most recently in the scientific computing environment R. As a command-line based software, R has a steep learning curve and can be somewhat inaccessible to students and new researchers. We have developed a new toolkit for phylogenetic comparative analysis based on the shiny web development framework.

This interface is explicitly designed to allow users to run their phylogenetic comparative analyses from a user-friendly web interface, while also helping to train them in R. So far, this interface is presented in English; however, we intend to develop parallel versions supporting both Spanish and Portuguese.

Neotropical origin of free-tailed bats: An integrative paleontological and molecular approach to re-evaluate a classic hypothesis

Enrique Rodríguez-Serrano¹, Kateryn Pino¹, Alexander Pari¹, Paulo Vallejos-Garrido^{1,6}, César E. Medina², Paúl M. Velazco³, Carlos A. Mancina⁴, Horacio Zeballos⁵

(1) Universidad de Concepción, Departamento de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Barrio Universitario s/n, Concepción, Chile

(2) Universidad Nacional de San Agustín de Arequipa, Departamento de Zoología, Escuela Profesional de Biología, Avenida Alcides Carrión s/n, Arequipa, Perú

(3) American Museum of Natural History, Department of Mammalogy, 200 Central Park West, New York, USA

(4) Academia de Ciencias Cubana, Instituto de Ecología y Sistemática, La Habana, Cuba

(5) Universidad Católica de la Santa María, Urb. San José s/n Umacollo, Arequipa, Perú

(6) Vida Silvestre Investigadores Limitada, Concepción, Chile

Free-tailed bats are a highly diverse family of bats distributed worldwide in tropical and subtropical areas. Previous studies based on molecular data of extant species hypothesize an origin in Eurasia or Africa, although the earliest fossils are known from North and South America. Thus, many relevant questions about the relationship between the 126 extant and 25 fossils species, their center of origin, and dispersal routes allowed the extant wide global distribution. Here, we integrated paleontological and molecular evidence to infer phylogenetic relationships and divergence times of extinct and extant lineages using the fossilized birth-death (FBD) approach. Then, we used “geo-model”, a recent Bayesian phylogenetic method, and the cartesian geographical locations of extant and extinct species to infer 1) the posterior distribution of ancestral locations across phylogenetic nodes, i.e., center of origin, and 2) the dispersal routes and distance travelled across every phylogenetic branch. Our results showed that molossids (crown clade) originated in South America during the Middle Eocene (~45 Ma), with several independent long-distance (i.e., trans-continental) dispersal events. These results contrast with all previous hypotheses of their origin and biogeographic history and showcase the necessity of integrating fossil and molecular data to re-write biogeographical histories.

Financing: FONDECYT 1170486 y 1220998

The hidden photosynthetic potential of *Polylepis tarapacana* under the dry conditions of the Altiplano

El potencial fotosintético oculto de *Polylepis tarapacana* en las condiciones áridas del Altiplano

Roke Rojas¹, Rafael E. Coopman², Jaume Flexas³

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Av. Rector Eduardo Morales Miranda 23, Campus Isla Teja, Valdivia, Chile

(2) Universidad Austral de Chile, Instituto de Conservación Biodiversidad y Territorio, Facultad de Ciencias Forestales y Recursos Naturales, Valdivia, Chile

(3) Universidad de Islas Baleares, Departamento de Biología, Instituto de investigaciones Agroambientales y de la Economía del Agua, Ctra de Valldemossa, km 7,5 Ed. Edifici Guillem Colom Casasnoves, 07122, Palma de Mallorca, España

Polylepis tarapacana (*Pt*) inhabits the Altiplano, forming the highest treeline in the world. To set the context of extreme conditions it must face, here I review the main climatic characteristics of Altiplano and compared them with other high mountain ecosystems around the world. Additionally, we determined the photosynthetic characteristics of *Pt* plants on the field and in the laboratory to assess the possible photosynthesis limitation experienced during moderate drought conditions. Net assimilation, and the underlying mechanisms were evaluated in well-watered laboratory plants (WWL), drought laboratory plants (WSL), adult field trees (AF) and field seedlings (SF). The climate analysis revealed that the Altiplano has some of the most extreme climatic conditions among treelines worldwide. WWL, WSL, AF, and SF showed high net assimilation ($>13 \mu\text{mol m}^{-2}\text{s}^{-1}$). However, WWL showed values 24% higher than the maximum values reported in the literature, and 27%, 21% and 38% higher than WSL, AF and SF, respectively. Moreover, WWL show higher mesophyll conductance and maximum rubisco carboxylation values than other high mountain plants or evergreen species. Our results suggest that, in the field, *Pt* plants could be photosynthetically depressed by low water availability. Also, that the strategy for inhabiting extreme atmospheric conditions is to exacerbate key attributes (such as mesophyll conductance or carboxylation rate), which are overexpressed in a well-hydrated condition thus reducing photosynthetic constraints. Our results suggest *Pt* is a suitable model species to study stress tolerance, adaptation, and physiological basis of the balance between productivity and stress tolerance.

Financing: FONDECYT grant Nr. 1171640; Scholarship CONICYT 21181928; CONAF; MINECO project PGC2018-093824-B-C41; ERDF (FEDER)

Determining the sex ratio of *Pelecanoides garnotii* in the breeding colony of Isla Choros, Chile, an endangered shorebird.

Determinación de la proporción de sexos de *Pelecanoides garnotii* en la colonia reproductiva de Isla Choros, Chile, un ave costera en peligro de conservación.

Luis Pastenes Opazo^{1,2}, Isabel Lobos Canales¹, Marta Fuentealba Cruz², Franco Cruz Jofré³, Frederick Toro Cortes³, Yerko Vilina Leiva⁴

(1) Laboratorio de Genética y Microevolución, Facultad de Ciencias Básicas, Universidad Católica del Maule

(2) Departamento de Biología y Química, Facultad de Ciencias Básicas, Universidad Católica del Maule

(3) Facultad de Recursos Naturales y Medicina Veterinaria, Universidad Santo Tomás

(4) Consultora BIOLOG, Santiago, Chile

The successful maintenance of biological conservation programs requires knowing the sex ratio of threatened species, thus allowing the prediction of the reproductive success of populations and potential differentiated mortalities during their ontogenesis. However, the sex ratios of endangered species are often not known, because this information can be difficult to determine under field conditions, particularly if the organisms are monomorphic species. The aim of this research was to determine the sex ratio of adult individuals of *Pelecanoides garnotii* from the reproductive colony of Isla Choros, Chile. Blood samples from captured birds ($n = 82$) and muscle tissue from birds found dead ($n = 22$) were collected, while DNA was isolated from each individual and sex was determined by PCR amplification of a chromosomal fragment of the CHD gene (Z/W sexual system). Females carry two alleles for the gene (heterozygous ZW) while males carry only one allele (homozygous ZZ). The male/female sex ratio in the analyzed sample was 0.56/0.44 (*i.e.*, 57 males/44 females). Three individuals were negative for genotyping (*i.e.*, absence of amplification). These results are similar to those reported for other endangered bird species, where the sex ratio shows a bias towards males. It should be noted that there are no reports indicating the proportion of sexes in the populations of *P. garnotii* in any of the stages of its ontogeny.

Financing: Funded by "Laboratorio de Genética y Microevolución" - UCM.

Relationship between saprophytic and symbiotic capacity in orchid mycorrhizal fungi

Relación entre la capacidad descomponedora y simbiótica en hongos micorrícicos de orquídea

Sofía Molina Vega¹, Felipe Figueroa¹, Mauricio Cisternas², Aurora Gaxiola^{1,3}, Maria Isabel Mujica^{3,4}

(1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Santiago, Chile

(2) Jardín Botánico Nacional, Viña del Mar, Chile

(3) Instituto de Ecología y Biodiversidad, Chile

(4) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas

Las interacciones biológicas son mecanismos que pueden promover coexistencia entre especies. Entre ellas se encuentran las interacciones planta-hongo como las denominadas micorrizas. Para las plantas de la familia Orchidaceae se trata de asociaciones obligadas, particularmente durante la germinación, a lo que se le conoce como "germinación simbiótica" donde el hongo brinda sustento nutricional al embrión antes de que comience la fotosíntesis. Los hongos participantes pertenecen a Rhizoctonia, un grupo polifilético de basidiomicetes con la capacidad genética de producir un pool de enzimas descomponedoras de materia orgánica. Sin embargo, aún no es claro el rol de la capacidad descomponedora de estos hongos en el establecimiento de la micorriza. Para esclarecer esta pregunta se evaluó la relación entre la capacidad germinadora y la capacidad descomponedora en 7 hongos aislados de raíces de dos orquídeas nativas, *Gavilea longibracteata* y *G. odoratissima*. Para esto se midieron las tasas de crecimiento y capacidad descomponedora de los hongos contrastando el éxito de germinación en medios de crecimiento con alto o bajo contenido de nutrientes. La actividad enzimática asociada a eventos de descomposición y germinación se utilizaron como proxys funcionales de estos hongos. Los resultados preliminares muestran una mayor tasa de crecimiento en el medio menos nutritivo para la mayoría de los hongos; lo que generó mayor densidad de crecimiento y por lo tanto sobrecrecimiento del micelio sobre las semillas impidiendo la germinación. Esto sugiere que el comportamiento del hongo como saprófito o simbiote dependería de las condiciones nutritivas en las que se encuentre.

Financing: Regular 1201643, FB210006, Fondecyt postdoc 3200774

SESIÓN DE POSTERS I



P1 TNF- α and IL-1 β regulate the permeability of Cx43 hemichannel and gap junction in mesangial cells through aRhoA/ROCK pathway

Claudia MJ Lucero Mariqueo¹, Lucas Marambio-Ruiz¹, Juan C Prieto-Villabos⁴, Marcelo León¹, Javiera Balmazabal⁴, Paola Fernandez², Juan Andrés Orellana⁴, Victoria Velarde³, Juan C Sáez², Gonzalo I Gómez Ordenes¹

(1) Universidad Autónoma de Chile, Instituto de Ciencias Biomédicas, Ciencias de la Salud, El Llano Subercaseaux #2801, Santiago, Chile
(2) Universidad de Valparaíso, Instituto de Neurociencias, Centro Interdisciplinario de Neurociencias de Valparaíso, Valparaíso, Chile
(3) Pontificia Universidad Católica de Chile, Departamento de Fisiología, Facultad de Ciencias Biológicas, Alameda #340, Santiago, Chile
(4) Pontificia Universidad Católica de Chile, Departamento de Neurología y Centro Interdisciplinario de Neurociencias, Facultad de Medicina, Marcoleta #49, Santiago, Chile

Introduction: Chronic Kidney Disease (CKD) is defined as progressive loss of nephrons. Oxidative stress (OS) and inflammatory response have been shown in CKD. Mesangial cells (MCs) maintain channel-mediated extracellular communication with other glomerular cells. The RhoA/ROCK pathway activation has been associated with inflammatory pathologies, and its inhibition has been proposed as a treatment in CKD, but its mechanism of action is unknown. Based on this, we hypothesize that “TNF- α /IL-1 β activate RhoA/ROCK pathway, producing OS and altering Connexin43 (Cx43) hemichannel (HC) and gap junction (GJ) permeability in MCs culture”.

Methods: Mice primary MCs culture were incubated with TNF- α /IL-1 β (10 ng/ml each) for 72h, then were treated with Cx43-HC blockers Gap19 (100 μ M) or TATL2 (100 μ M) or RhoA/ROCK inhibitors, Fasudil (15 μ M) or Y-27632 (15 μ M). Permeability through Cx43-HC and GJs were evaluated by Etd⁺ uptake rate and scrape-loading/dye transfer, respectively. Cx43 protein expression and RhoA/ROCK pathway activation were analyzed by western blot. OS was determined by TBARS assay.

Results: The selective blocking of Cx43-HC reduces the increase in Etd⁺ uptake induced by TNF- α /IL-1 β in MCs. A similar effect is observable by inhibiting the RhoA/ROCK. On other hand, we observed that TNF- α /IL-1 β treatment reduces GJ-mediated coupling, which is reversed by Fasudil. Furthermore, TNF- α /IL-1 β treatment increases Cx43 protein levels manner-dependent on the RhoA/ROCK pathway. Finally, TNF- α /IL-1 β increase OS, but this is reverted by Fasudil.

Conclusion: TNF- α /IL-1 β increased OS, rising Cx43-HC permeability in MCs, and these effects were avoided by inhibiting the RhoA/ROCK pathway.

P2 Exploring the role of Panx1 in mesangial cells in the dysfunction and renal damage induced by angiotensin II

Lucas Pablo Marambio Ruiz¹, Claudia M. Lucero¹, Marcelo León¹, Gonzalo I. Gomez¹

(1) Instituto de Ciencias Biomédicas, Universidad Autónoma de Chile, Facultad de Ciencias de la Salud, El Llano Subercaseaux #2801, Santiago, Chile

Chronic Kidney Disease (CKD) is a worldwide health problem in which hypertensive nephropathy is the second cause of terminal CKD. Angiotensin II (AngII) is a key factor for the pathogenesis of renal damage. In this sense, those responses might be enough to increase the probability of open Pannexin1 Channels (Panx1 Chs). In this work, we plan to establish whether AngII affects the function and Panx1-Based channels and how the expression of Panx1 affects the renal function.

The hypertensive nephropathy mice model was induced by in vivo administration of AngII (1000 ng/min) for six weeks. Animals were divided into two experimental groups: Wild type (control) and AngII. Mice were euthanized, then the mesangial cells (MCs) were isolated, treated with AngII during 72h, and then exposed to different inhibitors of Panx1 Chs: Probenecid (PBC), Carbenoxolone (CBX), and the mimetic peptide 10Panx1. Permeability through Panx1-Ch was evaluated by Etd⁺ uptake rate, release of proinflammatory cytokines (TNF- α and IL-1 β), formation of thiobarbituric acid reactive substances (TBARS) and renal function was estimated by UProt/UCrea ratio.

AngII could promote the release TNF- α and IL-1 β , as well as the formation of thiobarbituric acid reactive substances (TBARS) upon reaction with the lipid of cell membranes. Different inhibitors of Panx1 Chs could inhibit this loop: Probenecid (PBC), Carbenoxolone (CBX), and the mimetic peptide 10Panx1. the UProt/UCrea ratio increased significantly in mice treated with AngII compared to control conditions.

We speculate that in the onset of the hypertensive nephropathy, reactive MCs would undergo a dysfunctional process that may impact this disease progression.

Financing: Fndecyt iniciación, grant number 11200584

P3 Antioxidant activity and phenol content of aqueous extracts from *Carpobrotus edulis* leaves, stolons and roots

Carlos Schneider¹, Iván Quiñones¹, Eduardo Navarrete¹

(1) Universidad de Concepción, Departamento de Ciencias y Tecnología Vegetal, Juan Antonio Coloma 0201, Los Angeles, Chile

Carpobrotus edulis (L.) N.E. Br. (common name ice plant, Aizoaceae) is an invasive plant, that can exist in damp or dry areas, and this species is a succulent perennial subshrub. It is native to South Africa, where it finds use in traditional medicine for symptoms of various diseases. There have been several studies on the biological activity of extracts, of the leaves and fruits, of this species. For example, scientific reports about antioxidant, antimicrobial, anticholinesterase, and enzymatic inhibitory activity. *C. edulis* has been introduced in Chile and is found in the región of Valparaíso until the región of Los Ríos. The objective of this research was to evaluate the antioxidant activity, and phenolic compounds content in aqueous extracts of *C. edulis*, in order to compare the antioxidant activity between leaves, stolons and roots, and compare the antioxidant activity between plant samples collected in different seasons of the year. To determine antioxidant activity, assays with 2,2-Diphenyl-1-picrylhydrazyl radical (DPPH) and 2,2'-Azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) diammonium salt (ABTS) were carried out. With DPPH radical and ABTS cationic radical, the results were expressed as gallic acid equivalents and as trolox equivalents, respectively. The assessment of total phenolic and flavonoid content was determined by spectrophotometric methods. In general, the leaves extract resulted in a higher antioxidant activity as evidenced by the obtained equivalents, for the DPPH method and for the ABTS method, and regarding the phenol and flavonoid content it was also demonstrated a higher presence of this compounds in the leaves extracts of *C. edulis*.

Financing: Acknowledgement: Mrs. Claudia Flores Cortés for her technical assistance.

P4 Development of decellularized scaffolds derived from animals in reparative versus regenerative stages.

Desarrollo de scaffolds descellularizados derivados de animales en estadios regenerativos versus reparativos

Rocio Corrales Orovio^{1,2}, Valentina Castillo¹, Pamela Díaz³, Sebastian San Martin³, Jose Tomas Egaña¹

(1) Pontificia Universidad Católica de Chile, Institute for Biological and Medical Engineering, Schools of Engineering, Biological Sciences and Medicine, Vicuña Mackenna 4860, Santiago, Chile

(2) LMU, Division of Hand, Plastic and Aesthetic Surgery, Medicine, Munich, Germany

(3) Universidad de Valparaíso, Biomedical Research Center, School of medicine, Angamos 655, Valparaíso, Chile

Tissue regeneration capacities vary significantly during lifespan. In fact, mammals in fetal stages can fully regenerate certain tissue, while adults can only repair. Therefore, in this project we hypothesize that the extracellular matrix (ECM) derived from animals in regenerative stages will have a greater regenerative potential when used as scaffold for tissue regeneration. Thus, in this work we optimized a skin decellularization protocol to further characterize and compare the ECM derived from fetus and adult mice. First, structural, biomechanical and molecular analysis of the decellularized tissues was performed by different techniques, including histology, immunohistochemistry, SEM imaging and texture analysis. Results showed significant differences between decellularized fetus and adult mice skin regarding tissue composition and microstructure. Moreover, in order to assess the *in vitro* biocompatibility of scaffolds derived from fetus or adult mice skin, commercial collagen scaffolds were supplemented with ECM-based hydrogels generated with freeze dried and milled decellularized tissues. Dermal fibroblasts were seeded on scaffolds containing either fetus or adult ECM hydrogels, and adhesion, distribution and metabolic activity of cells was studied. Our results showed increased metabolic activity in scaffolds containing both ECM supplements, with data suggesting higher growth capacity in scaffolds supplemented with fetus-derived hydrogel. The results obtained in this work provide significant insights about the molecular clues that govern the tissue regeneration process in animals with high regenerative capacity, as well as a direct impact in the development of new biomaterials for tissue engineering.

Financing: Fondecyt 1200280

P5 Is KLK5 a determinant factor in lung cancer biology?

¿Es la calicreína 5 un factor determinante en la biología del cáncer de pulmón?

Adriana Stuardo^{1,6}, Pía Bascur^{1,6}, Paulina Fuentes^{1,6}, Fabiola Sanchez^{2,6}, Francisco Díaz², Alejandro Rojas^{3,6}, Carlos Figueroa^{1,6}, Rodrigo López^{4,6}, Franz Villarroel-Espindola⁵, Francisca Pavicic¹, Pamela Ehrenfeld^{1,6}

(1) Universidad Austral de Chile, Laboratorio de Patología, Instituto de Anatomía, Histología y Patología, Facultad de Medicina, Valdivia, Chile

(2) Universidad Austral de Chile, Laboratorio de Inmunología Vascular, Instituto de Inmunología, Facultad de Medicina, Valdivia, Chile

- (3) Universidad Austral de Chile, Instituto de Medicina, Facultad de Medicina, Valdivia, Chile
 (4) Universidad Austral de Chile, Instituto de Farmacología y Morfofisiología, Facultad de Ciencias Veterinarias, Valdivia, Chile
 (5) Instituto Oncológico Fundación Arturo López Pérez, Unidad de Medicina Traslacional, Departamento de Investigación del Cáncer, Santiago, Chile
 (6) Universidad Austral de Chile, Centro Interdisciplinario de estudios del Sistema Nervioso (CISNe), Valdivia, Chile

Introduction: Kallikrein-related peptidases (KLKs) are serine proteases that have been proposed as plausible biomarkers and as a regulator in several tumor types. Although KLK5 has been found in lung cancer tissue, which is one of the most diagnosed cancers worldwide, its role has not yet been clarified. The aim of this study was to explore the role of KLK5 in lung cancer biology.

Methodology: KLK5 levels were determined by western blotting in a panel of cell lines derived from lung cancer including H727 (carcinoid), H1299 (large cell carcinoma) and A549 (adenocarcinoma). To investigate KLK5 role in epithelial-mesenchymal transition (EMT), cell viability by MTT, and endothelial permeability, A549 cells were treated in vitro with recombinant KLK5 (rKLK5; 2, 5, and 10 ng/ml for 24h). Additionally, the levels of KLK5 were determined in A549 cells treated with Cisplatin (5, 7.5, and 10 μ M for 48h) by western blotting, and qPCR.

Results: Higher levels of KLK5 were detected in H727, H1299, and A549 compared to another cell lines from the panel. Although EMT markers did not change, the stimulation of A549 cells with rKLK5 induced changes in endothelial permeability and increased cell viability. Interestingly, cisplatin treatment increased the KLK5 protein levels.

Conclusions: Primary, KLK5 may be involved in lung cancer biology and cisplatin seemed to modulate KLK5 expression. Additional studies are needed to clarify the specific role of KLK5 in lung cancer progression.

Financing: Funding: This work was supported by FONDECYT 1201635 (PE); 1200427 (AR); Beca ANID Doctorado nacional – Gastos operacionales 21201493 (AS).

P6 Relationship between dendritic arborization, cortisol, bdnf and working memory in rats under a stress model: an approach to workload in the pandemic context

Relación entre arborización, cortisol, bdnf y memoria de trabajo en ratas bajo un modelo de estrés: una aproximación a la carga de trabajo en pandemia

Marcelo León Olivares¹, Claudia M. Lucero¹, Rodrigo Mira², Lucas Marambio Ruiz¹, Andres Liberona³, Jorge Abarca², Waldo Cerpa², Juan Andrés Orellana³, Gonzalo Gomez¹

- (1) Universidad Autonoma de Chile, Instituto de Ciencias Biomédicas, Ciencias de la Salud, El Llano Subercaseaux #2801, Santiago, Chile
 (2) Pontificia Universidad Católica, Laboratorio de Función y Patología Neuronal, Biología Celular y Molecular, Avenida Portugal, Santiago, Chile
 (3) Universidad de Chile, Laboratorio de Comunicación Neuroglial, Medicina, Santiago, Chile

The COVID-19 pandemic is a public health emergency, where workers experience stress due to the increase in health demand and the need to achieve an adequate response in patient care. Studies show that job stress can have adverse effects related to poorer cognitive performance at work among health workers. In stress, adaptation occurs in response to a stressful stimulus. The hypothalamic-pituitary-adrenal (HPA) axis participates in this adaptation, which the hormone cortisol participates. Along these lines, it has been observed that chronic stress can induce the loss of dendritic arborization in regions of the prefrontal cortex dorsolateral and the hippocampus associated with increased levels of cortisol, where brain-derived neurotrophic factor (BDNF) plays a critical role in synaptic development and plasticity of the central nervous system. In this study, a chronic stress environment was generated in rats to analyze its relationship with working memory measured in the Morris Water Maze. Protein levels of cortisol and BDNF were measurement with an ELISA kit and dendritic arborization was determinate by modified Golgi staining. It was found that rats subjected to chronic stress due to mobility restriction showed changes in spatial and acquisition working memory, where latency times and distance traveled increased, in addition to behavior associated with anxiety and depression that was observed in the openfield test. Finally, these results correlated with an apparent loss of dendritic arborization in the dorsal hippocampus and medial prefrontal cortex and decrease in plasma BDNF protein levels in the group of stressed rats.

P7 Aloe vera natural extract has a positive impact on zebrafish tissue regeneration after caudal fin amputation

Karen I. Fehrmann-Cartes¹, **Priscila García-Castro**^{2,4}, Patricio Yañez-Bailey^{3,4}, Alejandra Llanos-Rivera³, Javiera De la Paz^{2,3,4}

(1) Universidad de Las Américas, Facultad de Medicina Veterinaria y Agronomía, Avenida Chacabuco 529, Concepción, Chile

(2) Universidad de Concepción, Biología Celular, Facultad de Ciencias Biológicas, Víctor Lamas 1290, Concepción, Chile

(3) Universidad de Concepción, Departamento de Oceanografía, Facultad de Ciencias Naturales y Oceanografía, Víctor Lamas 1290, Concepción, Chile

(4) Danio Biotechnologies, spa, Las Lomas 7844, La Florida, Chile

Intensive aquaculture production systems increase the risk of health problems on fish including the attack of ectoparasites that cause tissue damage and predispose them to multiple infections. To face this problem, taking advantage of protective properties in components of natural origin emerges as an interesting strategy. In this work we analyzed the effects of Aloe vera (*Aloe barbadensis miller*, AV) on tissue regeneration and immune response *in vivo*, after tissue damage on the teleost model, zebrafish (*Danio rerio*).

To evaluate if a natural extract of AV can improve tissue regeneration and the normal innate immune response associated, a caudal fin amputation protocol on hatched zebrafish larvae was used. Briefly, a caudal fin amputation and regeneration protocol was applied on transgenic zebrafish larvae expressing the red fluorescent protein under the control of the Lysozyme C gene promoter, Tg(lysC:DsRed). After amputation (5 hours), the presence of phagocytic cell (macrophages and neutrophils) was quantified in the cut area, then 3 and 5 days after, the caudal fin area was measured by imaging analysis. To complement our result, we also characterized the molecular response by analyzing different immune markers by RT-qPCR.

Our results shows that the addition of AV to the zebrafish culture medium prior and after amputation, induced a significant immunostimulant effect and accelerate regeneration. Therefore we suggests that AV is a good candidate to be incorporated as an additive in farmed fish media and food to facilitate recovery after skin damage and help reducing infectious diseases in cultured fish.

Financing: Funding: UDLA PI202001 and Danio Biotechnologies.

P8 Coexistence of *Ambrosia chamissonis* and *Ammophila arenaria* in coastal dunes in the Ñuble Region, Chile

Coexistencia de *Ambrosia chamissonis* y *Ammophila arenaria* en dunas costeras de la Región del Ñuble, Chile

José Miguel Cerda¹, Rosanna Ginocchio Cea^{1,2}, José Miguel Fariña³

(1) P. Universidad Católica de Chile, Centro de Ecología Aplicada y Sustentabilidad (CAPES UC), Av. Libertador Bernardo O Higgins 340, Santiago, Chile

(2) P. Universidad Católica de Chile, Departamento de Ecosistemas y Medio Ambiente, Facultad de Agronomía e Ingeniería Forestal, Av. Vicuña Mackenna 4860, Santiago, Chile

(3) P. Universidad Católica de Chile, Departamento de Ecología, Facultad de Ciencias Biológicas, Av. Libertador Bernardo O Higgins 340, Santiago, Chile

Coastal dunes are widely distributed throughout the world. They have diverse properties, but common characteristics such as, an abiotic stress gradient that decreases inland. Plants that inhabit the dunes must face this stress and also their biological interactions, all of which determine the place that they occupy along the coastal dunes. *Ambrosia chamissonis* and *Ammophila arenaria* are invasive species that dominate the coastal dunes of Chile, but few studies have been done to understand their interactions. We aimed to characterize the coexistence between them and to evaluate the potential effect of the stress gradient. Soil abiotic variables (i.e., relative humidity, pH, salinity, and contents of organic matter, nitrogen, phosphorus, and potassium) of coastal dunes in the Ñuble Region, Chile, were evaluated. Biological variables (i.e., cover, living matter, height, water content, content of foliar macronutrient) were measured. The study was carried out in three scenarios; dunes in which each species dominated and one in which they coexisted. A stress gradient of soil salinity and available potassium was identified, which decrease with distance from the sea. In addition, it was observed that the species mainly interact in the intermediate zone of the dune. It can be deduced that *A. arenaria* competitively excludes *A. chamissonis* towards the zone of greatest stress. The first one presents characteristics of a competitive species and the second one is a tolerant species. Through of a Canonical Correspondence Analysis it was determined that soil salinity and available phosphorus are the physical factors that would define the community composition.

Financing: ANID PIA/BASAL FB0002

P9 High resolution melting (Bar-HRM) as fast and efficient technique for molecular characterizations of morels (*Morchella* spp.) in southern Chile.

David Alors Rodríguez², Oriana Betancourt¹, Leonardo Anabalon², Gabriel vivallo¹

(1) Universidad Católica de Temuco, Departamento de Veterinaria y Salud Pública, Facultad de Recursos Naturales, Campus Luis Rivas del Canto, Temuco, Chile

(2) Universidad Católica de Temuco, Departamento de Ciencias Biológicas y Químicas, Facultad de Recursos Naturales, Campus San Juan Pablo II, Temuco, Chile

The *Morchella* species are highly appreciated because of their flavor and medicinal properties being used in gourmet cooking and ayurvedic and Chinese traditional medicine. For this reason, *Morchella* species represents a worldwide million dollars market and an important exportation product for southern regions of Chile. Despite its economic interest, is difficult to identify the *Morchella* species because of the taxonomical complexity of the genus. Most of the knowledge becomes from northern hemisphere, fortunately recent molecular studies in southern south America are shedding taxonomical light helping to species circumscription. The taxonomical clarification will allow us to investigate the ecology, distribution and biology of the species, which could ultimately improve the commercialization of this exportation product.

In the present work we aimed: 1) as a general objective to improve the knowledge in *Morchella* species using molecular data to increase the value of the product and 2) as specific objective to validate the High-Resolution Melting barcode (Bar-HRM) technique as a fast and cheap molecular technique to identify *Morchella* species. Six environmental *Morchella* samples from center south and south Chile were analyzed. The results of Bar-HRM were compared with the universal fungal barcode (ITS) showing similar results. Our results suggests that Bar-HRM is a valid technique to be used for species identification of *Morchella* genus with potential to increase the value of the product. In addition, our results suggest that would be convenient to investigate the geographical zonation of *Morchella* species in the Chilean territory using molecular data with higher sample size.

P10 The blastocladialean fungus *Paraphysoderma sedebokerense*, importance as microalgal parasite and perspectives to control this pest

David Alors Rodríguez^{1,2}, Sammy Boussiba², Aliza Zarka²

(1) Universidad Católica de Temuco, Departamento de Ciencias Biológica y Químicas, Facultad de Recursos Naturales, Campus San Juan Pablo II, Temuco, Chile

(2) Ben Gurion University of Negev, Microalgal Blotechnology Laboratory, Campus Sde Boker, Midreshet Ben-Gurion, Israel

The blastocladialean fungus *Paraphysoderma sedebokerense* was isolated for the first time from *Haematococcus lacustris* and was described as species-specific parasite. However, it has been isolated from other microalgae being able to cause collapse of *H. lacustris*, *C. zofigiensis* and *S. dimorphus* cultures. We aimed to compare and understand the infection in these different microalgae and select a target to control the fungal pest. We established a patho-system to compare the infection in the three different host species to quantify parameters of the infection and parameters of the parasite fitness. We characterized for the first time the developmental stages of isolated fungal finding a generation time of 16 h. The three tested microalgae showed different susceptibility to *P. sedebokerense*, which correlates with blastoclad's preference to the host in the following order: *H. pluvialis* > *C. zofigiensis* > *S. dimorphus*.

We investigated the utilization of different nitrogen sources by *P. sedebokerense* finding that *P. sedebokerense* could use inorganic and organic nitrogen. The enzyme Glutamine synthetase (GlnS) and is a key enzyme in nitrogen metabolism since uses inorganic nitrogen as substrate (ammonia) to produce organic nitrogen (glutamine). We investigated the effect of the GlnS inhibitor glufosinate on the infection of *H. lacustris* by the blastocladialean fungus *P. sedebokerense*. We found inhibition of infection at millimolar concentrations of glufosinate, which is tolerated by *H. lacustris*. Our results showed that GlnS is mandatory for the development and growth of *P. sedebokerense* and a target to develop control strategies against the fungal parasite of *H. lacustris*.

Financing: Research funded by United States—Israel Binational Science Foundation (2017283) David Alors was the recipient of a postdoctoral fellowship from the Jacob Blaustein Center.

P11 Using Machine Learning in the classification of Nothofagus (Nothofagaceae) fossil leaves at intrageneric level: An initial approach.

El uso del Machine Learning en la clasificación de hojas fósiles de Nothofagus (Nothofagaceae) a nivel intragenérico: Una aproximación inicial.

Juan Pablo Pino Morales¹, Paola Liliana Poch Jiménez¹, Luis Felipe Hinojosa Opazo¹, Stephany Díaz Branada¹

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

A critical step to assess past alpha diversity and evolutionary relationships is both identification and classification of fossil remains. Classical papers in systematic paleobotany involve qualitative morphological descriptions while some recent studies use quantitative and multivariate methods like geometric morphometry. During last decades machine learning has become an important approach for classification via repetition and adjustment through training processes. The genus *Nothofagus* comprise 36 living species divided in four subgenera distributed mainly in the south hemisphere. It is considered a key genus in plant biogeography due to its disjunct distribution and its abundant fossil record which dates back to the Late Cretaceous of Antarctica. Since the pioneers studies of Romero (1986) and Tanai (1986) several studies had carried out morphological descriptions and classification of *Nothofagus* leaves in several morphospecies. Such classifications have never been tested in a quantitative framework less including extant species. Here we use machine learning supervised algorithms such Linear Discriminant Function Analysis (LDA), Support Vector Machines (SVM), Random Forest (RF) and deep learning methods such as convolutional neural networks (CNNs) to classify fossil leaves. To accomplish this, we will use extant cleared *Nothofagus* leaves from the Paleoecology Lab herbarium at University of Chile as training data. Using this method, we attempt to provide a modern taxonomic framework in classifying fossil leaves in order to unravel intrageneric history of *Nothofagus* in South America.

Financing: FONDECYT 1221214, 1211765 y Beca ANID de doctorado nacional.

P12 Macrolichens ecophysiological responses adapted to different forest environments in Chile

Johana Villagra Espinoza^{1,2}, José Raggio Quilez², Leopoldo García Sancho²

(1) Universidad Católica de Temuco, Departamento de Ciencias Biológicas y Químicas, Facultad de Recursos Naturales, Temuco, Chile

(2) Universidad Complutense de Madrid, Departamento de Farmacología, Farmacognosia y Botánica, Facultad de Farmacia, Madrid, España

Epiphytic lichens respond to the changes in humidity, light and temperature that can occur in the environment. There are important differences between the microclimate of different forest types like *Araucaria araucana* forest and Valdivian rainforest. In order to understand the adaptation mechanisms of epiphytic lichens in these two forests, the photosynthetic response of species was studied. We compared the photosynthetic responses to light and thallus water content under controlled conditions in laboratory of three macrolichens species of an *Araucaria araucana* forest, located in the Andes Mountain range in Chile with three macrolichens an evergreen forest of the Valdivian coastal mountain range. Our results showed differences between *A. araucaria* and Valdivian macrolichens in the different parameters studied. The macrolichen species of the *Araucaria* forest maintains the optimal photosynthetic for longer time than Valdivian forest microlichen species. We interpreted that this pattern indicates an adaptation to greater environmental exposure in the conifer forest than in the rainforest. This is supported by higher values of net photosynthesis for these species. The ecophysiological results recorded here provide unprecedented information on the behavior of epiphytic macrolichens in temperate forests of southern Chile.

Financing: Fondecyt Postdoctorado N° 3210256. Johana Villagra was recipient of a BecasChile grant.

P13 Functional Diversity And Composition Of Epiphytic Lichens In Malalcahuello National Reserve, Araucania Region, Chile

Functional diversity and composition of epiphytic lichens in malalcahuello national reserve, araucania region, chile

Johana Villagra Espinoza¹, David Alors Rodríguez¹

(1) Universidad Católica de Temuco, Departamento de Ciencias Biológicas y Químicas, Facultad de Recursos Naturales, Temuco, Chile

Climate change is affecting the different natural ecosystems in Chile, causing loss of biodiversity, ecosystem services and functions. One of the ecosystems that has shown a greater impact in Sothern Chile is being the *Araucaria araucana* forests.

The objective of the present work is the study of the lichen communities in *A. araucana* forests, to identify bioindicators of climate change based on functional traits and tolerance to environmental changes. The sampling was done in a valley at Malacahuello National Reserve with a total of 50 censuses at different altitudes and two orientations within each phorophyte tree. A total of 10 temperature sensors (ibutton) were installed, two in each sampling site covering both North and South orientations of the phorophyte trees. Our results shown differences in species distribution and species richness within altitude and orientation related to the recorded temperature by the ibuttons. The observed differences of species composition of the communities are in concordance with the environmental conditions (altitude, temperature and orientation) and categorized by functional groups. We observed high proportion of cyanolichens in south exposure of lowlands while beard lichens were mostly observed in north exposure of highlands. A third group of lichens showed an intermediate preference of temperature and other microclimatic conditions (probably humidity and sun exposition)

being located in north exposition at lowlands and south exposition at highlands. We still working on a definitive list of bioindicator species.

Financing: Fondecyt Postdoctorado N° 3210256.

P14 Evaluation of diverse bioremediation strategies for the decontamination of hydrocarbon-polluted coastal soils

Michael Seeger Pfeiffer¹, Constanza C. Macaya¹, Roberto E. Durán¹, Ester G. Rivera¹, Felipe Salazar-Tapia¹, Ximena Báez-Matus¹, Flavia Dorochesi¹, Anna Espinoza-Tofalos², Andrea Franzetti²

(1) Universidad Técnica Federico Santa María, Departamento de Química & Centro de Biotecnología, Avenida España 1680, Valparaíso, Chile

(2) University Milano-Bicocca, Department of Earth and Environmental Sciences, Milan, Italia

Bioremediation is an environmental-friendly and low-cost technology for the clean-up of polluted sites. This biotechnology may be limited by salinity, heavy metals, and reduced bacterial survival. *Pseudomonas* and *Acinetobacter* strains have been widely applied in bioremediation processes. The aim of this study was to evaluate different bioremediation strategies in hydrocarbon (HC)-polluted coastal soils. Growth studies were carried out in minimal-medium with HCs as carbon source. For field studies, five polluted saline soil cores and one saline soil core co-polluted with copper were performed. Biostimulation (compost and grape pomace) and bioaugmentation (free bacterial cells and cells immobilized on agro-industrial waste) were tested during 100 days. Physicochemical, operational, microbiological, molecular parameters were measured, and microbial community dynamics were monitored by NGS. No significant differences in the operational parameters in cores were observed. The highest HC removal (>80%) were observed in bioaugmented cores. Bioaugmentation strategies increased the cultivable hydrocarbonoclastic bacteria, whereas biostimulation with grape pomace enhanced cultivable heterotrophs and hydrocarbonoclastic bacteria. The immobilized consortium favored the settlement of the consortium and increased the catabolic genes in soils. An increase in the relative abundance of the genera associated with the consortium and the phylum Actinomycetota was observed during bioaugmentation. In conclusion, i) the immobilization of bacteria favors the tracking of specific bioremediation biomarkers, ii) grape pomace biostimulation favors the growth of the bacterial community, and iii) the combination of biostimulation and bioaugmentation strategies increase the hydrocarbon removal rates.

Financing: Acknowledgements: ANID/USM/PUCV PhD fellowships (CM,XB,FD), FONDECYT 1200756 (MS,RD) and ILS (MS,CM,RD,EG,FS,XB) grants.

P15 Buzz-pollinated flowers of highbush blueberry crops set high-quality fruits

Las flores polinizadas por zumbido de los cultivos de arándanos highbush producen frutos de alta calidad

José Neiva Mesquita Neto¹, Benito Cortés Rivas², Cecilia Smith-Ramirez², Víctor Hugo Monzón¹

(1) Universidad Católica del Maule, Departamento de Biología y Química, Facultad de Ciencias Básicas, Avenida San Miguel 3605, Talca, Chile

(2) Universidad Austral de Chile, Instituto de Biodiversidad, Conservación y Territorio, Facultad de Ciencias Forestales y Recursos Naturales, Valdivia, Chile

Bees capable to perform floral sonication (also known as buzz-pollination) are among the most effective pollinators of blueberries. Highbush blueberry is one of the most relevant buzz-pollinated crops worldwide. Different from most buzz-pollinated flowers that are nectar-less, blueberries also produce floral nectar, which implies that even a flower visitor capable of sonicating will not necessarily do so if it is looking for nectar. Therefore, we aimed to compare the performance of visitors with buzzing with non-buzzing visits to set fruits of highbush blueberry. For this, we evaluated buzz behavior at the visit level, considering only the subset of visits with noted floral sonication against the subset of visits without this behavior. Per-visit pollination performance (stigmatic pollen deposition, fruit set, and fruit quality) and visit frequency were measured and the presence of buzz behavior of flower visitors was evaluated in four cultivars grown in five blueberry orchards located in southern Chile. Besides we found no significant effect on the fruit set, floral visits accomplished by buzz-behavior produced fruits with better quality (higher weight and volume) and with more seeds than visits without this behavior. Moreover, flowers visited by insects not observed here nor reported sonicating set smaller and lighter fruits than those flowers visited by bee species capable of sonication. For instance, one single visit of *Cadeguala occidentalis* can increase fruit weight by 1.8 over that from *A. mellifera* visits. Therefore, visits of bees with buzz behavior are likely to enhance the blueberry crop productivity by setting better quality fruits.

Financing: This work was supported by the ANID/Fondecyt Iniciación en Investigación under Grant [11190013] to JNM-N and FIC 674 GORE Maule under Grant [BIP-40.019.177-0] to VHM.

P16 Characterization of populations of the exotic species *Cylindropuntia tunicata* inside Pan de Azúcar National Park

Caracterización de poblaciones de la especie exótica *Cylindropuntia tunicata* al interior del Parque Nacional Pan de Azúcar.

Nicole Alexandra Sandoval^{1,2}, Rafael García Araya^{1,2}, Aníbal Pauchard Cortés^{1,2}, Jonathan Urrutia Estrada²

(1) Universidad de Concepción, Facultad de Ciencias Forestales, Victoria 631, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Laboratorio de Invasiones Biológicas (LIB), Santiago, Chile

Las invasiones biológicas en ecosistemas áridos han recibido relativamente poca atención comparada con otros ecosistemas como bosques y praderas. Sin embargo, creciente evidencia demuestra que estos ecosistemas pueden ser invadidos por especies adaptadas a estas condiciones extremas. A modo de ejemplo, aún existe poca claridad respecto al origen biogeográfico de *Cylindropuntia tunicata*. Se realizó una prospección de la especie *C. tunicata* al interior del Parque Nacional Pan de Azúcar. Solo fue detectada en sector Las Lomitas, donde se establecieron 61 parcelas de 15m de radio, centradas en los individuos de *C. tunicata* encontrados. En cada parcela se cuantificó la riqueza total de especies de plantas y se georreferenció la cobertura de todos los individuos y/o conglomerados de cactáceas. En total se registraron 181 individuos vivos *C. tunicata*. En el área muestreada, la densidad promedio de individuos vivos de *C. tunicata* es de 84,82 individuos/ha los que ocupan una superficie promedio acumulada de 12,41m²/ha. El tamaño promedio de los conglomerados de *C. tunicata* fue de 0,19 ± 0,02m². Mientras que la cobertura de los secos y muertos fue de 0,54±0,17m² y 0,59±0,08m² respectivamente. Solo un 1,17% presento vestigios recientes de flores y un 3,53% de los individuos evidenció desarrollo de frutos. Por otro lado, un 58,56% de los individuos mostro desarrollo de reproducción vegetativa. La evidencia sugiere que esta especie sería de origen exótico, pero a la espera de estudios para comprobarlo es fundamental avanzar en el estudio de su distribución y potenciales impactos.

Financing: Trabajo financiado por CONAF-FIBN 015/2018 y ANID/BASAL FB210006.

P17 New ecosystem service from Patagonia: Wild yeast *Saccharomyces eubayanus* for a unique style of native beer.

Nuevo servicio ecosistémico de la Patagonia: Levadura salvaje *Saccharomyces eubayanus* para un estilo único de cerveza nativa.

Abel Antonio Ñunque González^{1,2}, José Ruiz Agurto¹, Wladimir Mardones⁴, Francisco Cubillos Riffo^{2,4}, Roberto Nespolo Rossi^{1,2,3}

(1) Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Universidad Austral de Chile, Valdivia, Chile.

(2) Millenium Nucleus of Patagonian Limit of Life (LiLi).

(3) Center for Applied Ecology and Sustainability (CAPES)

(4) Millennium Institute for Integrative Biology (iBio), Santiago, Chile

The isolation of the cryotolerant yeast *Saccharomyces eubayanus* from “lenga” forests (*Nothofagus pumilio*) at the high limit of Andean growth in Patagonia (the “tree-line”) provide a potential ecosystem service with great relevance for the local economy. This yeast is the missing ancestor of *S. pastorianus*, the commercial yeast used for lager beer in 94% of the market worldwide. In a collaborative effort, we studied lenga forests between Maule and Magallanes regions of Chile, covering over 2,000 km, identifying 160 strains of *S. eubayanus*, for which 80 were characterized by genomics and phenomics approaches. The genetic variability of these populations suggests a focus of diversification of *S. eubayanus* to the rest of the world, thus suggesting a Patagonian origin. We experimentally evolved several strains, for improving their fermentative capacities and tested their correlated responses in aromas and flavors. The resulting set of volatile compounds was unique and sensorially attractive, thus contributing not only to the complexity of fermented beverages, but also valuing the microbiological heritage of Patagonian forests. One of the isolates from the Villarrica National Park showed a unique profile of flavors and aromas according to expert tasters. Experimental industrial essays were developed in volumes between 25 - 1000 L with 7 breweries from Los Ríos Region, producing medium alcohol content and fruity and spicy aromas. Some of these beers were marketed and submitted to international competitions as experimental beers. This experience shows how Patagonian forests could provide sustainable benefits to humans in the form of a native microorganism.

Financing: ANID – Millennium Science Initiative Program – Center Code NCN2021-050ANID PIA/BASAL center FB0002 and Fondecyt 1221073. GORE Los Ríos - FIC2032

P18 Changes in the production and composition of extracellular polymeric substances (EPS) in the cyanobacterium *Trichormus* sp.

Variación en la producción y composición de sustancias poliméricas extracelulares (EPS) en la cianobacteria *Trichormus* sp.

Pablo Dahech¹, Claudia Ortiz Calderón¹

(1) Universidad de Santiago de Chile, Biología, Química y Biología, Av. Libertador Bernardo O'Higgins 3363, Santiago, Chile

Las cianobacterias filamentosas terrestres son organismos procariontes, fotoautotróficos y capaces de fijar CO₂ y en algunos casos N₂, entregando nutrientes a los suelos. Además, producen sustancias poliméricas extracelulares (EPS), formadas de un esqueleto de azúcares, asociado a proteínas y lípidos. Las EPS y los filamentos de las cianobacterias son capaces de adherirse y aglomerarse a las partículas de suelo, mejorando su estabilidad, particularmente en zonas desérticas y semidesérticas.

En este trabajo, se evaluó la producción de EPS de un cultivo enriquecido (no axénico) de la cianobacteria *Trichormus* sp., aislada desde costras biológicas de suelo de la IV región de Coquimbo, variando parámetros de crecimiento: concentración de NaCl, nitrógeno en el medio de cultivo e intensidades lumínicas. Solo a altas condiciones lumínicas (9.6 Wm⁻²), los cultivos aumentaron la producción de EPS a 377%, comparada con la condición basal (3.2 Wm⁻²).

Se estudió la composición y estructura de las EPS, determinándose que fucosa y glucosa son las principales azúcares del esqueleto de carbohidrato cuya proporción varía según la intensidad luminosa usada en los cultivos, con 18% de fucosa a 3.2 Wm⁻² y un 44% de fucosa a 9.6 Wm⁻². Estudios de RMN, permitieron determinar patrones estructurales de EPS descritos para otro tipo de bacterias. Finalmente, estudios en túnel de viento, demostraron que los cultivos de cianobacterias retienen alrededor del 100% de material particulado, sin diferencias estadísticamente significativas con el grupo control.

Los resultados permiten proponer una alternativa de mejora de los suelos degradados usando cultivos de la cianobacteria *Trichormus* sp.

Financing: Proyecto Fondec ID20110356

P19 Spy-hopping in Chilean dolphins (*Cephalorhynchus eutropia*): are they really spying?

Margherita Silvestri¹, George Swan², Sonja Heinrich³, Mauricio Soto-Gamboa⁴

(1) Universidad Austral de Chile, Escuela de Postgrado, Facultad de Ciencias, Valdivia, Chile.

(2) Universidad Austral de Chile, Facultad de Ciencias Forestales y Recursos Naturales, Valdivia, Chile

(3) University of St Andrews, Sea Mammal Research Unit, United Kingdom

(4) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Valdivia, Chile

Observing behaviour and its social context can provide important insights into a species' ecology but has been limited by logistic challenges of accessing and recording free-ranging cetaceans. Here we report preliminary observations of the social context of spy-hopping behaviour (SHB) in a poorly studied coastal delphinid, Chilean dolphins (*Cephalorhynchus eutropia*). We conducted focal group observations from a shore-based vantage point overlooking the estuary of the Valdivia River in southern Chile (39.9S, 73.4W) from November 2021 to February 2022. Data were collected using a digital video camera and on 4 occasions simultaneous recordings were obtained with an unmanned aerial vehicle (UAV). We recorded the frequency and duration of SHB, the number of individuals involved in this behaviour, the presence of calves or juveniles, and the main behavioural activity of the group: Foraging, Travelling, Socializing, Milling and Resting. We recorded a total of 58 SHB events in 236.75 hours of land-based sampling (0.24 event/hour), with a mean duration of 10.02 s (SD = 12.68, n = 58). SHB mean duration resulted to diminish as group size increase ($R^2 = 0.55$, $F(1,8) = 8.625$, $p < 0.05$) while no significant relationship appeared between SHB events and group size. We mostly observed SHB in groups with calves and during social behaviour. These preliminary results show the existence of a non-vocal surface behaviour that could be possibly linked to social functions, as previously described in other cetacean species. However, to understand the ecological role of SHB in Chilean dolphins, further studies are still needed.

P20 Individual variation in personality traits relates to *Leucocytozoon* spp. infection in *Aphrastura spinicauda*.

Variación individual en rasgos de la personalidad asociados con la infección por *Leucocytozoon* spp. infección en *Aphrastura spinicauda*

Yanina del Carmen Poblete Quintanilla^{1,2}, Élfego Cuevas^{3,4}, Esteban Botero-Delgadillo^{5,7}, Pamela Espíndola-Hernández⁵, Verónica Quirici⁴, Rodrigo Vasquez⁶

(1) Universidad de Las Américas, NIAVA: Núcleo de Investigaciones Aplicadas en Ciencias Veterinarias y Agronómicas, Medicina Veterinaria y Agronomía, Manuel Montt 948, Providencia, Santiago, Chile

(2) Center of Applied Ecology and Sustainability (CAPES), Santiago, Chile

(3) Universidad Andres Bello, Escuela de Medicina Veterinaria, Facultad de Ciencias de la Vida, Quillota 980, Viña del Mar, Chile.

(4) Centro de Investigación para la Sustentabilidad (CIS) Universidad Andrés Bello, Facultad de Ciencias de la Vida, República 440, Santiago, Chile

(5) Max Planck Institute for Ornithology, Department of Behavioral Ecology and Evolutionary Genetics, Seewiesen, Germany.

(6) Universidad de Chile, Instituto de Ecología y Biodiversidad, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Nuñoa., Santiago, Chile

(7) SELVA: Research for conservation in the Neotropics, Bogotá, Colombia.

Los parásitos habitan prácticamente todos los ambientes del planeta representando una importante presión selectiva sobre diferentes rasgos, incluido el comportamiento. La infección por Haemosporidios esta ampliamente distribuida entre las aves, sin embargo, aún sabemos poco sobre los efectos de esta infección sobre el comportamiento. Durante los periodos reproductivos de 2013 y 2014 realizamos pruebas de comportamiento para registrar tres reconocidos rasgos de la personalidad animal: audacia, agresividad y conducta exploratoria, en 89 rayaditos adultos (*Aphrastura spinicauda*) residentes en isla Navarino (55°S) sur de Chile y utilizamos la técnica PCR para la detección de *Leucocytozoon* spp. Los resultados muestran que la infección por *Leucocytozoon* spp. se relaciona positivamente con la audacia, la agresividad y la conducta exploratoria, lo que respalda la idea de que los parásitos actúan como una presión de selección sobre el comportamiento de las aves y amplían nuestra visión sobre los desencadenantes intra-individuales de la adquisición de enfermedades parasitarias en aves silvestres.

Financing: Fondecyt 1100359, 1140548, 11130245; CONICYT-Chile(ICM-P05-002, PFB-23,AFB170008-IEB (Rodrigo A. Vásquez) ; CONICYT-Chile 21130127 (Yanina Poblete); Fondecyt 1170972; Universidad Andrés Bello-Initiation Research Dirección General de Investigación (Verónica Quirici)

P21 Individual effect of six shrubs on fuel properties of the Maulino forest

Efecto individual de seis arbustos en las propiedades del combustible del bosque maulino

Constanza Figueroa Rojas^{1,2}, Aníbal Pauchard^{1,2}, Rafael García^{1,2}

(1) Laboratorio de Invasiones Biológicas (LIB), Instituto de Ecología y Biodiversidad (IEB).

(2) Facultad de Ciencias Forestales, Universidad de Concepción.

En las últimas décadas los incendios forestales han sufrido alteraciones en su régimen, frecuencia e intensidad, generando impactos como la pérdida de biodiversidad y la degradación de ecosistemas naturales. El bosque maulino costero se caracteriza por su singular biodiversidad y riqueza florística con altos niveles de endemismos, lo que, sumado a otros procesos de degradación, lo vuelven particularmente sensible a los efectos de los incendios forestales. El comportamiento del fuego está determinado por múltiples factores, caracterizar las propiedades del combustible acumulado (i.e. biomasa vegetal) al interior de estos bosques es esencial para diseñar acciones preventivas de silvicultura. El objetivo de este estudio es caracterizar las propiedades del combustible acumulado en poblaciones de seis especies de arbustos (i.e. *Azara integrifolia*, *Escallonia pulverulenta*, *Gaultheria insana*, *Ribes punctatum*, *Ugni molinae* y *Teline monspessulana*) en bosques nativos de la Cordillera de la Costa en la región del Maule. Las especies con una mayor incidencia en la intensidad del fuego debido a su acumulación de combustible total son *A. integrifolia* (1540,72 kg/ha), *G. insana* (961,49 kg/ha) y *E. pulverulenta* (321,20 kg/ha). Por otro lado, *A. integrifolia* y *E. pulverulenta* tienen la menor proporción de combustible fino. La menor densidad aparente se registró en *T. monspessulana*. El contenido de humedad fue menor en *E. pulverulenta*, *G. insana* y *U. molinae*. Estos resultados ayudan a comprender el rol individual que cada especie juega en el comportamiento del fuego, para así poder diseñar mejores actividades de silvicultura y de restauración.

Financing: Este trabajo es financiado por FONDECYT 11170516, ANID/Basal FB210006.

P22 Proposal of conservation targets and monitoring plan for El Cañi Sanctuary, Araucanía Region.

Propuesta de los objetos de conservación y plan de monitoreo del Santuario El Cañi, Región de la Araucanía.

Valentina Daza Coliñir^{1,2}, Aníbal Pauchard^{1,2}

(1) Laboratorio de Invasiones Biológicas (LIB), Instituto de Ecología y Biodiversidad (IEB).

(2) Facultad de Ciencias Forestales, Universidad de Concepción.

“El Cañi” Sanctuary is one of the first private protected areas in Chile, located in Pichares, Araucanía Region, with 485 hectares. The attractions of “El Cañi” include *Araucaria Araucana* forests, 12 volcanic lagoons, and two trails, the “Círculo de las Lagunas” (Lagoons Circuit) and the “Mirador Melidekiñ” (Melidekiñ Viewpoint). The latter is visually attractive, where the Lanín, Quetrupillán, Villarrica, and Llaima volcanoes can be observed. Currently, “El Cañi” Sanctuary faces a series of threats, one of which is that it does not have a legal instrument that meets its requirements as a protected area, so it urgently needs to establish a management plan that generates measurable protection for the site. Under this problem, the main objectives of this research were to determine the presence of flora and fauna species, to generate a baseline and thus establish a proposal for biological and cultural conservation targets and develop a monitoring plan. Within the biological ones, there are the Araucaria Forest and the volcanic lagoons of coarse filter, and of fine filter the Monito del monte (*Dromiciops gliroides*) and the carnivores. On the other hand, in the cultural ones there is the immaterial determined by cultural role and its importance and finally the material related to the associated infrastructure. This research is based on open standards for conservation, which includes the participation of local stakeholders.

Financing: This work is funded by Fondecyt 1180205 and ANID/Basal project FB21006.

P23 Anthropogenic pressure on the length-weight relationship and allometric traits of the river fish *Trichomycterus areolatus*

Presión antropogénica sobre la relación peso-longitud y rasgos alométricos del pez de río *Trichomycterus areolatus*

Cristian A. Zamora¹, Mauricio J. Carter², Gustavo A. Chiang², Enrico L. Rezende¹

(1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Santiago 6513677, Santiago, Chile

(2) Universidad Andrés Bello, Ecología y Biodiversidad, Ciencias de la Vida, República 440, Santiago, Chile

The fish fauna of Chile's freshwater systems is made up of a relatively low number of native species with a high degree of endemism. Importantly, there is little information on how those species that inhabit rivers subjected to high anthropogenic impact are currently being affected. To address this issue, we studied the native catfish *Trichomycterus areolatus* along the Mapocho River, which crosses Santiago city in the Metropolitan Region, and has been recently reported to contain high levels of active pharmaceutical ingredients and contaminants in general. We focused on morphometric relationships (Fulton's Condition factor, gonadosomatic index and hepatosomatic index) to assess general health status of the individuals along the river. We sampled six different sites in the Maipo basin, collecting a total of 374 fish of which 223 corresponded to *T. areolatus*. Analyses reveal that fish downstream were significantly leaner and in poorer condition than their counterparts upstream, particularly fish in pristine El Arrayán Natural Sanctuary, showing a clear metabolic disruption. However, the values of the gonadosomatic index (100 X gonads/body weight) and the hepatosomatic index (100 X liver/body weight) were similar between sites after controlling for sex differences. Our results suggest that anthropogenic effects may constitute an important stress factor on *T. areolatus*, although additional studies are needed to elucidate with certainty which specific factors might explain the lower body conditions of populations downstream the Mapocho River. Financing: FONDECYT 1211113

P24 Spatio-temporal analysis of primary productivity of the Corocoro-Cosapilla bofedal under different intervention levels using 35 years of Landsat satellite images

Análisis espacio-temporal de productividad primaria del bofedal de Corocoro-Cosapilla bajo distintos niveles de intervención usando 35 años de imágenes satelitales Landsat

Matías Olea¹, Roberto O. Chávez^{1,2}, Manuel Prieto³, Rosa Isela Meneses⁴, Fabian Nieto¹

- (1) Pontificia Universidad Católica de Valparaíso, Laboratorio de Geo-Información y Percepción Remota, Instituto de Geografía, Brasil 2241, Valparaíso, Chile
(2) Instituto de Ecología y Biodiversidad, Santiago, Chile
(3) Universidad de Tarapacá, Departamento de Ciencias Históricas y Geográficas, Luis Emilio Recabarren 2477, Iquique, Chile
(4) Universidad Católica del Norte, Instituto de Arqueología y Antropología, Le Paige 380, San Pedro de Atacama, Chile

Las turberas del Altiplano, conocidas localmente como bofedales, representan un hotspot de biodiversidad y sumideros de carbono ubicados en la región altoandina contigua al desierto de Atacama. Los bofedales cumplen un rol clave para la ganadería local y la regulación del ciclo hídrico, ya que constituyen reservas hídricas que almacenan agua tanto de origen pluvial como también del derretimiento de nieves y glaciares. Durante este siglo, los registros instrumentales han mostrado para el Altiplano una tendencia positiva de las temperaturas y una negativa de la precipitación, ocasionando una disminución en la superficie de nieves y glaciares. De esta forma, los regímenes hídricos que alimentan los bofedales andinos se han visto amenazados con efectos sobre la productividad de los bofedales en escalas temporales y espaciales, fenómenos que han sido poco investigados a la fecha. Este estudio analizará las dinámicas espacio-temporales del bofedal de Corocoro-Cosapilla en el Norte de Chile, que presenta secciones bajo diferentes estados de manejo local, utilizando series de tiempo del Índice de Diferencia Normalizada de Vegetación (NDVI) del satélite Landsat entre los años 1986-2021. Adicionalmente, se estudiarán las relaciones de estas dinámicas espacio-temporales de productividad con variables climáticas para los distintos niveles de manejo local.

Financing: Proyecto FONDECYT regular N°1201527: Dimensiones socioecológicas de los bofedales en el norte de Chile: Manejo local, variabilidad climática y extractivismo

P25 Characterization of fouling-forming organisms in salmon farming nets in Los Lagos region.

Caracterización de organismos bioincrustantes formadores del fouling en redes de salmonicultura de la región de Los Lagos.

Karina Ayala¹, Victoria Suescún¹, Carolina Parra², Leyla Cárdenas¹, Dana Gentil², María José Vargas²

- (1) Centro de Investigación de Dinámica de Ecosistemas Marinos de Altas Latitudes (IDEAL), Av. El bosque 01789, Magallanes., Punta Arenas, Chile
(2) Universidad Técnica Federico Santa María, Laboratorio Nanobio, Valparaíso 2390123, Valparaíso, Chile

The undesirable accumulation of macro- and microorganisms on submerged artificial surfaces in aquatic environments, known as biofouling, represents a considerable economic and ecological problem for aquaculture. The development of fouling occurs dynamically and successionally through four stages: 1) Chemical conditioning; 2) Bacterial colonization; 3) Unicellular colonization; and 4) Eukaryotic multicellular colonization formed by soft and hard macrofouling. Each of these stages is accompanied by a great diversity of organisms. Knowing this biodiversity allows the design and development of methodologies that help in the prevention and control of biofouling. The aim of this work is to create a research baseline to determine the biodiversity present as fouling organisms in structures commonly used in salmon farming. Samples of net, hose, filament, float and pellet from a salmon farm located in El Seno de Reloncaví were analyzed by morphological analysis through scanning electron microscopy (SEM), optical and stereo microscopy. The fouling fauna was taxonomically identified and the fouling-forming community present in the locality was characterized. Diatoms were the dominant group, followed by amphipods of the genus *Jassa* (Ischyroceridae). Our results suggest that the biofouling community, associated with salmon farming structures in El Seno de Reloncaví, is positioned in the third phase of the successional process, with soft and hard macrofouling being observed, indicating the low efficiency of the antifouling paints.

Financing: Proyecto Proyecto FONDAP IDEAL 15150003/ FONDEF ID21|10171

P26 Potential distribution of *P.chilensis* (Molina) Stuntz emend. Burkat in Chile. ¿Where could it be?

Distribución potencial de *P.chilensis* (Molina) Stuntz emend. Burkat en Chile. ¿Dónde podría estar?

Bastían Andrés Toledo Narbona^{1,2}, Paulette Naulin Gysling^{1,2}, Catalina Olmedo Valdivia^{1,2}

- (1) Laboratorio Biología de Plantas, Departamento de Silvicultura y Conservación de la Naturaleza, Ciencias Forestales y de la Conservación de la Naturaleza, Santa Rosa 11.315, Santiago, Chile
(2) Universidad de Chile, Departamento de Silvicultura y Conservación de la Naturaleza, Ciencias Forestales y de la Conservación de la Naturaleza, Santa Rosa 11.315, Santiago, Chile

El cambio climático, la sequía prolongada, la explosión demográfica y disturbios asociados limitan la subsistencia de los ecosistemas y las

especies contenidas en estos. Los modelos de distribución potencial son una herramienta de fácil acceso que pueden contribuir al conocimiento, la restauración de hábitat y apoyar la toma de decisiones de conservación. La especie usada como modelo *Prosopis chilensis*, presente dentro de la zona mediterránea de Chile central, ha manifestado un decrecimiento poblacional continuo y que se encuentra catalogada como vulnerable. 272 registros de ocurrencias fueron obtenidos de Global Biodiversity Information Facility y los herbarios CONC y JBN. Los datos fueron depurados quedando un total de 96 registros útiles y se utilizaron 18 variables predictoras socioambientales para estimar las áreas de distribución potencial de *P.chilensis*, mediante el algoritmo de máxima entropía MaxEnt. El ajuste se realizó con AUC ROC y ROC-parcial. Los modelos indicaron que la especie se puede distribuir entre las Regiones de Atacama y Metropolitana, preferentemente en la depresión intermedia. Hay áreas protegidas que tienen idoneidad para la presencia de la especie donde esta no ha sido reportada oficialmente. Las poblaciones modeladas permiten inferir un hábitat más idóneo en la zona norte, entre las Regiones de Atacama y Coquimbo, donde se puede sugerir un mayor esfuerzo de muestreo ya que, en literatura para la especie no se encuentran suficientes registros, lo que permitiría ampliar y/o focalizar los esfuerzos de restauración o forestación con *P.chilensis*.

Financing: Fondo de Investigación del Bosque Nativo CONAF 010/2019

P27 Home range of Torres-Mura's dragon (*Liolaemus torresi*): testing body-size and habitat-productivity hypotheses in *Liolaemus* lizards

Ámbito de hogar del dragón de Torres-Mura (*Liolaemus torresi*): testeo de las hipótesis del tamaño corporal y la productividad de hábitat en el género *Liolaemus*

Martin A. H. Escobar¹, Nélida R. Villaseñor^{1,2}

(1) Universidad de Chile, Grupo de Ecología, Naturaleza y Sociedad, Facultad de Ciencias Forestales y Conservación de la Naturaleza, Santiago, Chile

(2) Universidad Bernardo O'Higgins, Departamento de Ciencias Químicas y Biológicas, Santiago, Chile

Respecto al ámbito de hogar, la hipótesis del tamaño corporal plantea que especies de mayor tamaño usan áreas de distribución más grandes para satisfacer sus necesidades metabólicas. Esta relación está bien documentada en una amplia gama de especies. Menor atención ha tenido la hipótesis de la productividad del hábitat, que establece que, para una masa dada, los animales en áreas de baja productividad deben tener rangos de hogar más grandes que las especies que habitan en hábitats de mayor productividad. Para probar estas dos hipótesis, establecimos el ámbito de hogar (AH) del dragón de Torres-Mura (*Liolaemus torresi*), especie endémica del desierto de Atacama que habita ambientes desérticos con muy baja o nula cobertura de vegetación, y lo comparamos con datos del AH de 21 especies del género *Liolaemus*. El AH promedio ($\pm$ EE) del dragón de Torres fue de 1,6 ha ($\pm$ 0,6) (n = 6). La dimensión estimada del AH para esta especie fue aproximadamente 202, 125, 60 y 54 veces más grande, que el promedio para especies de tamaño similar del género *Liolaemus* de hábitos arborícolas, arenícolas, terrícolas y saxícolas, respectivamente. La relación del tamaño corporal y AH fue positiva, pero no significativa, mientras que la relación de la productividad del hábitat y el AH fue negativa y significativa. Nuestros resultados entregan evidencia que sugiere que en el género *Liolaemus*, el tamaño del AH dependería más de la productividad del hábitat que del tamaño corporal de la especie.

P28 Spatio-temporal variation of soil nutrients and plant recovery across a fire-severity gradient in old-growth Araucaria-Nothofagus forests.

Variación espacio-temporal de los nutrientes del suelo y recuperación de la vegetación en un gradiente de severidad de fuego en bosques primarios de Araucaria-Nothofagus.

Andres Fuentes-Ramirez^{1,2}, Leonardo Almonacid¹, Camila Fernández^{1,2,3}, Nayadeth Muñoz¹

(1) Universidad de La Frontera, Departamento de Ciencias Forestales, Laboratorio de Biometría, Facultad de Ciencias Agropecuarias y Medioambiente, Francisco Salazar 01145, Temuco, Chile

(2) Pontificia Universidad Católica de Chile, Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Santiago, Chile

(3) Universidad de La Frontera, Programa de Doctorado en Ciencias Agroalimentarias y Medioambiente, Facultad de Ciencias Agropecuarias y Medioambiente, Temuco, Chile

Forest fires can alter essential ecosystem processes, including soil nutrient cycling, potentially cascading into permanent vegetation changes. This is key to elucidate in ecosystems where fires are infrequent. We assessed the effects of fire severity on the spatio-temporal response of soil nutrients and plant diversity in old-growth forests of south-central Chile, 1, 2, and 3 years after a fire that occurred in 2015. Within ancient, old-growth Araucaria araucana and Nothofagus pumilio forests, ranging from areas burned with fire of high severity to unburned forests, we evaluated nitrogen (N), phosphorus (P), potassium (K), and soil organic matter (SOM) content using spatial interpolation to predict their spatial distribution and assessed their availability over time. We also assessed plant species richness and abundance following the fire.

The availability of N noticeably increased during the first year after fire but rapidly decreased in the following years, especially in areas of high fire severity. P, K, and SOM were less affected by the fire, remaining more constant over time. In the short term, plant species richness and diversity significantly decreased in severely burned areas, but over time, they became more similar to those of the unburned forests.

The time since a fire and its severity determine a heterogeneous distribution of soil nutrients, with N shifting to a significantly lower availability after fire, which was more notable in areas of high fire severity. Here, vegetation exhibited a decrease in plant diversity and the establishment of exotic species, likely producing cascading effects at the community level.

Financing: Centro ANID Basal FB210015 (CENAMAD), DIUFRO DI20-0066, DI22-1003

P29 Determination of basic fields that maximize the quality of primary biodiversity data reported to GBIF

Determinación de campos básicos que maximizan la calidad de datos primarios de biodiversidad reportados a GBIF.

Andrés Aguilar Velasco^{1,2}, Paulette I. Naulin¹

(1) Laboratorio de Biología de Plantas, Facultad de Ciencias Forestales y de la Conservación de la Naturaleza, Universidad de Chile, Santiago, Chile

(2) Escuela de Ciencias Forestales, Facultad de Ciencias Forestales y de la Conservación de la Naturaleza, Universidad de Chile, Santiago, Chile

Las bases de datos biológicas concentran y gestionan información de biodiversidad. Chile es participante de “The Global Biodiversity Information Facility” (GBIF), infraestructura internacional de datos de biodiversidad. GBIF utiliza el estándar Darwin Core (DwC) como lenguaje en común para el manejo de los datos. Generalmente, los datos levantados en Chile no se encuentran estandarizados ni publicados. Estandarizar los datos para publicarlos en GBIF requiere de recursos y tiempo. La manipulación de los datos da lugar a errores de transcripción, además, el estándar por sí solo, no es suficiente para agregar calidad a los datos. A partir de un análisis de calidad en datos primarios se determinaron los campos básicos de estándar DwC para maximizar la calidad de los datos. Los principales resultados encontrados indican que el mayor problema es lo incompleto de la información y el formato de los registros tomados en terreno. Campos con información geoespacial son de los fundamentales y no se presentan o presentan errores en su registro inicial, e.g. el Datum agrega calidad a los datos y solo puede ser incorporado en terreno. La inconsistencia en los registros resulta en un apartado de datos observacionales que son transcritos, mermando su calidad al momento de digitalizar la información. Tomar datos de biodiversidad utilizando el estándar DwC en terreno, permite reducir esfuerzos y facilitar la migración de los datos a GBIF, ahorrando tiempo y recursos. Los datos de calidad aumentan la usabilidad y esto a su vez, contribuye al desarrollo científico y a la toma de decisiones.

P30 Diagnosis of the quality of primary biodiversity data published in GBIF-Chile

Diagnóstico de la calidad de datos primarios de biodiversidad publicados en GBIF-Chile

Marcelo Oyaneder¹, Paulette I. Naulin Gysling¹

(1) Universidad de Chile, Laboratorio de Biología de Plantas, Facultad de Ciencias Forestales y de Conservación de la Naturaleza, Santiago, Chile

Durante años se ha recopilado información sobre biodiversidad en diversas fuentes y formatos. El cambio climático, sobreexplotación, especies invasoras, enfermedades y otras situaciones amenazan la salud de los ecosistemas y el desarrollo humano. Es necesario contar con datos de biodiversidad confiables y accesibles. Si bien estos datos tienen una gran relevancia, la realidad es que datos de alto nivel científico no se les da la importancia necesaria en su procesamiento curatorial. Desde esto surgen conceptos interesantes como la calidad, la cual según GBIF, se define en base al cumplimiento de criterios y necesidades del usuario de una base de datos determinada. La calidad de datos primarios de biodiversidad en Chile fue analizada con todos los datos publicados por instituciones chilenas en GBIF-Chile (131.600 registros) hasta el 2020, basados en el análisis de calidad propuesto por GBIF. Los resultados muestran falencias en la georreferenciación de los datos (20%), la identificación de la colección o institución curadora de los datos (61%), en el reporte de origen geográfico de la especie (91%) e incompletitud o heterogeneidad de formato del reporte. Los datos pueden aumentar su calidad estandarizándolos, sin embargo, hay un conjunto de información que debe ser relevada desde la toma primaria de la observación y/o muestreo que maximiza su usabilidad y por ende su calidad de dato de biodiversidad. Un muestreo estandarizado y completo permite ahorrar tiempo y recursos en la gestión de datos, mejorando su calidad y por ende su usabilidad en la toma de decisiones de conservación.

P31 Carnivore-poultry conflict in Chile: Dogs as the main threat

Conflicto carnívoro-aves de corral en Chile: Perros como principal amenaza

Carolina Susana Ugarte Caraball¹, Constanza Napolitano Valenzuela^{1,3,4}, Diego Montecino Latorre²

(1) Universidad de Los Lagos, Ciencias Biológicas y Biodiversidad, Av. Fuchslocher 1305, Osorno, Chile

(2) University of California, One Health Institute, School of Veterinary Medicine, Davis, California, United States of America

(3) Instituto de Ecología y Biodiversidad (IEB), Santiago, Chile

(4) Centro Internacional Cabo de Hornos (CHIC), Puerto Williams, Chile

Carnivore-livestock conflict is usually studied in large carnivores predating upon large livestock, with only 11.3% of scientific articles on this topic including poultry losses. Poultry predation may be underestimated due to a lack of studies, masking potential threats for small carnivores due to retaliatory killing. In Chile, poultry is the second most predated domestic animal group, and güiñas (*Leopardus guigna*) and foxes (*Lycalopex sp.*) have been historically considered as suspects of their predation. Nowadays, exotic carnivores as dogs (*Canis lupus familiaris*) and minks (*Neovison vison*) are usually reported as poultry predators. The objective of this work was to assess carnivore-poultry conflict through 66 surveys to INDAP (Institute for Agricultural Development) territorial technical teams across Chile and provide a diagnosis of this conflict. Poultry, mainly chicken, is most commonly raised in flocks under 50 heads, which turn out to be more vulnerable to attacks. Confinement is the most common preventive and responsive technique, and it is associated to declines in attacks intensity. 92.4% of respondents report predation and dogs are the most frequently mentioned predator, followed by foxes and minks. Dogs increase 3.58 times the intensity of attacks and most respondents consider it as a growing problem. More than 30% of respondents in charge of surveyed farms react using lethal control, posing a real threat to native carnivores. Carnivore-poultry conflict exists, and there is a high willingness of local farmers to adopt new techniques to reduce it. Dog and mink control needs to be urgently addressed to advance towards human-carnivore coexistence.

Financing: ANID PAI 77190064

P32 Spatial and temporal representation of marine fish occurrences available from online ecoinformatic platforms

Representación espacial y temporal de las ocurrencias de peces marinos disponibles en plataformas ecoinformáticas en línea

Andrea Gabriela Castillo Velásquez^{1,2}, Vanessa Pizarro², Andrea Piñones³, Horacio Samaniego^{2,4}

(1) Programa de Doctorado en Ciencias mención Ecología y Evolución, Escuela de Graduados, Facultad de Ciencias, Universidad Austral de Chile, Valdivia, Chile.

(2) Instituto de Conservación, Biodiversidad y Desarrollo, Laboratorio de Ecoinformática, Facultad de Ciencias Forestales y Recursos Naturales, Universidad Austral de Chile, Valdivia, Chile

(3) Instituto de Ciencias Marinas y Limnológicas, Facultad de Ciencias, Universidad Austral de Chile, Valdivia, Chile

(4) Instituto de Sistemas Complejos de Valparaíso, Subida Artillería #47, Valparaíso, Chile

Gracias a los avances significativos en herramientas ecoinformáticas, los registros de ocurrencia de especies accesibles al público están creciendo rápidamente. Estos datos representan una variedad de fuentes y han aumentado explosivamente en número en las últimas tres décadas. Sin embargo, pese a la increíble acumulación de registros de biodiversidad, no todos los datos son realmente útiles, ni representan nuevos conocimientos sobre la distribución de las especies. Este estudio evaluó la representatividad espacial y temporal de los registros de peces marinos del orden Actinopterygii disponibles en los repositorios globales GBIF y OBIS. Se proporciona un marco metodológico basado en un conjunto de estimadores no paramétricos para calcular el número potencial de especies a partir de datos de incidencia, y uso de grillas hexagonales sobre unidades de análisis de biorregiones marinas. Esto permitió identificar las regiones mejor muestreadas y que, por lo tanto, cuentan con datos más confiables, y las regiones que requieren un mayor esfuerzo de muestreo. Se evaluaron, además, hipótesis sobre los sesgos de la información (taxonómico, geográfico y temporal) para comprender el estado actual de la distribución de los registros de la ictiofauna marina. Considerando que se analizaron más de 40 años de información, los resultados demostraron que, a escala global, los datos primarios de peces marinos disponibles en plataformas GBIF y OBIS, aún están lejos de ser representativos y completos. La información parece estar sesgada hacia las zonas costeras y donde se desarrolla la industria pesquera, mientras que las especies mejor representadas son aquellas de alto valor comercial.

Financing: Proyecto FONDECYT Regular 1211490

P33 Marine protected areas in Chile: advances and challenges

Áreas marinas protegidas en Chile: grandes avances y grandes desafíos

Miriam Fernandez Bergia¹, **Montserrat Rodriguez**¹, Sebastian Silva¹, Karina Perez¹, Silvia de Juan²

(1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Avda Libertador Bernardo OHiggins, Santiago, Chile

(2) Consejo Superior de Investigaciones Científicas, Mediterranean Institute for Advanced Studies, Miquel Marqués 21, Esporles, España

Las áreas marinas protegidas (AMP) son un instrumento clave para la conservación de la biodiversidad, la provisión de servicios ecosistémicos y la mitigación ante cambio climático, aunque los beneficios dependen del nivel de protección y de la efectividad en la gestión. Analizamos el avance en la creación de AMP en Chile, su distribución entre regiones biogeográficas, y la implementación de las mismas. Los datos provienen del World Database on Protected Areas, información local y encuestas a los encargados de la administración de cada una de las AMP, asignándose puntaje por niveles de implementación de la gestión en diferentes variables (ej. personal, fiscalización, financiamiento). El porcentaje de la Zona Económica Exclusiva (ZEE) de Chile asignado a AMP es de los más altos del mundo (41%), destacando el alto porcentaje asignado a figuras con protección total (23%). Sin embargo, existe (a) un fuerte desbalance entre ecoregiones, con una alta concentración de superficie asignada a AMP en las ecoregiones más remotas y con menores conflictos de usos, y (b) bajo nivel de implementación de las AMP. Menos de un cuarto de las AMP de Chile tienen un plan de manejo parcial o totalmente implementado. Mientras que un 82% de las AMP tienen alguna persona responsable, solo el 30% cuentan con personal en terreno. Las diferentes variables que deben conjugarse para la protección efectiva varían entre tipos de figuras legales. El puntaje promedio obtenido conjugando todas las variables evaluadas alcanza 12,4 (44% del máximo posible), revelando desafíos en materia de conservación.

Financing: Pew Charitable Trust

P34 npphen: A non-parametric approach for vegetation extreme anomaly detection and mapping based on remotely sensed phenological historical variability

npphen: Una aproximación no paramétrica para la detección y el mapeo de anomalías extremas, basada en la variabilidad fenológica histórica proveniente de sensores remotos.

José Antonio Lastra Muñoz¹, Roberto Orlando Chávez^{1,2}, Sergio Andrés Estay^{3,4}, Carlos Riquelme⁴, Matías Olea¹, Javiera Aguayo¹, Mathieu Decuyper⁵

(1) Pontificia Universidad Católica de Valparaíso, Laboratorio de Geo-información y Percepción Remota, Instituto de Geografía., Facultad de Ciencias del Mar y Geografía, Avenida Brasil 2241, Valparaíso, Chile

(2) Institute of Ecology and Biodiversity (IEB), Santiago, Chile

(3) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Valdivia, Chile

(4) Pontificia Universidad Católica de Chile, Center of Applied Ecology and Sustainability, Facultad de Ciencias Biológicas, Santiago, Chile

(5) Wageningen University and Research, Wageningen, Países Bajos

El monitoreo de los cambios en la vegetación empleando percepción remota satelital es crucial para el manejo ambiental, la conservación de la diversidad y para elaborar estrategias de adaptación a diferentes escalas. Sin embargo, establecer si los cambios detectados en la vegetación son significativos o no sigue siendo una tarea difícil; considerando que los métodos tradicionales de detección de anomalías no indican si estas son parte de la oscilación natural de un sistema o si son una anomalía real.

Este trabajo presenta el paquete de R npphen (1.5.2), que está diseñado para detectar no solo anomalías en la vegetación en base a series de tiempo satelital, sino que también, permite cuantificar la posición de las observaciones anómalas dentro de la frecuencia fenológica anual histórica.

El paquete permite a ecólogos y tomadores de decisiones estudiar cambios en la vegetación considerando un amplio rango de ecosistemas, debido a la flexibilidad de las estimaciones de densidad de kernel que se ajustan a cualquier forma de fenología anual considerando su variabilidad en el tiempo. Entrega un marco estadístico uniforme para el estudio de dinámicas vegetacionales locales o globales, contribuyendo a los esfuerzos de monitoreo de las Variables Esenciales de la Biodiversidad (EBV, en inglés).

Financing: Fondecyt Regular N° 1211924

P35 Plant diversity in *Araucaria araucana* forests under contrasting fire regimes in Villarrica National Park

Diversidad vegetal en bosques de *Araucaria araucana* bajo regímenes de fuego contrastantes en el Parque Nacional Villarrica

Fernanda Silva Cabrera^{1,2}, Luisa Parra^{3,4}, Felix Zapata^{1,2}, Camila Riedemann², Susana Paula^{2,3,4}

(1) Escuela de pregrado Instituto de conservación biodiversidad y territorio, Facultad de Recursos Naturales, Universidad Austral de Chile, Campus Isla Teja, Valdivia, Chile

(2) Centro del Fuego y Sistemas Socioecológicos (FireSES), Universidad Austral de Chile, Campus Isla Teja, Valdivia, Chile

(3) Instituto de Ecología y Biodiversidad (IEB), Victoria 631, Barrio Universitario, Concepción, Chile

(4) Instituto de Ciencias Ambientales y Evolutivas, Universidad Austral de Chile, Campus Isla Teja, Valdivia, Chile

Fire is a historical phenomenon in the Andes of central-southern Chile. However, there is limited knowledge about how fires modulate the diversity of plant assemblages in the region. In this context, we evaluated if there are differences in the diversity of plant species and the floristic composition between *Araucaria araucana* forests developed in the same landscape, but with different fire histories. To this end, we established fifteen 50 x 20 m plots in Villarrica National Park (south-central Chilean Andes), potentially reflecting different fire records. Fire history was estimated by the probability of unimodality of the frequency distribution of the diameter at the breast height of the live stems of *A. araucana*. Alpha diversity indices of understory vascular plants were calculated, and the following microenvironmental variables measured: microclimate, light availability, canopy opening and physicochemical characteristics of the soil. The relationship between alpha diversity and disturbance history, as well as with micro environmental variables was evaluated using linear regressions. Non-metric multidimensional analysis was used to evaluate how these variables modulate the composition of plant assemblages. Our results indicate that the least disturbed forests are the most diverse, due to an increase of the community evenness as disturbance frequency decreases. The relationship between plant community diversity and fire frequency is mediated by the concentration of exchangeable aluminium in the soil. The species composition was not related to disturbance frequency, but to microenvironmental conditions. Our results are relevant to understand plant biodiversity in these forests and contribute to planning their conservation.

Financing: ANID FONDECYT1190999, ANID PIA/BASAL FB210006

P36 Escape behavior of rockyfish reveals the potential impact of dive fishing activities on coastal fish biodiversity in north-central Chile

Conducta de escape de peces litorales revela potencial impacto de actividades pesqueras por buceo sobre la biodiversidad íctica costera del centro-norte de Chile

Francisco J. Contreras-Drey^{1,2,4}, Natalio Godoy³, Andrés Smith^{1,2}, Enrico L. Rezende^{2,4}, Stefan Gelcich^{1,2,4}

(1) Instituto Milenio en Socio-ecología Costera, Chile

(2) Pontificia Universidad Católica de Chile, Departamento de Ecología, Ciencias biológicas, Santiago, Chile

(3) The Nature Conservancy, Santiago, Chile

(4) Center of Applied Ecology and Sustainability, Chile

Flight initiation distance (FID), the distance at which an organism begins to flee from an approaching threat, is a major component of anti-predator behavior and a potential indicator of threat perception. In this study on three targeted rockyfish species, we tested the predictions that FID to a diver threat increases with the following factors: (1) body size of target fish species, (2) in the most commercially valuable species, (3) in areas without fishing restrictions, and (4) in zones with higher fishing pressure. We studied three size ranges of three harvested rockyfish species, in three different access regimes, and in two zones with different fishing pressures. We used the mean square criterion to select the models that best explained the variation of our response variable. Our results suggest that size, species, access regimes and zone, by them self had strong support for explaining FID, as did models including zone/species and zone/size interactions. FID was higher in bigger species and those of higher commercial value, outside the reserves and in the zone where the highest fishing pressures were present. Although we were unable to include other factors associated with fishing pressure such as surveillance efforts, this study supports the predictions that increased FID is associated with the threat that diving fishing activities exerts.

Financing: Iniciativa milenio, instituto milenio en Socio Ecología Costera (SECOS) ICN2019_015 y FONDECYT N 1190109, ETAPA 2022.

P37 The role of soil nutrients and plant-soil interactions in the regeneration of chilean forests.

El rol de los nutrientes del suelo y las interacciones planta suelo en la dinámica de regeneración de bosques de Chile.

Vicente Robinson¹, Aurora Gaxiola^{1,3}, Álvaro Gutiérrez^{2,3}

(1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Chile

(2) Universidad de Chile, Ciencias Ambientales y Recursos Naturales Renovables, Ciencias Agronómicas, Chile

(3) Instituto de Ecología y Biodiversidad, Chile

La diferenciación entre nichos es un mecanismo clave determina la regeneración de especies en ecosistemas de bosques. En estos ecosistemas, en particular, se ha establecido un eje de diferenciación relacionado con los requerimientos de luz de las especies. Por lo tanto, la competencia por este recurso entre especies (sombra-tolerantes y sombra-intolerantes) es considerada como el factor que gobierna la estructura y dinámica comunitaria en varios bosques, incluyendo los de Chile. Sin embargo, si la competencia por luz es el factor que determina la estructura y diversidad de los bosques, se esperaría que la regeneración se relacionara con atributos de la estructura del bosque que puedan determinar la disponibilidad de luz (i.e., cobertura de dosel, densidad de adultos, etc.). Ahora bien, la capacidad de sobrevivir y crecer en distintos ambientes de luz depende de las condiciones edáficas, entre estas, la disponibilidad de nutrientes y la biogeoquímica del suelo. En ese sentido, es clave entender el rol del suelo en la capacidad competitiva de especies arbóreas y, por tanto, en la dinámica de regeneración de bosques. Por este motivo, el objetivo del siguiente trabajo es caracterizar la dinámica de regeneración de especies arbóreas de Chile, en función de los atributos de la estructura del bosque y características biogeoquímicas del suelo. Donde encontramos que la densidad de plántulas y brinzales no presenta relaciones negativas con la densidad de adultos o la cobertura del dosel, mientras que la densidad de brinzales sí se correlaciona positivamente con la disponibilidad de fósforo.

Financing: FB 210006, Regular 1201643, Regular 1200468

P38 Integrating metabolic capacities in the projection of the future distribution of Darwin's leaf-eared mouse (*Phyllotis darwini*) in a context of climate change.

Integrando las capacidades metabólicas en la proyección de la futura distribución del ratón orejudo de Darwin (*Phyllotis darwini*) en un contexto de cambio climático.

Alejandro Yamil Salvador Paredes Adriaola¹, Gabriela Piriz¹, Karin Maldonado³, Daniela Figueroa², Pablo Sabat¹

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Chile

(2) Centro de investigación aplicada de Chile (CIACHI), Chile

(3) Universidad Adolfo Ibáñez, Departamento de Ciencias, Facultad de Artes liberales, Chile

El Cambio Climático (CC) generó un aumento de la temperatura promedio de la superficie terrestre y oceánica de aproximadamente 0,99°C en las primeras dos décadas del último siglo. Diversas hipótesis han propuesto que los rasgos fisiológicos de los animales son los principales factores que limitan los rangos geográficos de las especies. En este contexto, se ha propuesto que las especies exhibirán cambios en su distribución en función a la capacidad de respuesta fisiológica a la temperatura. Incluir las capacidades fisiológicas en los modelos de distribución de especies (SDMs) podría mejorar la capacidad predictiva de éstos, sin embargo, se ha realizado principalmente en especies ectotermas. Para evaluar el efecto de la incorporación de rasgos fisiológicos en las proyecciones de la distribución geográfica de *Phyllotis darwini* en respuesta al CC, se examinó la capacidad termorregulatoria (CT; tasas metabólicas, conductancia térmica y temperaturas críticas) en dos poblaciones ubicadas en los límites norte y sur del rango geográfico de esta especie. Estas variables se incorporaron al SDM a través de un índice denominado adecuación metabólica, para proyectar la distribución potencial de *P. darwini* en cuatro escenarios de cambio climático, utilizando tanto variables climáticas como fisiológicas. Contrario a lo esperado, se encontró un pequeño efecto de la adecuación metabólica sobre la distribución futura de especies, siendo la estacionalidad de las precipitaciones, seguido por la temperatura máxima del mes más cálido los mejores predictores de la distribución de esta especie. Financing: Financiado por FONDECYT 1151343. FONDECYT 1200513

P39 Spatial ecology and experimental dispersion of the arboreal marsupial *Dromiciops gliroides* in the temperate-rainy forest.

Dispersión experimental y ecología espacial del marsupial arbóreo *Dromiciops gliroides* en el bosque templado-lluvioso.

Isidora Camus^{1,2,3}, Carlos Mejías^{2,3}, Tamara Abarzúa^{2,3,4}, Francesca Cáceres^{2,3}, Julián F. Quintero-Galvis^{2,3}, Roberto F. Nespolo^{2,3,5,6}

(1) Universidad de Chile, Departamento de Ciencias Biológicas Animales, Facultad de Ciencias Veterinarias y Pecuarias, Av. Sta. Rosa 11735, Santiago, Chile

(2) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Avda. Rector Eduardo Morales s/n, Valdivia, Chile

(3) Millennium Nucleus of Patagonian Limit of Life (LiLi)

(4) Pontificia Universidad Católica de Chile, Facultad de Ciencias Biológicas, Marcoleta 49, Santiago, Chile

(5) Center for Applied Ecology and Sustainability (CAPES)

(6) Millennium Institute for Integrative Biology (iBio), Santiago, Chile.

Monito del monte (*Dromiciops gliroides*) has been cataloged as the most abundant micromammal of the temperate rainforest, with densities up to 27 individuals/ha in some localities and a home range between 0.7 and 1.6 hectares. However, great variability has been observed between different studies, geographical areas and seasons of the year. Additionally, it is unknown if the range of motion of *Dromiciops* varies throughout their life cycle, or between young individuals and adults. We started a field dispersion experiment to evaluate the trophic enrichment of these parameters, through 6 spider web-type sampling grids, each with 51 Tomahawk traps, where half of the grids were calorically supplemented. In September, 10 individuals, previously captured in the same locality, per grid were released. Releases were made at the center of each grid in order to quantify the concentric dispersion. Density, dispersal speed and home range were measured by capture-recapture method by marking animals. We also determined if there are phenological differences between stages, genders or seasons of the year. Preliminary data suggests that dispersal speed is faster for adult males than females, and that caloric enrichment causes a reduction in the rate of dispersion, or, in other words, individuals become more sedentary. This experiment will be continued throughout fall and winter to determine how these parameters are affected by hibernation.

Financing: This thesis was funded by ANID – Millennium Science Initiative Program – Center Code NCN2021-050; ANID PIA/BASAL center FB0002 and Fondecyt 1221073.

P40 Are all Chilean orchids terrestrial? Distribution of terrestrial and epiphytic habits of the orchid *Gavilea odoratissima* Poepp. (Orchidaceae, Chloraeinae)

¿Todas las orquídeas chilenas son terrestres? Distribución del hábito terrestre y epífita en la orquídea *Gavilea odoratissima* Poepp. (Orchidaceae, Chloraeinae).

Claudio Martínez Molina^{1,4}, Alejandra Zúñiga-Feest¹, Mauricio Cisternas^{4,5}, Iván Díaz², María Isabel Mujica^{1,3,4}

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas (ICAEV), Facultad de Ciencias, Valdivia, Chile

(2) Universidad Austral de Chile, Instituto de Conservación, Biodiversidad y Territorio, Facultad de Ciencias Forestales y Recursos Naturales, Valdivia, Chile

(3) Instituto de Ecología y Biodiversidad, IEB

(4) Centro de Conservación de Orquídeas Chilenas, CECORCH

(5) Jardín Botánico Nacional, Viña del Mar

Orchidaceae es una de las familias de plantas más diversas en el mundo, están distribuidas en todos los continentes, excepto la Antártica y habitan una gran diversidad de hábitats. Igualmente presentan varios hábitos de crecimiento: terrestre, epífita y litófito. Históricamente en Chile se ha considerado que todas las orquídeas son terrestres, sin embargo, en los últimos años se han registrado observaciones de individuos creciendo de forma epífita. La gran mayoría de observaciones corresponden a *Gavilea odoratissima*, especie descrita como terrestre y que se distribuye desde la región de Ñuble hasta la Patagonia. En este trabajo, evaluamos la distribución y condiciones climáticas en que *Gavilea odoratissima* crece de forma epífita y si existe alguna preferencia por algún hospedero en particular. Para esto se recopilamos observaciones de *G. odoratissima*, tanto epífita como terrestre, extraídas de la plataforma inaturalist.org, complementado con datos entregados por expertos y de herbario. En total, se recopilamos 91 observaciones, 53 de iNaturalist, 10 de expertos y 28 de herbario. Del total de observaciones, 11 correspondieron a crecimiento epífita y 80 a crecimiento terrestre. Los resultados preliminares muestran que el hábito terrestre se distribuye entre 34.53°S y 51.06°S, en matorral, bosque esclerófilo y templado, mientras que las de hábito epífita solo están presentes entre los 37.82°S y 42.44°S, en bosques templados lluviosos y zonas con alta humedad. Estos resultados sugieren que los factores temperatura y humedad serían claves en la distribución del hábito epífita. Análisis de modelamiento de nicho nos ayudarán a precisar qué factores climáticos determinan este contraste.

P41 Trophic dynamics of the saproxylic beetle assemblage in the urban forest Arboretum, Valdivia, Chile

Dinámica trófica del ensamble de escarabajos saproxílicos en el bosque urbano Arboretum, Valdivia, Chile

Fernanda Olivares Soto¹

(1) Universidad Austral de Chile, Facultad de Ciencias Forestales y Recursos Naturales, Valdivia, Chile

Urban forests are considered areas of great importance for the well-being of cities. In forests, dead trees are a very important ecological component because it can provide food and habitats to many organisms, such as saproxylic insects. Within this group of insects, beetles are one of the most diverse orders in richness and abundance of individuals, for this reason they represent an important tool to evaluate the conservation status of forests. However, the saproxylic trophic dynamics are scarcely understood in urban forests. Thus, the goals of this study were evaluating the trophic diversity and temporal trophic dynamics of the saproxylic beetle assemblage, using as a study model the urban forest Arboretum from Valdivia, Chile, which is considered an important ecological corridor. For this purpose, we used twelve dead trees, monitored using tree-trunk flight intercept traps. At the micro-habitat level, environmental conditions were recorded, and each tree diameter, decomposition stage and bark cover were determined. The preliminary results show that the mycophagous trophic group (i.e., fungivores) were the most diverse group in all seasons. The high diverse and abundances of this group are explained by the higher amount of highly decayed trees. Additionally, the abundances and diversity of xylophagous species were explained by the lesser decayed trees. These results suggest that the diversity of saproxylic beetles in urban areas are related to both amount and heterogeneity of saproxylic habitat (i.e., dead wood quantity and quality).

Financing: ANID-Fondecyt Iniciación a la Investigación 11220685

P42 Ecological effects of *Thaumamermis* sp. (Nematoda, Mermithidae) on its host *Orchestoidea tuberculata* (Amphipoda, Talitridae) in the Southeast Pacific Ocean

Efectos ecológicos de *Thaumamermis* sp. (Nematoda, Mermithidae) sobre su hospedador *Orchestoidea tuberculata* (Amphipoda, Talitridae) en el Océano Pacífico Sudeste

Ruby López Rodríguez¹, Mario George-Nascimento^{3,4}, Karen Huentena², Nashira Figueroa², Ángel Urzúa^{3,4}

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Ciencias, Valdivia, Chile

(2) Universidad Católica de la Santísima Concepción, Programa de Magister en Ecología Marina, Facultad de Ciencias, Concepción, Chile

(3) Universidad Católica de la Santísima Concepción, Departamento de Ecología, Facultad de Ciencias, Concepción, Chile

(4) Universidad Católica de la Santísima Concepción, Centro de Investigación en Biodiversidad y Ambientes Sustentables CIBAS, Concepción, Chile

Studies about natural enemies in community and population ecology frequently overlook cryptic enemies within, such as parasitoids, parasites and pathogens. In this study we focused on the ecological effects of *Thaumamermis* sp. (Nematoda: Mermithidae) on its host *Orchestoidea tuberculata* (Amphipoda, Talitridae) in the Biobío region, Chile. Survival, reproductive output of females, mobility of the host and burial behavior in the sand were compared between parasitized (P) and non-parasitized (NP) specimens in field observations and lab experiments. The overall prevalence was 19.0% (n = 3156), although changes among years and seasons highlight temporal changes in the ecological effects of this nematode. Prevalence peaked among juveniles during the autumn of 2018, reaching up to 92%. The survival of amphipods and their mobility were lower in P individuals. None of the 44 parasitized females carried eggs, whereas 9.6% of the 673 NP females were ovigerous. The body length of the amphipod was not a good predictor of the variations in prevalence, as observed in changes throughout seasons and years. No differences in prevalence were found between female and male amphipods. No differences in the depth of burial in the sand were found between P and NP *O. tuberculata*. These results suggest mild changes in host behavior and reinforce the evidence that *Thaumamermis* sp. is an important natural enemy of *O. tuberculata* that should be considered a parasitoid due to its large relative body size and ability to kill and castrate its host.

Financing: Magister en Ecología Marina UCSC, and FONDECYT 11140213

P43 Relevance of temperature seasonality in the evolution of the diet of Phyllostomidae bats.

Relevancia de la estacionalidad de la temperatura en la evolución de la dieta de murciélagos Phyllostomidae.

Samuel Venegas Ravé¹, Cristián Hernández Ulloa¹, Joaquín Cárcamo Gallardo¹, Nicolás Espinoza¹, Enrique Rodríguez Serrano¹, Reinaldo Rivera Jara¹

(1) Universidad de Concepción, Departamento de Zoología, Laboratorio de Ecología Evolutiva y Filoinformática, Facultad de Ciencias Naturales y Oceanográficas, Víctor Lamas 1290, Concepción, Chile, Concepción, Chile

La gran riqueza de murciélagos Phyllostomidos, una de las familias de mamíferos con mayor diversidad de dietas y amplia distribución en el Neotrópico, está estrechamente relacionada con la estacionalidad en la temperatura ambiental (ETA). La importancia de la ETA se ha enfatizado a nivel ecológico por la ausencia de hibernación y torpor para soportar bajas temperaturas, pero su relevancia como fuerza evolutiva para promover cambios en la dieta, como respuesta fisiológica alternativa a la hibernación, es una hipótesis aun no evaluada. El tipo de dieta juega papel fundamental en la historia evolutiva de los mamíferos, influyendo sobre aspectos morfológicos y fisiológicos, así como en su radiación evolutiva. Nosotros evaluamos la hipótesis del cambio en la ETA como un promotor en los cambios evolutivos de la dieta para adaptación a nuevas condiciones ambientales extremas. Esta hipótesis fue evaluada con modelos evolutivos de la tasa de transición de la dieta (TR) y la ETA de cada especie, con la predicción de una relación positiva. Los resultados mostraron que existe una relación negativa entre el TR y la tasa de cambio evolutiva de la ETA, pero no con el valor actual de la ETA, reflejando que especies con mayor conservatismo de nicho acumulan más transiciones evolutivas en las dietas, rechazando la hipótesis. Esto sugiere que, aunque la ETA actual no es relevante para explicar los cambios históricos del tipo de dieta, el conservatismo filogenético de la ETA promueve sus cambios.

Financing: FONDECYT-1201506

P44 Physiological compensation in the mussel *Choromytilus chorus* exposed to low-pH and high-temperature conditions

Compensaciones fisiológicas en el choro zapato *Choromytilus chorus* expuesto a condiciones de bajo pH y alta temperatura

Sebastián Ignacio Martel Alarcón^{1,3}, Carolina Fernández¹, Cristian Antonio Vargas Gálvez^{2,3}, Marco Antonio Lardies Carrasco^{1,3}

(1) Universidad Adolfo Ibáñez, Ciencias, Artes Liberales, Av. Diagonal Las Torres #2640, Santiago de Chile, Chile

(2) Universidad de Concepción, Centro EULA, Ciencias Ambientales, Concepción, Chile

(3) Instituto Milenio en Socio-Ecología Costera SECOS

Global change is currently proposing novel conditions to living organisms affecting their individual performance and scaling into higher levels of organization. It has been proposed that marine species are critically exposed to ocean acidification and ocean warming, two global change drivers derived from the human-driven atmospheric CO₂ enrichment. Mollusks have been indicated among the more endangered species by the rapid environmental change. Indeed, mollusks are calcifying species that must produce their shells recurring to the dissolved carbonate ion which availability in the ocean decrease with its acidification. Moreover, high temperatures affect the energetic budget and its allocation to different biological processes in ectotherms as mollusks are. In this context, it has been suggested that the giant mussel *Choromytilus chorus* has the capacity to tolerate well acidified conditions by triggering energetic tradeoffs, thus positioning it as a species of possible social and economic importance. However, there is no data about the physiological response of *C. chorus* facing a combination of global change drivers. In this work, we studied the phenotypic responses of *C. chorus* after a 30-days of exposition to high-temperature and acidification conditions in a laboratory experimental set-up. Our data suggest a physiological and energetic compensation between calcification, shell composition, growth, food ingest and oxygen uptake suggesting a high capacity of this species to cope with predicted novel scenarios. These kinds of finding are important from an ecological perspective, but they also could have significant social and economic impacts on the search of food supply to human societies.

Financing: FONDECYT n° 1190444 Instituto Milenio SECOS ICN2019_015 ICM-ANID

P45 Dietary and immunological seasonal changes in birds: are they related?

Cambios estacionales dietarios e inmunológicos en aves: ¿están relacionados?

Natalia Ramírez Otárola¹, Lucas Navarrete^{2,3}, Felipe Álvarez^{2,3}, Pablo Sabat^{2,3}

(1) Universidad Mayor, Escuela de Medicina Veterinaria, Ciencias, Camino La Piramide 5750, Santiago, Chile

(2) Universidad de Chile, Departamento de Ciencias Ecológicas, Ciencias, Las Palmeras 3425, Santiago, Chile

(3) Center of Applied Ecology and Sustainability (CAPES)

Field and experimental studies suggest that the capacity of organisms to mount an immune response is affected by environmental conditions, being primary productivity and dietary quality significant explanatory factors. Besides, current evidence reports the existence of seasonal variation in immune function, and some components of diet (e.g. quality and availability), may affect the immune variability. In this study we evaluated seasonal changes of the constitutive immune function, specifically hemolysis and hemagglutination score, of *Zonotrichia capensis*, *Troglodytes aedon* and *Spinus barbata*, three passerine birds with different dietary habits. Using the stable isotopes analysis and the standard ellipse area (SEA), we characterized the isotopic niche of these species to evaluate if changes in immune function are related to changes in diet between seasons. We found, *Z. capensis*, exhibited a modulation of hemolysis score between seasons. Also, this species showed variation in SEA, being the isotopic niche of winter narrower than in summer. Moreover, in summer *Z. capensis* seems to incorporate a great diversity of dietary items (invertebrates), while in winter its diet seems to be reduced to a few food resources (mainly seeds). The other two species did not show seasonal variation in the immune variables analyzed; however, the isotopic niche width of *S. barbatus* was narrower in winter than in summer. In this regard, the variation in the immune variable observed in *Z. capensis* could be due to seasonal changes in the incorporation of prey of animal. (Funded by ANID/FONDECYT N° 11190671 and 1200386).

P46 Evolution of reproductive productivity and lifestyles in birds, effects of allometric constraints and evolutionary conservatism.

Evolución de la productividad reproductiva y los estilos de vida de las Aves, efectos de las restricciones alométricas y el conservadurismo evolutivo

Joaquín Cárcamo Gallardo¹, Christian M. Ibáñez², Herlado V. Norambuena³, Enrique Rodríguez-Serrano¹, Cristián E. Hernández¹

(1) Universidad de Concepción, Departamento de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Barrio Universitario s/n., Concepción, Chile

(2) Universidad Andrés Bello, Departamento de Ecología y Biodiversidad, Facultad de Ciencias de la Vida, Avenida República 440, Santiago, Chile

(3) Universidad Santo Tomás, Centro Bahía Lomas, Facultad de Ciencias, Chile

La productividad reproductiva (PR) cuantifica la fracción metabólica asignada a reproducción escalada por el tamaño corporal (TC) de un organismo, donde en general los organismos pequeños son altamente productivos y mueren tempranamente; y los organismos grandes tienen bajas productividades y son longevos. Esto se explicaría por las altas y bajas tasas metabólicas masa-específica, respectivamente. Sin embargo, en Aves existe más de un orden de magnitud de variación no explicada por el TC, la cual se ha denominado “estilos de vida” (EV) y representa la variación en la tasa de asignación de energía a reproducción. Trabajos previos sugieren una correlación evolutiva entre PR y TC, y que la diversidad de EV habría surgido por una radiación adaptativa temprana y posterior conservadurismo evolutivo. En este estudio se evaluó el efecto de la evolución del TC en la evolución de PR, y se determinó el modo de evolución de los EV comparando 4 modelos (I. continuo-estocástico, II. alométricamente óptimos, III. radiación adaptativa y posterior conservadurismo evolutivo, y IV. linaje-dependiente). Se detectó acoplamiento evolutivo positivo entre PR y TC, reflejando una respuesta selectiva conjunta. Los EV han evolucionado heterogéneamente con un modelo linaje-dependiente: lentamente en la historia temprana de las aves y con aceleraciones evolutivas en la historia más reciente de algunos grupos. Se propone que, si bien el valor y evolución de PR está condicionada por efectos alométricos, algunos grupos han experimentado recientemente rápidos cambios evolutivos en su PR que escapan a lo esperado para su tamaño, generándose la diversidad actual de EV.

Financing: FONDECYT-1201506

P47 Heat tolerance of marine ectotherms in a warming Antarctica

Tolerancia al calor de los ectotermos marinos en una Antártida en calentamiento

Andrés N. Molina^{1,3}, José M. Pulgar², Enrico L. Rezende^{1,3}, Mauricio J. Carter²

(1) Pontificia Universidad Católica de Chile, Departamento de Ecología, Facultad de Ciencias Biológicas, 6513677, Santiago, Chile

(2) Universidad Andres Bello, Departamento de Ecología, Facultad de Ciencias de la Vida, República 440, Santiago, Chile

(3) Center of Applied Ecology and Sustainability (CAPES)

Global warming is affecting the Antarctic continent in complex ways, with rapid rising temperatures of the Antarctic Peninsula contrasting with regions of the Southern Ocean whose temperatures have remained relatively stable. Because its organisms are highly specialized to living in the cold, they are presumably vulnerable to increasing temperatures, though quantitative analyses of this issue are currently lacking. Here we compiled a total of 184 estimates of heat tolerance belonging to 39 marine species, and reconstructed their thermal tolerance landscape describing how survival is affected concomitantly by both the intensity and duration of a thermal stress. Analyses show that species exhibit tolerance landscapes displaced towards colder temperatures when compared against their counterparts from lower latitudes. In addition, the arthropods and fish exhibit low tolerance to acute heat challenges, which contrasts with brachiopods, molluscs and echinoderms that tend to be more sensitive to chronic exposure. We contend that these differences might be associated with mobility and the possibility to avoid thermal extremes by behavioral means in more mobile arthropods and fish. Importantly, simulations show that current temperatures in both the intertidal and subtidal zones can result in some heat mortality, but the nature of the thermal stress differs between these environments and might favor contrasting physiological responses and different lineages. Overall, our analyses demonstrate that Antarctic organisms already encounter temperatures that might be physiologically stressful and indicate that these ecological communities are indeed vulnerable to ongoing rising temperatures.

Financing: INACH RT_09-18FONDECYT 1211113 FONDECYT 1200813ANID PhD fellowship 21221525

P48 Floral specialization in *Adesmia* (Papilionoideae): an approach from Geometric Morphometrics

Especialización floral en *Adesmia* (Papilionoideae): una aproximación desde la morfometría geométrica

Juan Ignacio González Melipillán¹, **Amelia Rojas Carvallo**¹, Fernanda Perez¹

(1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

In the evolution of Angiosperms, some lineages have specialized in particular groups of pollinators. Within the Fabaceae, flowers have petals that require some manipulation to access pollen. In this functional specialization, the force required to access pollen may serve as a pollinator filter. The genus *Adesmia* (Papilionoideae) has 240 species distributed in a great diversity of habitats along the Arid Diagonal. These flowers are composed of five petals; a banner, two wings and two keels. The stamens are hidden by the keel, requiring pollinators to descend the keel to access the pollen. In this work, 15 species were analyzed by geometric morphometry to study the morphological diversity of the flower. The results of the analysis of canonical variants group the species into three clusters. Group 1 corresponds to flowers with a banner and keel curvature, having an elongated corolla tube. Group 2 has slightly larger curvatures, but has a shorter corolla tube. Finally, group 3 presents an elongated and straight keel and standard, while presenting a variety of corolla tube lengths. The trait that explains the greatest variability among species is curvature, which in turn is related to the force exerted by pollinators. These results suggest that indeed flowers with greater curvature are more complex in terms of access to stamens and pistils than straighter ones. This study provides an opportunity to understand the diversification of the genus, and the processes of specialization in different environments.

Financing: Proyecto FONDECYT #1211765. Agradecimientos a Proyecto FONDECYT #1221214

P49 Distribution and bioavailability of iron in *Tristerix corymbosus*, a hemiparasitic plant of southern South America.

Distribución y biodisponibilidad de hierro en *Tristerix corymbosus*, una planta hemipárasita del cono sur.

Damaris Santibáñez¹, Pía Urbina¹, Nathalia Navarro¹, **Tomás Bernales**^{1,2}, María Fernanda Pérez², Hannetz Roschztardt¹

(1) Pontificia Universidad Católica de Chile, Genética Molecular y Microbiología, Ciencias Biológicas

(2) Pontificia Universidad Católica de Chile, Departamento de Ecología, Facultad de Ciencias Biológicas, Avenida Libertador Bernardo O'Higgins 340, Santiago, Chile

El hierro es un micronutriente esencial en las funciones celulares, crucial como cofactor en reacciones de transferencia de electrones y, por ende, presente en fotosistemas y complejos mitocondriales. La biodisponibilidad de hierro en niveles tróficos bajos es determinante en la calidad de la dieta de los consumidores primarios, siendo de especial importancia la forma en que es almacenado dicho micronutriente. Una de las formas de hierro más biodisponibles es la asociación en forma de proteínas ferritinas. En esta investigación nos hemos interesado en el quintral (*Tristerix corymbosus*, Loranthaceae) como un modelo para estudiar la acumulación de hierro en plantas parásitas. El quintral es un arbusto hemiparásito que depende de su planta hospedera para la obtención de agua y nutrientes. Esta especie se distribuye en las regiones centro y sur de Chile, y en zonas aledañas acotadas en Argentina. Su floración es temprana, comenzando en otoño, y dando paso a frutos al final del invierno, lo que permite su clasificación como una especie pivotante para polinizadores y depredadores en tiempos de escasas fuentes de alimento, tales como *Sephanoides sephanoides*, *Mimus thenca* y marsupiales del género *Dromiciops*. Frutos de quintral fueron colectados en diferentes estadios de desarrollo y fijados en paraformaldehído 4%. Se realizaron cortes histológicos con la tinción Perls/DAB para determinar la localización de hierro a nivel celular y subcelular. Nuestros resultados sugieren que los embriones de quintral acumulan hierro asociado a proteínas ferritinas, lo que permitiría una alta biodisponibilidad de este micronutriente en las bayas de esta especie.

Financing: Proyecto Fondecyt 1211765 convocatoria 2020 (PI = María Fernanda Pérez)

P50 Leaf dehydration tolerance in high-mountain plants: central Chile vs. Patagonia.

Tolerancia a la deshidratación de hojas en plantas de alta montaña: Chile central vs. Patagonia.

María Ignacia Herrera Ferrer^{1,2}, Claudia Reyes Bahamonde^{1,2}, Vinka Anic Thomas^{1,2}, Lohengrin Cavieres González^{1,2}

(1) Universidad de Concepción, Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Barrio Universitario, casilla 160-C, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile

High mountain ecosystems are expected to be highly vulnerable to the increases in drought due to climate change. To estimate the potential effects of drought on alpine plant species of the Chilean Andes we evaluated tolerance to leaf dehydration species from two sites: Farellones in central Chile (N=23) and Torres del Paine (N=18) in Patagonia. As central Chile has a Mediterranean climate characterized by summer droughts, while the Patagonian Andes do not experience summer drought, we expected a greater number of dehydration tolerant plants in Farellones compared to Patagonia. Leaves were collected from 3 individuals of each study species, which were hydrated for 24h to measure the maximal photochemical efficiency of PSII (F_v/fm). After that, the leaf tissue was exposed to two dehydration treatments during 48h: (i) Silica gel (Relative humidity <10%) and (ii) a solution of Magnesium chloride ($MgCl_2$) (Relative humidity 50%). The samples were subsequently rehydrated to determine the percentage of F_v/fm recovery. Plant species with a F_v/fm recovery lower than 30% were classified as dehydration sensitive (DS), while those species that exceed this percentage were considered dehydration tolerant (DT). The two dehydration treatments indicate that Patagonia has a higher percentage of DT species (treatment (i) = 44%, treatment (ii) = 67%) compared with central Chile (treatment (i) = 9%, treatment (ii) = 43%). The greater number of DT plants in the Patagonian Andes could be attributed to the biogeographical origins of its flora, with species originating in the semi-arid to arid Patagonian steppe.

Financing: FONDECYT 1211197, ACT 210038, FB 210006

P51 Do leaf functional traits predict drought resistance in plants from the Atacama salt flat, Chile?

¿Los rasgos funcionales de las hojas predicen la resistencia a la sequía en plantas del salar de Atacama, Chile?

Francisca Alveal Contreras^{1,2}, Claudia Reyes-Bahamonde^{1,2}, Graciela Valencia^{1,2}, Maritza Mihoc^{1,2}, Vinka Anic^{1,2}, Lohengrin A. Cavieres^{1,2}

(1) Universidad de Concepción, Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Casilla 160-C, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile

Plant performance depends on their functional traits, which are controlled by environmental variables such as water availability. As leaves control plant water loss, foliar traits has been suggested as good surrogates or predict of plant responses to drought. The southern area of the Atacama salt flat is expected to decrease in rainfall due to climate change. Therefore, it is important to know whether species are adapted to deal with drought. The objective of this work was to evaluate whether there is a relationship between leaf functional traits and drought resistance in 12 representative plant species of the Atacama Salt flat. The leaf functional traits measured were: specific leaf area (SLA), dry matter content (LDMC), relative water content (CRA), leaf thickness, chlorophyll and nitrogen content, and carbon/nitrogen ratio (C/N) leaf. Drought resistance was estimated through a leaf dehydration treatment (<10% relative humidity) and subsequent determination of the recovery percentage of the maximum photochemical efficiency of photosystem II (F_v/fm) compared to pre-dehydration values (control). The water use efficiency of the plants was evaluated through the determination of the isotopic discrimination of carbon ($\delta^{13}C$). A Principal component analysis (PCA) was performed using all leaf traits, and the

relationship between the eigenvalues of the first two components (PC1 and PC2) with resistance to foliar dehydration and $\delta^{13}\text{C}$ was evaluated. Only a significant negative relationship was found between PC2 and $\delta^{13}\text{C}$ ($R^2=0.47$; $p=0.007$), suggesting that nitrogen and chlorophyll contents of the leaf would be associated with water use efficiency.

Financing: FONDECYT 1211197, ACT 210038, FB 210006

P52 Functional consequences of the facilitation by cushion-plants in the high-Andes of central Chile.

Consecuencias funcionales por la facilitación de plantas en cojín en los Andes de Chile Central.

Benjamín Morong Alegría^{1,2}, Graciela Valencia Acevedo^{1,2}, Vinka AnicThomas², Lohengrin Cavieres González^{1,2}

(1) Universidad de Concepción, Botánica, Facultad de Ciencias Naturales y Oceanográficas, Barrio Universitario, casilla 160-C, Concepción, Chile
(2) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile

Functional diversity is an important feature of plant communities and it is directly linked to ecosystem functioning. In alpine plant communities, interspecific facilitation plays a key role in the community assembly. In these environments, cushion plants provide favorable microhabitats for the establishment of other plant species, increasing species richness at the community level. However, the consequences of the facilitative effects of cushion species on the functional diversity of alpine plant communities have been seldom explored. The aim of this study was to assess the consequences of the facilitative effect of the cushion species *Azorella madreporica* on the functional diversity of a high-Andean plant community at 3200 m.a.s.l. in central Chile. The following functional traits were measured in plant growing within and outside cushions: specific leaf area, leaf dry matter content, plant size, leaf thickness, plant height, leaf chlorophyll content and leaf nitrogen content. Rao's quadratic entropy (DFQ) and functional dispersion (FDis) indices showed that the functional diversity within plant cushions differed from that determined outside them. The functional diversity of the community is higher when the samples taken within *A. madreporica* cushions are summed to the samples taken outside cushions. Our results highlight the importance of the presence of the cushion plant *A. madreporica* for the functional diversity of high-Andean plant communities.

Financing: FONDECYT 1211197. ACT 210038. FB 210006.

P53 Prenatal caloric restriction modifies energy homeostasis and the behavior of adult rodents in response to acute and chronic variations in food availability

La restricción calórica prenatal modifica la homeostasis energética y la conducta de roedores adultos ante variaciones agudas y crónicas de la disponibilidad de alimento

Isaac Peña Villalobos^{1,2}, **Fabiola Otárola**¹, David Arancibia Altamirano¹, Pablo Sabat², Verónica Palma Alvarado¹

(1) Universidad de Chile, Biología, Ciencias, Laboratorio de Células Troncales y Biología del Desarrollo, Las Encinas 3370, Santiago, Chile
(2) Universidad de Chile, Ciencias Ecológicas, Ciencias, Laboratorio de Ecofisiología Animal, Las Encinas 3370, Santiago, Chile

La programación metabólica fetal ante condiciones nutricionales prenatales desfavorables conduce al desarrollo de patologías tales como la diabetes e hipertensión en la adultez. No obstante, existen escasos estudios que aborden el desarrollo de "fenotipos ahorrativos" en términos energéticos, que representen una ventaja adaptativa frente a condiciones carenciales en la adultez.

Con el objetivo de llenar este vacío, se analizaron machos adultos de *Mus musculus* (BALB/C), provenientes de dos grupos maternos de preñez: control (*ad libitum*) y bajo restricción calórica desde el día 10 de gestación (70%). Los machos adultos a su vez fueron sometidos a: 1) restricción absoluta de alimento por 24, 48 o 72 horas y 2) restricción calórica al 60% por 20 días. Se evaluaron cambios morfológicos (masa corporal y de órganos), de expresión de genes en los tejidos (metabolismo de lípidos e hidratos de carbono) y conductuales (exploración). La masa del hígado se mantuvo inalterada en los individuos sujetos a restricción prenatal, en contraste con la reducción experimentada por el grupo control (45,5%). Además, se observaron variaciones en la razón NAD/NADH en el hígado y la expresión de genes claves en la homeostasis energética (*Pepck*, *Ppara*/*Ppary*), en el cerebro e hígado, que indican el uso diferencial de recursos nutricionales. Por último, la actividad conductual de los roedores adultos fue influenciada por la condición prenatal en el grupo de restricción calórica crónica. Todo lo anterior indica que la restricción calórica prenatal se traduce en un metabolismo ahorrativo ante la carencia aguda y crónica de alimento en individuos adultos.

Financing: Postdoctorado FONDECYT N° 3180108

P54 Bioenergetics of hibernation in *Dromiciops gliroides*: modulation of torpor under chronic caloric restriction

Bioenergética de la hibernación en *Dromiciops gliroides*: modulación del sopor bajo restricción calórica crónica

Francesca Cáceres^{1,2}, Carlos Mejías^{1,2}, Tamara Abarzúa^{1,2}, Isidora Camus^{1,2}, Julian F. Quintero-Galvis^{1,2}, Roberto F. Nespolo^{1,2,3,4}

(1) Millennium Nucleus of Patagonian Limit of Life (LiLi).

(2) Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Universidad Austral de Chile.

(3) Center for Applied Ecology and Sustainability (CAPES).

(4) Millennium Institute for Integrative Biology (iBio), Santiago, Chile.

Winter is a challenging season for many animals because during this time food is scarce and thermoregulatory costs are higher, especially in small endotherms. A strategy to cope with these periods is the temporary abandonment of endothermy, and thus decrease the metabolic rate. These events are known as “torpor”, which when seasonal is known as hibernation. Heterotherms can modulate torpor by adjusting its frequency, duration, and depth; and this depends on the availability of energy. In the present investigation, a complete hibernation cycle was studied in the marsupial *Dromiciops gliroides* under chronic caloric restriction under natural conditions. We used 5 monitos, which were kept in semi-natural enclosures in the forest, and they were released at the end of winter. Using miniature intraperitoneal temperature sensors, we measured the frequency, duration, and depth of torpor, and energy savings associated with hibernation were estimated by calculating torpor and euthermic metabolic rates. We found that monitos extend the duration of torpor events as winter progresses, decreasing euthermic periods. We also found that monitos can minimize energy expenditure during the colder months, but they arise from torpor when ambient temperatures are above ~9.5°C. From this study, it can be concluded that the hibernation period of the monito del monte is 6 months and that it uses torpor opportunistically.

Financing: ANID – Millennium Science Initiative Program – Center Code NCN2021-050; ANID PIA/BASAL center FB0002 y Fondecyt 1221073

P55 Energetics of the hibernation of the monito del monte (*Dromiciops gliroides*): A study of mesocosms and quantitative magnetic resonance

Energética de la hibernación del monito del monte (*Dromiciops gliroides*): Un estudio de mesocosmos y resonancia magnética cuantitativa

Tamara Abarzúa Estay^{1,2}, Carlos Mejías², Isidora Camus^{2,3}, Francesca Cáceres², Julian F Quintero-Galvis², Roberto F Nespolo²

(1) Pontificia Universidad Católica de Chile, Ciencias Biológicas, Marcoleta 49, Santiago, Chile

(2) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Avda. Rector Eduardo Morales s/n, Valdivia, Chile

(3) Universidad de Chile, Departamento de Ciencias Biológicas Animales, Facultad de Ciencias Veterinarias y Pecuarias, Av. Sta. Rosa 11735, Santiago, Chile

For small endotherms, winter represents a challenging period, since low ambient temperatures and reduced trophic supply notably raise the metabolic cost of euthermia. Thus, hibernation is a strategy that allows them to deal with these energy bottlenecks, because it saves energy by temporarily abandoning endothermy. The monito del monte (*Dromiciops gliroides*) is a South American marsupial that experiments a marked physiological and energetic cycle. During winter, monitos enter deep torpor, where their metabolic rate decreases by 96% and their body temperature maintains slightly above ambient temperature (~5°C). This state lasts from days to weeks, until the fat reserves are consumed. By using quantitative magnetic resonance (qMR), a new technique that measures body composition *in vivo*, we estimated the daily energy expenditure in hibernating monitos in the field, through replicated semi-natural enclosures (mesocosms) installed in the natural habitat of *D. gliroides* throughout the entire hibernation period. We found that monitos reduce their energy expenditure from 88.0 kJ/day to 4.83 kJ/day, which represents a 94.5% of energy savings. Nevertheless, we observed that this reduction increases as winter progresses, because as the ambient temperature decreases, torpor is longer and deeper. Considering the lack of food as a proximal trigger of hibernation and environmental temperature as a modulator of its maintenance, we discuss the potential effects of climate change on non-Holarctic hibernators as *D. gliroides*.

Financing: This investigation was funded by ANID – Millennium Science Initiative Program – Center Code NCN2021-050; ANID PIA/BASAL center FB0002 y Fondecyt 1221073.

P56 Effect of light pollution on some physiological variables of a diurnal insect: *Astylus trifasciatus* (pololo) as a study model

Efecto de la contaminación lumínica sobre algunas variables fisiológicas de un insecto diurno: *Astylus trifasciatus* (pololo) como modelo de estudio

Sofía Valenzuela Zuccar¹, Claudio Patricio Veloso Iriarte¹

(1) Departamento de Ciencias Ecológicas, Facultad de Ciencias, Universidad de Chile, Las Palmeras 3425, Ñuñoa, Santiago, Chile

La luz artificial nocturna ha sido descrita como uno de los principales factores de contaminación de origen antrópico, afectando a todo tipo de organismo. En este trabajo analizamos el potencial efecto de la contaminación lumínica sobre algunos elementos de la biología en una especie de insecto diurno (*A. trifasciatus*), importante polinizador nativo. Para ello se mantuvieron en cautiverio en condiciones diarias de luz continua y ciclo L:O 12:12 hrs a grupos de machos, a los cuales luego de 2, 4, 8 y 10 semanas se les midió el patrón respiratorio de reposo (discontinuidad respiratoria), cambio en masa corporal, sobrevivencia, temperatura preferencial y rendimiento locomotor. La temperatura ambiente fluctuó entre los 15°C y los 25°C en ambos tratamientos y bajo el mismo régimen de tiempo (12:12 hrs). Los resultados muestran que durante las dos primeras semanas los efectos sobre las variables medidas son mínimos, sin embargo, a medida que el tiempo de exposición aumenta, los animales mantenidos con luz 24 horas presentan un mayor deterioro fisiológico y locomotor que los animales mantenidos con ciclo discontinuo de L:O. Los resultados nos permiten proponer que es la exposición a la luz a largo plazo la que tendría efectos sobre la fisiología y capacidad locomotora en esta especie, a través de la alteración de la fase de reposo.

Financing: Laboratorio de Ecofisiología de Invertebrados

P57 Causes of the decay of *Austrocedrus chilensis* in the O'Higgins region

Causas del decaimiento de *Austrocedrus chilensis* en la región de O'Higgins

Carolina Álvarez Maldini¹, Claudio Ramírez², Daniela Estay¹, Jorge Guajardo², Alex Fajardo³, Frida Piper²

(1) Universidad de O'Higgins, Instituto de Ciencias Agroalimentarias Animales y Ambientales (ICA3), San Fernando, Chile

(2) Universidad de Talca, Instituto de Cienocas Biológicas, Av. Lircay s/n, Talca, Chile

(3) Universidad de Talca, Instituto de Investigación Interdisciplinaria (I3), Vicerrectoría de Investigación, Av. Lircay s/n, Talca, Chile

El cambio climático está causando decaimiento y mortandad de árboles alrededor del mundo, pero las causas de este fenómeno no están claras. Se ha propuesto que la sequía afecta negativamente la fisiología del árbol, aumentando su predisposición al ataque de patógenos e insectos. Una especie que ha evidenciado decaimiento y mortalidad en Sudamérica es *Austrocedrus chilensis* (Ciprés de la Cordillera). Para evaluar las causas del decaimiento en *A. chilensis*, seleccionamos 28 individuos adultos que exhibían un grado variable de decaimiento en un área de la región de O'Higgins (Fundo Los Cipreses). En cada individuo cuantificamos el vigor mediante el grado de necrosis, clorosis y defoliación, y medimos el potencial hídrico, la fotosíntesis neta, la concentración de carbohidratos solubles (SS) y carbohidratos totales no estructurales (NSC), y la incidencia (presencia/ausencia) del insecto taladrador nativo *Bilyaxia cupriceps*. Encontramos una disminución significativa de la conductancia estomática, fotosíntesis neta, tasa de transpiración y potencial hídrico con el aumento del nivel de defoliación y necrosis. Sin embargo, no hubo relación entre la presencia o abundancia de insectos y el grado de clorosis y necrosis. Además, todos los individuos presentaron concentraciones similares de NSC y SS independientemente de su vigor, siendo los NSC mayoritariamente representados por SS. Los resultados apuntan a limitaciones hídricas como una causa probable del decaimiento de *A. chilensis*, sin un rol claro de limitación por carbono ni de mayor daño por *B. cupriceps*.

Financing: Fondecyt 1190900, 1190927 y 11200807; Millenium Initiative NCN2021-050; PIA/BASAL FB210006

P58 Growth and photochemical performance under different water availability in plants from the Salar de Atacama, Chile.

Crecimiento y desempeño fotoquímico bajo diferentes disponibilidades hídricas en plantas del Salar de Atacama, Chile.

Noemí Labra Oróstica^{1,2}, Claudia Reyes Bahamonde^{1,2}, Lohengrin Cavieres González^{1,2}

(1) Universidad de Concepción, Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Casilla 160-C, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile

Water deficit negatively affects plant performance, so the objective of this work was evaluate the effect of different drought levels on the growth and

photochemical performance of dominant wetland plants in the Salar de Atacama, Chile. According to the habits of the plant families present in this ecosystem, hypothesized that species belonging to the Poaceae family are more resistant to drought compared to the other families. The plants studied were *Puccinellia frigida* (Poaceae), *Distichlis spicata* (Poaceae), *Triglochin concinna* (Juncaginaceae), *Juncus balticus* (Juncaceae) and *Shoenoplectus californicus* (Cyperaceae). For each species, 6 groups of 10 individuals each were irrigated with aqueous solutions with different water potentials: control 0 MPa, -0.75 MPa, -1.6 MPa, -2.8 MPa, -3.7 MPa and -4.6 MPa. To determine drought resistance for each species, measurements of photosynthesis (Amax), chlorophyll fluorescence (Fv/Fm), height growth (cm), and survival (%) were made. One-way ANOVA'S for each species and for each parameter were performed separately. The results showed a decrease in all the parameters evaluated as the water deficit increased. The most drought resistant species was *D. spicata* (Poaceae), while one of the most affected was *P. frigida* (Poaceae). Therefore, the effects of drought do not depend on the family.

Financing: FONDECYT 1211197, ACT 210038, FB 210006

P59 Effect of wildfires on the arbuscular mycorrhizal colonization in nurse plants of the hydrophyll forest and its implications for ecological restoration.

Efecto de los incendios forestales sobre la colonización de micorriza arbuscular en plantas nodrizas del bosque hidrófilo y sus implicancias para la restauración ecológica.

María José Vargas Álvarez^{1,3}, Patricia Silva-Flores^{5,6}, Milen Duarte^{3,7}, Sarina Scalia³, Monserrat Tomé^{2,3}, Ronny Zuñiga^{1,3}, Pablo Becerra⁴, Nicolás Velasco^{1,3}, Pablo Farías³, Diego Pillado³, Ramiro Bustamante^{1,3}

(1) Facultad de Ciencias, Universidad de Chile.

(2) Facultad de Ciencias Agronómicas, Universidad de Chile.

(3) Instituto de Ecología y Biodiversidad.

(4) Facultad de Agronomía e Ingeniería Forestal, Pontificia Universidad Católica de Chile.

(5) Centro de Investigación de Estudios Avanzados del Maule (CIEAM), Vicerrectoría de Investigación y Postgrado (VRIP), Universidad Católica del Maule, Chile.

(6) Centro del Secano, Facultad de Ciencias Agrarias y Forestales, Universidad Católica del Maule, Chile.

(7) Facultad de Ciencias, Universidad Austral de Chile, Campus Isla Teja, Valdivia, Chile.

Wildfires in the Mediterranean forest of Chile have become more frequent and harmful through the decades, representing a severe threat for native forest conservation. Thus, while prevention is the main goal, developing new restoration strategies is urgent to recover affected areas. In this scenario, focusing our attention on facilitative interactions could be key, especially on Nurse effect and Mycorrhiza during early stages of ecological succession. Nurse effect has been described as an interaction where plants help seedlings establish and grow, while mycorrhiza refers to a symbiotic relationship between fungi and plants with positive effects for both. Considering this, our study evaluates the effects of fire over mycorrhizal colonization on nurse plant roots from a hydrophyll variant of the sclerophyllous forest. Four study sites (32° to 35° S, ~ 200 to 800 m a.s.l.) were selected and 16 samples were taken from each of them, 8 from wildfire affected area (F+) and 8 from non affected area (F-), collecting 64 samples in total. Mycorrhizal colonization was compared between F+ and F- conditions. In general, significant differences were not found, but when study site identities were considered, significant differences appeared. While three sites exhibit a common pattern, evidence of a negative effect of fire over mycorrhizal colonization, one site showed the opposite. These results represent an interesting reminder that facilitation is a community level interaction as well as the potential importance of the identity of the plant species, so that more studies considering site-dependent conditions and different nurse species are required.

Financing: Financiado por: FIBN 013/2020 CONAF e Instituto de Ecología y Biodiversidad, FB210006

P60 Effect of forest fires and nurse plants on the diversity of arbuscular mycorrhizal fungi in the hydrophilic forest of central Chile

Efecto de incendios forestales y facilitación por plantas nodrizas en la diversidad de hongos micorrícicos arbusculares en el bosque hidrófilo de Chile central.

Monserrat Arielle Tomé Pérez^{1,3}, Pablo Becerra Osses⁴, Ramiro Bustamante^{2,3}, Milen Duarte^{3,7}, Pablo Farías³, Sarina Scalia², María José Vargas Álvarez^{2,3}, Nicolas Velasco Saragoni^{2,3}, Ronny Zúñiga², Patricia Silva Flores^{5,6}

(1) Universidad de Chile, Departamento de Ciencias Ambientales y Recursos Naturales Renovables, Facultad de Ciencias Agronómicas, Av. Santa Rosa 11315, La Pintana, Santiago, Chile

(2) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Santiago, Chile

(3) Instituto de Ecología y Biodiversidad, Chile

- (4) Pontificia Universidad Católica de Chile, Facultad de Agronomía e Ingeniería Forestal, Avenida Vicuña Mackenna 4860, Santiago, Chile
 (5) Universidad Católica del Maule, Centro de Investigación de Estudios Avanzados del Maule (CIEAM), Avenida San Miguel 3605, Talca, Chile
 (6) Universidad Católica del Maule, Centro del Secano, Facultad de Ciencias Agrarias y Forestales, Avenida San Miguel 3605, Talca, Chile
 (7) Universidad Austral de Chile, Facultad de Ciencias, Avenida Rector Eduardo Morales Miranda 23, Valdivia, Chile

El bosque esclerófilo de tipo hidrófilo de Chile central se desarrolla en una matriz de fuerte presión antrópica, con dos problemáticas que destacan: los incendios forestales y la escasez hídrica. El restablecimiento de la vegetación queda restringido a plantas nodrizas, quienes producen un microhábitat bajo su dosel, actúan como focos de dispersión de semillas y pueden proveer hongos micorrícicos. A su vez, la vegetación del bosque hidrófilo se asocia particularmente a hongos micorrícicos arbusculares (HMAs) que se han reportados ser sensibles al fuego. El presente trabajo tiene como objetivo evaluar el efecto de los incendios, las plantas nodrizas y la interacción de estos factores sobre la diversidad de HMAs. Para ello, se tomaron muestras desde bosques hidrófilos afectados o no por fuego y con presencia y ausencia de plantas nodrizas, en un diseño factorial completo de 2x2 con tres repeticiones por tratamiento y desde dos sitios con características macroecológicas similares, generando un total de 24 unidades experimentales. Para cada unidad experimental, se delimitaron parcelas de 100 m², en donde se recolectaron muestras de suelo para evaluar la diversidad de HMAs a partir de esporas presentes en el suelo. Los resultados indicaron que ninguno de los factores estudiados afecta significativamente las variables de diversidad estudiadas, que fueron riqueza y diversidad de HMAs. Se concluye que las esporas de HMAs de bosque hidrófilo podrían estar actuando como estructuras de resistencia al fuego, sin embargo, la viabilidad de las esporas de HMAs es desconocida y se propone evaluar esto en futuros experimentos.

Financing: Financiamiento: FIBN 013/2020 CONAF e Instituto de Ecología y Biodiversidad, FB210006.

P61 Effect of the life history of herbaceous plants of the genus *Adesmia* (Papilionoideae) on the diversity of nitrogen-fixing bacteria.

Efecto de la forma de vida de plantas herbáceas del género *Adesmia* (Papilionoideae) en la diversidad de bacterias fijadoras de nitrógeno

Daniela Araneda Orellana¹, Nicolás Sáez Pinilla¹, Nicolás Lavandero¹, Fernanda Perez¹

(1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

Entre los mutualismos que presentan algunas plantas con otros organismos se encuentra la simbiosis de leguminosas con bacterias fijadoras de nitrógeno o "rizobios", los cuales se alojan en nódulos en las raíces de su hospedero. Una pregunta importante respecto a este mutualismo es cómo ha evolucionado la especificidad o el generalismo de los simbioses, y cuáles son los factores que podrían estar influyendo en la diversidad de rizobios. Se ha postulado que la forma de vida de la planta (anual o perenne) podría ser un factor relevante, dada la diferencia en ciclos de vida y en estrategias de adquisición de recursos. A partir de esto surge la pregunta de que si las plantas perennes, debido a su mayor tiempo de vida y a condiciones más estables de colonización pueden acumular una mayor diversidad de simbioses a través del tiempo. Para responder esta pregunta se analizó la diversidad y composición de rizobios simbioses de especies anuales y perennes del género *Adesmia* (Papilionoideae) que crecían de forma simpátrica, en dos sitios distintos de la IV Región de Chile. Se obtuvo una mayor diversidad de morfotipos rizobianos en especies perennes que anuales. Sobre la composición, se pudo ver que hay mayor diferencia entre especies anuales y perennes que crecen de forma simpátrica, que entre poblaciones alopatricas de la misma especie, lo cual puede sugerir que hay algún grado de especialización.

P62 Exotic flora present in protected wild areas of Chile

Flora exótica presente en áreas silvestres protegidas de Chile

Jonathan Urrutia-Estrada¹, Javier Ulloa Cornejo¹, Rafael A. García Araya^{1,2}, Pedro Jara-Seguel³

(1) Instituto de Ecología y Biodiversidad, Laboratorio de Invasiones Biológicas, Victoria 631, Concepción, Chile

(2) Universidad de Concepción, Departamento de Manejo de Bosques y Medioambiente, Facultad de Ciencias Forestales, Victoria 631, Concepción, Chile

(3) Universidad Católica de Temuco, Departamento de Ciencias Biológicas y Químicas, Facultad de Recursos Naturales, Rudecindo Ortega 3239, Temuco, Chile

Las áreas silvestres protegidas (ASP) tienen como tarea principal la protección de la biodiversidad de un área determinada. Para lo cual es fundamental limitar el ingreso de especies exóticas. El objetivo del presente estudio fue determinar las especies de plantas exóticas que prosperan al interior de ASP de Chile y describir algunos patrones florísticos implícitos en la dinámica de su comportamiento. Se recopiló antecedentes para 35 ASP, en donde se informa del número total de especies de flora y la proporción de plantas exóticas. Con lo anterior se obtuvo la riqueza y se calculó un índice de invasibilidad para cada ASP. El análisis de composición de especies y la determinación de patrones florísticos se realizó a través de diversos análisis estadísticos. Se registró un total de 355 especies de plantas presentes en las 35 ASP. La RN Río Clarillo posee la mayor riqueza de plantas, en tanto que la mayor proporción e invasibilidad recaen en el MN Cerro Nielol. Las variables ambientales con mayor influencia

sobre la composición de especies exóticas en las ASP son: distancia a la ciudad más cercana, precipitación y temperatura. La riqueza de plantas exóticas al interior de las ASP es alta, lo que puede deberse a la cercanía a centros poblados. La mayor presencia de especies exóticas en la zona mediterránea-templada obedece a la concentración de la población en esta misma área. Estos estudios constituyen la base para la confección de listas de riesgo y diseño de programas de gestión de especies de plantas exóticas.

Financing: Proyecto ANID/BASAL FB210006

P63 Presence of exotic mammals in Chile's protected areas

Presencia de mamíferos exóticos en las áreas protegida de Chile

Kevin Patricio Antonio Vinett Canales^{1,2}, Anibal Pauchard^{1,2}, Darío Moreira^{2,3}, Elvis Gavilán²

(1) Laboratorio de Invasiones Biológicas (LIB), Instituto de Ecología y Biodiversidad (IEB).

(2) Facultad de Ciencias Forestales, Universidad de Concepción.

(3) Laboratorio de Estudios del Antropoceno (LEA).

Los mamíferos exóticos se distribuyen a lo largo y ancho de Chile ejerciendo distintas presiones sobre la fauna nativa que interactúa con ellos. Las Áreas Silvestres Protegidas de Chile ofrecen un verdadero refugio para la biodiversidad nativa. Por este motivo resulta fundamental evaluar los patrones de distribución (presencia y abundancia) de mamíferos exóticos/invasores al interior de estas con el fin de poder diseñar acciones de manejo que permitan reducir sus impactos. Mediante las imágenes obtenidas por la red de monitoreo con cámaras trampa implementadas por CONAF al interior del SNASPE y el análisis de paquete camtrapR del programa R, se pretende evaluar la riqueza relativa, horas de actividad y sobre posicionamiento con especies nativas. Además, se busca ver el efecto de covariables ambientales y antrópicas sobre la presencia de mamíferos exóticos a través de modelos de ocupación con variables continuas y categóricas y regresiones logísticas simples a través del análisis con el paquete unmarked del programa R. Los resultados preliminares nos demuestran que los mamíferos exóticos más distribuidos dentro de las doce áreas protegidas estudiadas son el perro (*Canis lupus familiaris*) y la vaca (*Bos Taurus*), que se encuentran en todas las áreas silvestres bajo estudio, esto refuerza la hipótesis de que la presencia de las especies exóticas invasoras se explica por covariables antropogénicas y ambientales.

Financing: Trabajo financiado por Fondecyt Regular 1180205 y ANID/Basal FB210006.

P64 How rural communities perceive the invasion of *Pinus radiata*?: Interest in participating in community control programs.

¿Cómo perciben comunidades rurales la invasión de *Pinus radiata*?: Interés a participar en programas de control comunitario.

Pabla Catalina Sánchez Fuentes^{1,2}, Barbara Andrea Langdon Fornet^{1,2}, Anibal Pauchard Cortés^{1,2}, José Cristobal Pizarro Pinochet^{1,2}

(1) Universidad de Concepción, Laboratorio de Invasiones Biológicas (LIB), Facultad de Ciencias Forestales, Victoria 631, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad, Las Palmeras 3425, Ñuñoa, Chile

Invasive alien species affect biodiversity, ecosystem services and human well-being. In view of this, rural communities possess valuable local ecological knowledge. Understanding the perceptions of local communities is an essential step in building commitment and trusting relationships with key stakeholders. In addition, it is essential when applying invasive species management strategies to have the support of local stakeholders, since they are the ones who receive the direct impacts and are interested in what happens in their environment. The question guiding this research is: What is the willingness to participate in community control programs, the level of knowledge of the invasion and the general perception of rural communities about the species *Pinus radiata* in central Chile?. The objective is; evaluate the predisposing factors to the interest in participating in *Pinus radiata* control programs in rural communities in central Chile. For this purpose, face-to-face surveys will be carried out in the communes of Constitución and Florida, will evaluate demographic and economic factors, knowledge, landscape context and effects of the species. In the case of this research, a mixed methods design will be applied, which combines quantitative and qualitative data. Data analysis will be performed in SPSS 26 and NVivo software. It is expected that young people or people with good socioeconomic status, as well as those who have lived in the locality for more years and who perceive negative effects of the species will be interested in participating in community control programs, while those who perceive benefits will not be interested.

Financing: Proyecto NERC-CONICYT NE/S011641/1 y Proyecto ANID FB210006.

P65 Characterization of the seed bank of the invasive species *mesembryanthemum* spp. In four asp of northern chile

Caracterización del banco de semillas de la especie invasora *mesembryanthemum* spp. En cuatro asp del norte de chile

Antonio Lara Cuevas^{1,2}, Rafael García Araya^{1,2}, Anibal Pauchard^{1,2}, Jonathan Urrutia Estrada², Nicole Sandoval Vidal^{1,2}

(1) Universidad de Concepción, Manejo de Bosques y Medio Ambiente, Facultad de Ciencias Forestales, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Laboratorio de Invasiones Biológicas (LIB), Concepción, Chile

La presencia de la planta anual invasora *Mesembryanthemum crystallinum* y *M. nodiflorum* (Aizoaceae) ha sido reportada en el norte de Chile, entre las regiones de Tarapacá y Coquimbo, sin embargo, no existe una cuantificación de su abundancia dentro de áreas silvestres protegidas. Este trabajo busca caracterizar el patrón de cobertura de *Mesembryanthemum* spp en cuatro áreas protegidas, Monumento Nacional Paposo Norte (MNP), Parque Nacional Pan de Azúcar (PNPA), Parque Nacional Llanos de Challe (PNLLC) y la Reserva Nacional Pingüino de Humboldt (RNPH), y caracterizar el banco de semillas formado por estas especies. La abundancia de estas especies es mayor, en PNLLC y RNPH, mientras que en MNP solo fue registrada en las afueras de la unidad. En los sectores invadidos, *M. crystallinum* (en estado vivo o muerto) es la especie con mayor cobertura. La RNPH presentó el mayor banco edáfico (1132 ± 423 semillas/m²) y el mayor banco aéreo se encontró en el PNLLC (39.669 ± 3.758 semillas/m²). La germinación de semillas de *M. crystallinum* obtenidas de plantas v vivas fue de $40,4 \pm 11,5$ % y desde plantas secas $60,1 \pm 3,6$ %. *Mesembryanthemum nodiflorum*, solo se evaluó desde plantas secas con $8,3 \pm 2,1$ % de germinación. Las adaptaciones fisiológicas propias del género *Mesembryanthemum*, el patrón de distribución y la formación de bancos de semillas permanentes, aseguran su permanencia y la colonización de nuevos sitios dentro y fuera de las ASP, aumentando la vulnerabilidad de las especies que se espera conservar en estas áreas

Financing: CONAF/FIBN 015/2018 ANID/BASAL FB210006

P66 Diversity of fungal soil communities associated to *Nothofagus obliqua* growing in native forests and within in a *Pinus radiata* plantations.

Diversidad de las comunidades de hongos del suelo asociados a *Nothofagus obliqua* creciendo en bosque nativo y dentro de una plantación de *Pinus radiata*

Leonardo Almonacid Muñoz¹, Hector Herrera¹, Andres Fuentes Ramirez^{1,2,3}, Rodrigo Vargas Gaete^{1,2,3}, Ronald Jara Gacitua⁵, Camila Fernández Urrutia^{2,3,4}

(1) Universidad de La Frontera, Departamento de Ciencias Forestales, Facultad de Ciencias Agropecuarias y Medioambiente, Francisco Salazar 01145, Temuco, Chile

(2) Universidad de La Frontera, Laboratorio de Biometría, Facultad de Ciencias Agropecuarias y Medioambiente, Francisco Salazar 01145, Temuco, Chile

(3) Pontificia Universidad Católica de Chile, Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Santiago, Chile

(4) Universidad de La Frontera, Doctorado en Ciencias Agroalimentarias y Medio Ambiente, Facultad de Ciencias Agropecuarias y Medioambiente, Francisco Salazar 01145, Temuco, Chile

(5) Universidad Austral de Chile, Instituto de Bioquímica y Microbiología, Facultad de Ciencias, Independencia 631, Valdivia, Chile

Soil microorganisms are influenced by many factors, exudates released by the roots, organic matter, environmental stress and biological interactions, among others. Specific microorganisms and their interactions can change particularly among conifers and broad leaves species. *Pinus radiata* D. Don in Chile covers extended areas (~1.9 million ha) compromising biodiversity and ecosystems services when compared with native forest ecosystems. In this study, we aimed characterizing the fungal communities associated to *Nothofagus obliqua*. Using a metabarcoding approach, we analyzed microorganisms related to *N.obliqua* individuals either on its natural condition in native forests, as those naturally regenerated within an old *P. radiata* plantation (>45 years). Diversity indices, relative abundance, preferential taxa and predicted functions were estimated using bioinformatic tools. The β -diversity analysis showed that both factors, soil type (rhizosphere or bulk) and site (native forest or *P. radiata* plantation) were significant, being the site which explains most of the variation among fungal communities. Basidiomycota were the most abundant fungal phyla, in both soil types and sites. The main fungal taxa associated to native forest were Tricholomataceae and Cantharellales, whether in *P. radiata* plantations Russulaceae and Hyaloscyphaceae were the most abundant families. Overall, these results demonstrate that the composition and diversity of fungal communities associated with native *N. obliqua* forests are influenced mainly influenced on the site. The study of fungi associated to this native tree species in further studies could help to improve the establishment, growth and survival of plant species, with the potential to be used in restoration processes of degraded environments.

Financing: Acknowledgments: Proyecto DIUFRO DI22-0027; ANID BASAL FB210015, SCIA-Anillo ACT210052; DIUFRO DI22-0042

P67 Seasonal characterization of marine and terrestrial resource use and isotopic niche width in two coastal passerines of the genus *Cinclodes* (Passeriformes, Furnariidae).

Caracterización estacional de la utilización de recursos terrestres/marinos y amplitud de nicho isotópico en dos passeriformes costeros del género *Cinclodes* (Passeriformes, Furnariidae).

Lucas Navarrete Parra^{1,2}, Felipe Ignacio Alvarez Vergara^{1,2}, Roberto Fernando Nespolo Rossi³, Karin Evelyn Maldonado Pacheco⁴, Pablo Sabat Kirkwood^{1,2}, Seth D. Newsome⁵

(1) Universidad de Chile, Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile.

(2) Pontificia Universidad Católica de Chile, Avda. Libertador Bernardo O'Higgins 340, Santiago, Chile.

(3) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Av. Rector Eduardo Morales Miranda 23, Valdivia, Los Ríos, Valdivia, Chile.

(4) Universidad Adolfo Ibáñez, Departamento de Ciencias, Facultad de Artes Liberales, Diag. Las Torres 2640, Santiago, Peñalolén 7941169, Región Metropolitana, Santiago, Chile.

(5) University of New Mexico, Department of Biology, NM 87131, Albuquerque, USA.

Recognize the trophic patterns of organisms is essential for ecology studies to avoid the decline of the species in the face of the current climate crisis. Previous studies of the trophic ecology of the genus *Cinclodes* revealed that the incorporation of marine and terrestrial prey depends on primary productivity and rainfall patterns. It is unknown however to what extent the availability of terrestrial insects and fresh water affect the diet of this unique group of passerines on seasonal scale. By analyzing the carbon ($\delta^{13}\text{C}$), nitrogen ($\delta^{15}\text{N}$), and hydrogen ($\delta^2\text{H}$) isotopic composition of blood and feathers, we explore seasonal and interspecific variation of the "isotopic niche" in *C. nigrofumosus* and *C. oustaleti* captured along the coast of central Chile. Due to the potential difference in the availability of terrestrial prey among seasons, we expected increases i) in the use of terrestrial prey use by *C. nigrofumosus* during the winter and ii) in the isotopic niche width of *C. oustaleti* in winter, when both species occur in sympatry. No seasonal variation was found in the isotopic composition or isotopic niche size of *C. nigrofumosus* tissues, but *C. oustaleti* tissues showed increase in the use of marine resources in winter with no concomitant increase in isotopic niche width. Overall, the data suggests that the coastal resident *C. nigrofumosus* consumes similar trophic resources between seasons, whereas *C. oustaleti* is a generalist species that seasonally varies its consumption of terrestrial and marine prey.

Financing: Funded by FONDECYT 1200386; ANID PIA/BASAL FB0002.

P68 Role of "Drosophila blood brain barrier" monocarboxylate transporters in the adaptive response to nutritional restriction.

Rol de los transportadores de monocarboxilato en la "barrera hematoencefálica de *Drosophila*" en la respuesta adaptativa a la restricción nutricional

Jorge Ignacio Gaete², Andres Esparza¹, Jimena Sierralta¹, Andrés González-Gutiérrez¹

(1) Universidad de Chile, Neurociencia, Medicina, Independencia 1027, Santiago, Chile

(2) Universidad Mayor, Biotecnología, Ciencias, Camino la piramide 5750, Santiago, Chile

In an organism, the central nervous system is separated from the rest of the body by a physical barrier called the blood brain barrier (BBB). One main role of the BBB is to balance the availability of nutrients in the blood with the high energy requirements of the brain. This crucial function might be achieved by adapting the transport of nutrients such as glucose or monocarboxylates (MC). In *Drosophila*, the BBB is formed by the Subperineurial glia (SPG) and the Perineurial glia (PG) cells. Which are *Drosophila* MC transporters (dMCTs) that mediate the transport at the BBB and which of these transporters are involved in the adaptive response to a nutritional restriction is not known.

To address this, we measured changes of several metabolites in hemolymph from *Drosophila* larvae fed or starved for different periods of times. Additionally, we studied lactate/pyruvate dynamics and changes in the intracellular pH (pHi) in glia and neurons of fed or starved larval brains using FRET-based sensors.

After a period of 5 or 24 hrs of starvation, lactate, glucose and trehalose levels decreased in hemolymph. In these conditions, monocarboxylate transport in glia and motorneurons remained unchanged. However, we found an up-regulation in the transport of lactate and pHi changes associated to the transport of ketone bodies in SPG in starved conditions compared to fed larvae.

Our results suggest that changes in proton coupled-MC transport specifically affecting SPG cells are part of the adaptive response to a period of starvation.

Financing: Fondecyt iniciacion 11200477

P69 More than a neurotransmitter, studying dopaminylation of histone as a new epigenetic mark

Más que un neurotransmisor: Estudiando la Dopaminilación de histonas como nueva marca epigenética

Antonia Soto-González¹, Rafaella V. Zarate², M Estela Andrés¹, Jorge M Campusano¹

(1) Pontificia Universidad Católica de Chile, Departamento de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Avenida Del Libertador Bernardo O'Higgins 340, Santiago, Chile

Biogenic amines like dopamine and serotonin are traditionally known as neurotransmitters. Nevertheless, it was described that these amines can be added to different proteins as post-translational modifications (PTM). Recent evidence showed that the N-terminal tail of histone 3 is aminylated in glutamine 5 by transglutaminase 2 (TG2), an enzyme that is highly expressed in the central nervous system and is associated with several neurodegenerative disease. Further, Histone aminylation is studied in the context of drugs of abuse. The need arises to understand how this epigenetic mark is regulated. We are assessing whether histone 3 dopaminylation is modulated by pharmacological treatments in the *Drosophila* cell line S2 and catecholaminergic cell line PC12. In order to detect this modification, it is used the fluorescent amine analogue dansyl cadaverine and an anti dopaminylated histone 3 antibody. Our preliminary results indicate that this PTM is found in both, mammalian and insect cell models. We expect to advance our understanding on how this epigenetic mark is regulated and the consequences of modifying this PTM in cellular models.

Financing: This study was supported by Fondecyt grant 1191152 to M. Estela Andrés

P70 Fenofibrate (a PPAR- α Agonist) Administered During Ethanol Withdrawal Reverts Ethanol-Induced Neuroinflammation and Restores the Levels of Glutamate Transporter in Ethanol-Administered Rats

Fenofibrate (a PPAR- α Agonist) Administered During Ethanol Withdrawal Reverts Ethanol-Induced Neuroinflammation and Restores the Levels of Glutamate Transporter in Ethanol-Administered Rats

Eduardo Karahanian¹, Francisca Villavicencio Tejo¹, Lucas Marambio Ruiz¹, Osvaldo Flores Bastías¹, Diliana Pérez-Reytor¹

(1) Universidad Autónoma de Chile, Instituto de Ciencias Biomédicas, Facultad de Ciencias de la Salud. Llano Subercaseux 2801 - San Miguel, Santiago, Chile

High-ethanol intake induces a neuroinflammatory response, which has been proposed as responsible for the maintenance of chronic ethanol consumption. Neuroinflammation decreases glutamate transporter (GLT-1) expression, increasing levels of glutamate that trigger dopamine release at the corticolimbic reward areas, driving long-term drinking behavior. The activation of PPAR α by fibrates inhibits neuroinflammation, in models other than ethanol consumption. However, the effect of fibrates on ethanol-induced neuroinflammation has not yet been studied. We previously reported that the administration of fenofibrate to ethanol-drinking rats decreased ethanol consumption. Here, we studied whether fenofibrate effects are related to a decrease in ethanol-induced neuroinflammation and to the normalization of the levels of GLT-1. Rats were administered ethanol on alternate days for 4 weeks (2 g/kg/day). Then, ethanol was withdrawn and fenofibrate was administered for 14 days. The levels of GFAP, pIkB α , TNF α , IL-1 β , IL-6, IL-10 and GLT-1 were quantified in the prefrontal cortex, hippocampus, and hypothalamus. Ethanol treatment increased the levels of GFAP, pIkB α and all the inflammatory cytokines, while the administration of fenofibrate normalized these effects. These results indicate that fenofibrate reverts neuroinflammation probably through the inhibition of NF- κ B. Finally, ethanol decreased GLT-1 expression in the prefrontal cortex and hippocampus. Fenofibrate normalized the levels of GLT-1 in both areas, suggesting that its effect in reducing ethanol consumption could be due to the normalization of glutamatergic tone.

Financing: Anillo ANID ACT210012

P71 eMIC domain-containing Srrm234 isoforms enable dorsal cluster neurons synaptogenesis in *Drosophila melanogaster*

Las isoformas de Srrm234 que contienen el dominio eMIC permiten la sinaptogénesis de las 'dorsal cluster neurons' en *Drosophila melanogaster*

Benjamín Andrés Pérez Urzúa¹, Jorge Garay Montecinos¹, María Estela Andrés Coke¹, Carlos Oliva Olave¹

(1) Pontificia Universidad Católica de Chile, Cellular and Molecular Biology, Biological Sciences, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

Alternative splicing (AS) is a post-transcriptional modification that boosts protein diversity. Recently, short-length nucleotide sequences named microexons (≤ 30 nt) have become a new field of interest given that not only their inclusion through AS coincides with the development of the nervous system, but also as a misregulation in their percentage spliced in is associated with neurological deficits. Homologous to vertebrates, the main neural-microexon inclusion regulators in *Drosophila melanogaster* are the splicing factor isoforms expressed from the *Srrm234* gene that, via AS, include the enhancer of microexons (eMIC) domain. Yet, the function of eMIC—let alone Srrm234—remains to be unravelled in distinctive biological processes wherein the genes containing microexons are known to participate in, such as, in synapse formation. Based on our preliminary analyses in the *Drosophila* visual system, the Srrm234 isoforms with eMIC are more predominant from the pupal stage onwards. That is, when synaptogenesis occurs. Thus, this research aims to determine in *Drosophila*—a well-characterised model to study development—the role of Srrm234 isoforms with eMIC, as well as microexon inclusions dependent on this domain, in dorsal cluster neurons synaptogenesis; for which we have already observed a different number of axons projecting to the medulla when the expression of *Srrm234* is reduced relative to controls. Essentially, using bioinformatics, *Gal4-UAS*, immunofluorescence, and a visual-motor behavioural assay, among other techniques, this research will shed light into the role of Srrm234 and their eMIC-dependent microexon inclusions in synaptogenesis, an indispensable process for further neural wiring formation and functioning.

Financing: Regular FONDECYT 1191424

P72 MitoNEET agonists accelerates IRP1 inactivation, protecting against iron accumulation and apoptosis.

Agonistas de mitoNEET aceleran la inactivación de IRP1, protegiendo contra la acumulación de hierro y la apoptosis.

Francisco Castro Román¹, Daniela Pacheco Donoso¹, Pabla Aguirre Ortiz¹, Pamela Urrutia², Marco Tulio Nuñez¹

(1) Universidad de Chile, Departamento de Biología, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

(2) Universidad San Sebastián, Facultad de Medicina y Ciencia, Lota 2426, Santiago, Chile

Cellular iron homeostasis is maintained by the iron regulatory protein-iron responsive element (IRP-IRE) system. IRP1 is a bifunctional protein that under normal iron conditions has an [4Fe-4S] iron-sulfur cluster (ISC) acting as cytosolic (c)-aconitase. While under iron deprivation, IRP1 loses its ISC and binds to IREs in the untranslated regions (UTRs) of specific mRNAs, rising bioavailable iron levels. Previously was reported that nitrosative stress disassemble the ISC of IRP1, inducing an aberrant activation, and promoting cellular iron accumulation. MitoNEET, is a mitochondrial outer membrane protein involved in the ISC biosynthesis, mitobiogenesis and mitophagy. MitoNEET also regulates cellular iron homeostasis converting IRP1 into c-aconitase through the transference of two [2Fe-2S] clusters. MitoNEET knockout mice shows iron accumulation, diminished dopamine levels and motor impairment, symptoms normally associated with Parkinson's disease. In this work we used two mitoNEET agonist (Pioglitazone and TT01001), to determinate mitoNEET capacity to prevent NO-mediated IRP1 activity increase by transferring its cluster and reducing iron accumulation. We found that both compounds improve the IRP1 cluster recovery time. We also determined that these agonists improved cell viability in cells treated with rotenone, a complex I inhibitor. These early results suggest that Pioglitazone and TT01001, or similar mitoNEET agonists, could be used in the treatment of iron accumulation disorders, such as Parkinson's.

Financing: Proyecto Fondecyt de Iniciación 11201141

P73 Analysis of the subcellular localization of RCOR2, a protein necessary for the correct development of the cortex

Análisis de localización subcelular de RCOR2, una proteína necesaria para el correcto desarrollo de la corteza.

Karina Reichel¹, Daniel Verbel-Vergara¹, Marcela González¹, María Estela Andrés¹

(1) Pontificia Universidad Católica de Chile, Biología celular y molecular, Ciencias Biológicas, Avda. Libertador Bernardo O'Higgins 340, Santiago, Chile

RCOR2 is a protein initially characterized as a co-repressor of the REST transcription factor for controlling neuronal gene expression. RCOR2 null mice exhibit proliferation and neurogenesis problems with a smaller cerebral cortex. The role that RCOR2 plays during mitosis is unknown. But recent studies suggest that RCOR2 is located in the midbody, a mitotic structure that controls cell division. We have identified two splice variants of RCOR2. Only one of these variants has been studied. This work aims to compare the subcellular localization of RCOR2 variants during the cell cycle and the role of their N-terminal and C-terminal regions in their localization. Our data show that there are changes in the localization of RCOR2 variants during interphase, metaphase, and cytokinesis. Both variants are located in the mitotic spindle and in the midbodies. Furthermore, deletions of the N-terminal and C-terminal regions did not alter colocalization with tubulin during cytokinesis. In conclusion, the RCOR2 variants show a similar localization during the cell cycle, suggesting that both may be involved in the proliferation of neuronal precursors.

Financing: Fondecyt 1191152

P74 Human respiratory syncytial virus infects neurons and modulates the release of glutamate

José Muñoz¹, Karen Bohmwald¹, Alexis Kalergis^{1,2}

(1) Millennium Institute of Immunology and Immunotherapy, Departamento de Genética Molecular y Microbiología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Avenida Libertador Bernardo O'higgins 340, Santiago, Chile

(2) Pontificia Universidad Católica de Chile, Departamento de Endocrinología, Facultad de Medicina, Avenida Libertador Bernardo O'higgins 340, Santiago, Chile

Among respiratory viruses, human respiratory syncytial virus (hRSV) is one of the most prevalent in children under 5 years of age, pregnant women, and the elderly. Besides the respiratory disease that hRSV can cause, neurological alterations such as seizures, encephalitis, encephalopathies and learning impairment have been described for severe cases. Recently, data from our laboratory showed that hRSV infection could reach the central nervous system (CNS) by altering the permeability of the blood-brain barrier allowing the passage of macromolecules and the infiltration of immune cells to this tissue. Moreover, hRSV infection can alter the behavior of mice up to 60 days post-infection due to the inflammatory response triggered by the virus. The mechanisms responsible for the cognitive and behavioral alterations remain unknown. However, it is established that glutamate is an excitatory neurotransmitter of the CNS involved in processes such as memory, learning, and brain development. Changes in glutamate concentrations can cause neurological alterations due to synaptic impairment, given the activation of many of its receptors. Based on these elements, we hypothesized that hRSV infection of hippocampal neurons can alter the release of glutamate and the expression of the receptor for this neurotransmitter. In this work, using immortalized HT22 hippocampal cells, we evaluate the effects of hRSV infection on glutamate release. Our data suggest that hRSV can infect HT22 cells *in vitro* and promoting pro-inflammatory cytokine secretion in infected cells in a time-dependent manner. These results provide new evidence for the mechanism behind the behavioral alterations produced by hRSV.

Financing: This work was supported by ANID/FONDECYT grants #11221280; #1190830, the Millennium Institute on Immunology and Immunotherapy grant number ICM-ANID ICN09_016.

P75 S29 phosphorylation as a critical regulator of the subcellular distribution of TRPM8 channels

Elizabeth Mendoza^{1,2}, Bianca Bustamante^{1,2}, Rodolfo Madrid^{1,2,3}, Carolina González^{1,2}, María Pertusa^{1,2,3}

(1) Universidad de Santiago de Chile, Biología, Química y Biología, Alameda 3363, Santiago, Chile

(2) Millennium Nucleus for the Study of Pain (MiNuSPain)

(3) Millennium Nucleus of Ion Channel-Associated Diseases (MiNICAD)

In mammals, environmental cold sensing carried out by peripheral cold thermoreceptor neurons mostly depends on TRPM8. This polymodal TRP channel is activated by cold, cooling compounds such as menthol, voltage, and osmolality rises. Modulation of TRPM8 function entails several forms of molecular regulation, including phosphorylation. In that regard, we previously identified that serine 29 phosphorylation downregulates TRPM8 function, reducing the number of active TRPM8 channels in the plasma membrane. To further understand how this post-translational modification affects TRPM8 subcellular distribution, we analyze the number and the area of TRPM8-containing structures in HEK293 cells expressing mTRPM8-YFP and S29A-mTRPM8-YFP channels, in control conditions and after treatment with staurosporine, a kinase inhibitor. When S29 phosphorylation is not prevented, TRPM8 channels distribute in larger and less abundant vesicles. Moreover, Total Internal Reflection Fluorescence Recovery After Photobleaching (TIR-FRAP) revealed that HEK293 cells transfected with the S29A-mTRPM8-YFP show a 30% increase in the mobile fraction compared to mTRPM8-YFP expressing cells, suggesting that the unphosphorylation of this position increases the number of ion channels that could be incorporated into the plasma membrane. In agreement with this observation, S29A-mTRPM8-YFP channels displayed a higher colocalization with LAMP1-RFP, a marker of the vesicles involved in its exocytosis.

Overall, our findings suggest that S29 phosphorylation is a relevant mechanism that governs the abundance of TRPM8 at the plasma membrane. Therefore, this critical form of reversible regulation emerges as a novel and dynamic target that should be considered when studying pathological conditions related to altered TRPM8 function.

Financing: DICYT VRIDel 022143PP and 021843MM, Millennium Nucleus of Ion Channel-Associated Diseases (MiNICAD) and the Millennium Nucleus for the Study of Pain (MiNuSPain)

P76 Changes in visual exploration strategies during experiments in free viewing of visual scenes

Cambios en estrategias de exploración visual durante experimentos de visión libre sobre escenas visuales

Camilo Espinosa-Curilem^{1,3}, Marcos Orchard Concha¹, Christ Devia^{2,3,4}, Pedro E. Maldonado^{2,3,4}, José Ignacio Egaña^{2,3,5}

(1) Universidad de Chile, Departamento de Ingeniería Eléctrica, Facultad de Ciencias Físicas y Matemáticas, Av. Tupper 2007, Santiago, Chile

(2) Universidad de Chile, Departamento de Neurociencia, Facultad de Medicina, Av. Independencia 1027, Santiago, Chile

(3) Biomedical Neuroscience Institute, Laboratorio de Neurosistemas, Independencia 1027, Santiago, Chile

(4) National Center for Artificial Intelligence (CENIA), Vicuña Mackenna 4860, Santiago, Chile

(5) Universidad de Chile, Departamento de Anestesiología y Medicina Perioperatoria, Facultad de Medicina, Independencia 1027, Santiago, Chile

A considerable part of our actions requires visual information. Furthermore, to gain knowledge about our surroundings, we must direct our eyes to different places many times a second. Understanding the decisions of when and where we look can reveal the information priorities of our visual system and its strategies to sample this information. During scene viewing, two main events occur: saccades, ballistic movements of the fovea to regions of interest; and fixations, moments in which the eyes are relatively still. Previous studies relate characteristics like saccade amplitude and fixation duration to different visual exploration strategies. This work investigates the existence of a discrete change in the exploration strategy on static visual scenes over time, which has found supporting evidence in experiments with monkeys. In this case, the experiment data is taken from free exploration of visual scenes in humans. The main goal is to study variables related to the dynamics of saccades and fixations in time, which could yield information about the possible change in visual strategy. Preliminary results show a systematic decrease in both amplitudes of saccades and the duration of fixations. This trend varies according to the type of information available in the image: images containing semantic information tend to decrease slower, and images with only low-level features or no information produce faster decreases of saccade amplitude and fixation duration in time. Further work will examine the quantification of image information, its acquisition during the trials, and its relation to the observed dynamics.

Financing: BNI, Iniciativa Científica Milenio ICN09_015 PROYECTO ACE 210007; Fundación Guillermo Puelma; Centro Nacional de Inteligencia Artificial CENIA FB210017, Financiamiento Basal ANID

P77 Whom do psychopaths harm?

María Alexandra García Pérez^{1,2}, Benjamin Carrasco^{1,2}, Marco Contreras^{1,3}, José Luis Valdés^{1,2}

(1) Universidad de Chile, Neurociencia, Medicina, Av. Independencia 1007, Santiago, Chile

(2) Biomedical Neuroscience Institute (BNI), Medicina, Santiago, Chile

(3) University of Arizona, Neuroscience Department, Tucson, AZ, United States

Psychopathy is a personality disorder characterized by a lack of empathy and violent antisocial behavior, usually resulting in high emotional and psychological costs for its victims. Unfortunately, there is no viable animal model to explore the neurophysiological basis of this behavioral disorder or even possible treatments. Here we develop an operant conditioning paradigm in the rodent as a model of psychopathy, and we characterize the predisposition of one animal to harm others at the expense of personal benefits.

The task consists of an initial phase where a rat could press any of two levers to obtain rewards (sucrose 20%). Then one of the preferred levers delivers a foot shock to a neighboring rat located in a continuous operant chamber.

We found that, regardless of familiarity with the neighbor rat (cagemate or stranger), the operant rats reduce the number of preferred lever presses when it causes damage to a conspecific. However, not all the animals behave the same way, and we distinguished three different profiles in the rat population: Psychopathic, Empathic, and Mixed profile. When we analyzed each profile, we found that Empathic rats who switch their behavior to non-shock lever pressing do not distinguish between cage mates or strangers. Conversely, no-switcher or Psychopathic rats prefer to harm acquaintances. These results indicate that in normal population exist a proportion of animals with psychopathic-like behavior with a preference to harm their acquaintances over strangers, opening a new window for studying empathy and psychopathy neurobiological processes.

Financing: The Pew Innovation Fund Grant #34503

P78 Recognition of critical facial features: Comparison between normal vision and simulated central and peripheral vision alterations.

Jazmín Magali Sánchez Valenzuela^{1,2}, María de los Ángeles Juricic Urzúa^{2,3}, Iván Antonio Plaza Rosales^{2,4}

- (1) Universidad de Chile, Escuela de Tecnología Médica, Facultad de Medicina
(2) Universidad de Chile, Laboratorio de Neurosistemas, Facultad de Medicina
(3) Universidad de Chile, Departamento de Oftalmología, Facultad de Medicina
(4) Universidad de Chile, Departamento de Tecnología Médica, Facultad de Medicina

Face recognition is a fundamental part of social interaction and one of the main complaints in visually impaired people, particularly in central vision loss (CVL). Face identity recognition relies on discrimination of critical facial features. This study aimed to identify how discrimination of critical and non-critical facial features differs in CVL and peripheral vision loss (PVL) from normal vision (NV).

28 volunteers were asked to grade two facial features, lip thickness (critical) and interocular distance (non-critical), across 40 faces on an arbitrary scale from -5 to +5, in three different conditions: NV and simulated CVL and PVL. Their answers in CVL and PVL were compared with NV grading by subtracting $N_{\text{grading}} - \text{CVL/PVL}_{\text{grading}}$ and medians for each condition were obtained.

We found that lip thickness grading was significantly more affected by CVL than PVL ($N_{\text{grading}} - \text{CVL}_{\text{grading}} = 1 \pm 1$; $N_{\text{grading}} - \text{PVL}_{\text{grading}} = 1 \pm 0$; $p < 0.001$) and also on interocular distance grading ($N_{\text{grading}} - \text{CVL}_{\text{grading}} = 1 \pm 0.75$; $N_{\text{grading}} - \text{PVL}_{\text{grading}} = 1 \pm 0$; $p = 0.02$). These data show that both simulated CVL and PVL affected facial features grading, but lip thickness is much more affected than interocular distance, particularly in CVL.

These results suggest that discrimination of critical facial features, and no non-critical features, is particularly affected in CVL compared with PVL, providing a potential explanation about why identity facial recognition is so impaired people with central vision loss.

Financing: Acknowledgments: FONDECYT Postdoctorado N°3180389; Iniciativa Científica Milenio ICN09_015 Proyecto ACE 210007.

P79 Neurophenomenology of subjective realisms manipulation in a food affordance paradigm.

Constanza Baquedano¹, Diego Cosmelli², Antoine Lutz³

- (1) Universidad Adolfo Ibañez, Center for Social and Cognitive Neuroscience (CSCN, Psychology, Santiago, Chile
(2) Pontifical Catholic University of Chile, School of Psychology, Psychology, Santiago, Chile
(3) Lyon Neuroscience Research Center, INSERM, Lyon 1 University, Lyon, Francia

Dereification is the process of realizing that thoughts and perceptions are mere mental representations, and not necessarily an accurate depiction of reality. This process has previously also been labeled as decentering, cognitive diffusion, mindful attention, or phenomenological reduction. The opposite of dereification is experiential fusion or immersion, the process of being lost or totally immersed into the contents of one's mind.

Here we investigated whether a "mindful attitude" compared to an "immersed attitude", as induced by brief instructions, differentially modulates automatic approach–avoidance tendencies when processing visual stimuli. 50 healthy participants were shown food pictures with either a mindful or immersed attitudes. Then participants performed an Approach–Avoidance Task based on these images. Dependent measures included behavioral and salivary volume measures, electroencephalography, self-report questionnaires, and qualitative interviews.

In this article we guide the study of electrophysiological data using refined first-person reports from the mindful instruction exposure phase collected during interviews to unravel the mechanism by which people dereify thoughts or mental contents. Using this neurophenomenological approach (Varela, 1996) we found that participants utilized diverse strategies to dereify, "observing" and "rationalization" being the most prominent, and that these experiential categories were associated with differential neurophysiological correlates (such as P300 and LPP). Additionally, we discovered that in the control group almost the half of the sample was using a strategy of cognitive reappraisal, rather than dereification per se. The repercussions of these findings in the methodological assessment of abstract concepts used in cognitive psychology, as well for clinical applications, are discussed.

Financing: Fondecyt Posdoctoral 3210170

P80 Self-initiating stimulus in Working Memory: differential effects of temporal prediction and motor control

Rocio Loyola-Navarro^{1,2,3}, Ricardo Mendoza^{2,3}, Pedro Maldonado^{2,3,4}

(1) Universidad de Chile, Centro de Investigación Avanzada en Educación, Instituto de Estudios Avanzados en Educación,, Periodista José Carrasco Tapia 75, Santiago, Chile

(2) Universidad de Chile, Departamento de Neurociencias, Facultad de Medicina, Independencia 1027, Santiago, Chile

(3) Universidad de Chile, Biomedical Neuroscience Institute, BNI, Independencia 1027, Santiago, Chile

(4) Centro de Inteligencia Artificial (CENIA), Santiago, Chile

Classic studies of working memory (WM) required passively waiting for the stimulus. In contrast, sensory activation is typically the consequence of self-initiated movements in natural behavior. We previously shown that self-initiation improves accuracy in a WM task. Nevertheless, whether this effect is related to the temporal predictability or to the motor systems activation produced in self-initiation (motor control) is still unknown. We hypothesize that both mechanisms have differential but additive effects on WM. Undergraduate students underwent a modified Stenberg task, modified to manipulate the degree of motor control and temporal predictability of the stimulus onset. We designed five conditions: Active Predictable (AP), Active Unpredictable (AU), Passive Predictable (PP), Passive Unpredictable (PU). In the active conditions, the participants had full motor control of the stimulus onset, while in passive ones, they had null motor control. The stimulus was presented at a fixed time in predictable conditions, while in unpredictable conditions, the stimulus appeared randomly. Here, we present the preliminary results of 4 subjects. Results show no statistically significant effects on accuracy or reaction times. Noteworthy, a priori required sample size indicates we need 24 subjects, with an effect size $f=0.25$, $\alpha=0.05$ and $\beta=0.8$. We expect our results to show differential accuracy performance for active versus passive and fixed versus random conditions. Previous studies suggest we should find better AP performance than AU, PP, and PU. Literature also suggests that PU should perform better than PP. Thus, motor control and temporal prediction should yield principal and interaction effects.

Financing: Funded by FONDECYT 3220044 to R.L.N. and PROYECTO ACE 210007 to P.M.

P81 Environmental spatial orientation affects the neuronal activity of the posterior parietal cortex of the rat

Luis S Antilao^{1,2}, José L Valdés^{1,2}

(1) Universidad de Chile, Departamento de Neurociencia, Facultad de Medicina, Independencia 1027, Santiago, Chile

(2) Universidad de Chile, Biomedical Neuroscience Institute, Facultad de Medicina, Independencia 1027, Santiago, Chile

Spatial navigation is how organisms can establish a route to land a goal and navigate towards it. The Path Integration mechanism allows us to continuously estimate and update animals' position in space by integrating internal body signals (egocentric) with external cues (visual, olfactory, allocentric). Then, it is necessary neural mechanisms that allow the integration of multiple types of information.

The posterior parietal cortex (PPC) has been proposed as a region that allows allocentric-egocentric integration during navigation behaviors. However, it has been reported that PPC neuronal activity correlates with animal movement parameters but has a poor association with spatial environmental configuration.

This work aimed to determine if the spatial configuration of an environment affects PPC neuronal activity. Changes in PPC neuronal activity between environments with discordant orientations favoring different path integration components were assessed using freely movement electrophysiology. Three hundred and thirty-one single units from two rats and ten recording sessions were analyzed for: spatial (Spatial Correlation, Spatial Information Content, and Rate remapping) and self-motion (Velocity, Acceleration, and Turning Angle) variables. Our results indicated that spatial orientation of the environment significantly affects spatial variables in higher magnitude than the self-motion variables. These results suggest that PPC neurons are sensitive to the spatial structure in which the animal navigates and more sensitive to spatial coding variables than to those related to the movement by itself.

Financing: Biomedical Neuroscience Institute (BNI), Facultad de Medicina, Universidad de Chile, ACE210007.

P82 Human metapneumovirus infection causes long-term neurological sequels in mice

La infección por metapneumovirus humano provoca secuelas neurológicas a largo plazo en ratones

Catalina A. Andrade¹, Karen Bohmwald¹, Valentina P. Mora¹, Jorge A. Soto^{1,2}, Alexis M. Kalergis^{1,3}

(1) Millennium Institute on Immunology and Immunotherapy, Departamento de Genética Molecular y Microbiología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

(2) Millennium Institute on Immunology and Immunotherapy, Departamento de Ciencias Biológicas, Facultad de Ciencias de la Vida, Universidad Andrés Bello, República 440, Santiago, Chile

(3) Departamento de Endocrinología, Facultad de Medicina, Pontificia Universidad Católica de Chile, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

The human metapneumovirus (hMPV) is a major viral pathogen that causes acute lower respiratory tract infections, mainly affecting pediatric and elderly populations. The symptoms observed in hMPV-positive patients are primarily respiratory, but it has been reported that they can also present neurological manifestations, such as encephalitis or encephalopathy. Additionally, it has been reported that these patients can develop long-time neurological sequels after the clearance of the virus. Therefore, this work seeks to evaluate the long-term effects of the hMPV-infection in the brain using a mice model. For the evaluation of this work, four to six weeks of female BALB/c mice were challenged intranasally with either hMPV (clinical isolate named CZ0107) or non-infectious control (mock). After 28- and 45-days post-infection, brain samples were collected to evaluate the level of cytokines in this tissue. Additionally, after 28- and 45-days post-infection, a Marble Burying (MB) test was performed to determine long-time neurological sequels. The levels of cytokines in the brain were measured, and it was observed that by 28 days post-infection with hMPV, the infected mice presented an increased expression of several cytokines, such as IL-6, IL-1 β , and IL-10. Lastly, the hMPV-infected mice showed impaired performance in cognitive tests up to 28 and 45-days post-infection. All these results suggest that the infection with hMPV can cause long-term behavioral impairment in mice up until 45 days post-infection. This effect might be related to increased cytokines observed in brain tissue.

Financing: This work was supported by ANID/CONICYT scholarship #21210662 (CAA), ANID/FONDECYT grants #11221280 (KB) and #1190830 to (AMK), Millennium Institute on Immunology and Immunotherapy grant ICN09_016.

P83 Facial emotion recognition in two different phases of the menstrual cycle.

Reconocimiento facial de emociones en dos fases distintas del ciclo menstrual.

Macarena Pedraza Roca¹, Pedro E. Maldonado^{1,2,3}, Christ Devia^{1,2,3}

(1) 1. Departamento de Neurociencia, Facultad de Medicina, Universidad de Chile, Av Independencia 1027, Santiago, Chile.

(2) 2. Biomedical Neuroscience Institute, Universidad de Chile, Av Independencia 1027, Santiago, Chile.

(3) 3. National Center for Artificial Intelligence (CENIA), Vicuña Mackenna 4860, Santiago, Chile.

Recent research suggests that throughout the menstrual cycle and associated with the fluctuation of sexual hormones, there are changes in the visual perception of women. Specifically, electroencephalography has been shown to improve early visual processing during the luteal phase of the menstrual cycle. This reflects a better performance when recognizing emotional stimuli tasks, independent of their emotional content. On the other hand, recognition tasks that use faces that express emotions report better performance during the follicular phase. Thus, the question arises: Are the changes in facial emotion recognition produced by a general shift in visual processing during the menstrual cycle or by a specific change in emotion processing? We hypothesize that levels of sex hormones, estrogen, and progesterone, which fluctuate throughout the menstrual cycle, modify visual processing and modulate face perception. In our work, we evaluate, during the follicular and luteal phases of the menstrual cycle, the amplitude of the event-related potential N170 to faces expressing different emotions, including neutral facial expressions. According to the available evidence, we expect to find that the amplitude of N170 is increased during the luteal phase, independent of the emotional content of the stimuli. These results suggest that variations in estrogen and progesterone levels impact visual processing.

Financing: BNI, Iniciativa Científica Milenio ICN09_015 PROYECTO ACE 210007; Fundación Guillermo Puelma.

P84 When it comes to deciding, looking-at-nothing reveals the option that will be chosen.

Karla Margarita Padilla Olvera^{1,2}, Samuel Madariaga^{2,3}, Susana Manhood¹, Pedro Maldonado^{2,3}

(1) Universidad de Chile, Laboratorio de Neurosistemas, Departamento de Neurociencia, Medicina, Independencia 1017, Santiago, Chile., Chile

(2) Instituto de Neurociencia Biomedica, Independencia 1027, Santiago, Chile
(3) Centro Nacional de Inteligencia Nacional (CENIA), Vicuña Mackenna 4860, Santiago, Chile

It is well-known we encode and store information through our eye movements, but it has also been shown that eye movements have a significant role in memory retrieval. Previous studies have demonstrated that people fixate their gaze on an empty portion of the visual field previously occupied by targets of interest. This phenomenon is called looking-at-nothing. Looking-at-nothing is known to allow us to generate internal memory representations of the external visual world. Interestingly, decision-making research theories have suggested choosing the decision-maker sample values from past experiences. Thus, here we investigated whether using the looking-at-nothing phenomenon can provide an accessible biomarker for retrieving sample values from decision-maker episodic memory to decide. Furthermore, we hypothesized that successful memory retrieval could be involved in constructing hypothetical scenarios to evaluate the possible decision consequences. Tracking looking-at-nothing behavior during a preferential choices task correlates with the position on the screen where the food to be chosen was previously located. In addition, we explore if this gaze behavior remains after two experimental manipulations; 1) modifying the level of complexity of the decision by comparing easy vs. difficult decisions and 2) modifying the location of the empty frames concerning the original position of the items to be selected. Our results suggest looking-at-nothing as a potential approach to exploring the mental simulations hypothesis as an underlying mechanism of the decision-making process.

Financing: BNI, PROYECTO ACE 210007; Fondecyt N°3210646

P85 Design and evaluation of a spatial learning task using immersive virtual reality in a child population

Diseño y evaluación de una tarea de aprendizaje espacial utilizando realidad virtual inmersiva en una población infantil

Rodrigo Montefusco-Siegmund^{1,3}, **Luz Gomez**¹, Álvaro Navarro¹, Diego Oyarzún¹, Álvaro I. Langer^{2,3}, Emilia Soto¹

(1) Universidad Austral de Chile, Instituto de Aparato Locomotor y Rehabilitación, Facultad de Medicina, Rudloff 1650, Valdivia, Chile
(2) Universidad Austral de Chile, Instituto de Estudios Psicológicos, Facultad de Medicina, Isla Teja s/n, Valdivia, Chile
(3) Universidad Austral de Chile, Centro Interdisciplinario de Estudios del Sistema Nervioso (CISNe), Valdivia, Chile

The hippocampus is of great relevance for animals since, in addition to its role in spatial navigation, it is central to the learning process and episodic memory. The standardized instruments typically used to assess these cognitive functions in humans take the individual out of the context in which they are normally used, and therefore do not accurately reflect these functions. In our laboratory we are studying the relationship between body fat tissue and hippocampal function in children since in recent years there has been a significant increase in obesity rates. The objective of this work was to design, implement and evaluate the feasibility of using a spatial learning task in an immersive virtual environment in the population of interest. This consisted on finding 5 hidden target boxes out of a total of 25, in a virtual room. The task was the same in each round of a total of 10 and the location of the target remained constant. We recruited children aged 10 to 12 years (n=15) from educational establishments of Valdivia. Most of the children showed a positive attitude towards solving the task. In addition, the search time, the virtual distance covered, and the number of errors showed a significant decrease from the initial rounds to the final ones, replicating the results in similar tasks used in murine models.

P86 Self-initiating auditory and visual stimulus: behavioral effects in Short Term- and Working Memory

Rocio Loyola-Navarro^{1,2}, Pablo Dartnell¹

(1) Universidad de Chile, Centro de Investigación Avanzada en Educación, Instituto de Estudios Avanzados en Educación, Periodista José Carrasco Tapia 75, Santiago, Chile
(2) Universidad de Chile, Departamento de Neurociencias, Facultad de Medicina, Independencia 1027, Santiago, Chile

We have previously shown that self-initiation improves accuracy in visual Working Memory (WM). Nevertheless, it is not clear whether this effect is multimodal, or it is specific to visual WM. Besides, our previous task has little ecological validity, thus our results are not easily generalizable.

26 undergraduate students remotely engaged in four Digit Span task Forward and Reverse. We designed two encoding conditions: Passive (PC) and Active (AC). PC consisted of the automatic presentation of the digits, 550 ms after a cue. AC consisted of the presentation of the digits 550 ms after the subject pressed the spacebar. Subjects participated in two sessions, with the stimulus presented either in the visual or auditory modality.

We assessed the effects of self-initiation and sensory modalities over span (maximum digit length a subject can remember), using two ANOVA tests. Results show statistically significant effects of self-initiation, sensory modalities and their interaction only in the Reverse task. Post hoc tests yield significantly better performance in AC and in the visual modality. Moreover, the best performance is observed when subjects self-initiate visual stimulus. PC shows no statistically significant differences between sensory modalities. In the auditory modality, AC and PC do not show statistically

differences.

Our results suggest that self-initiating the stimulus enhances performance when the memory task is demanding, i.e., when the information is stored and manipulated in mind. Our results also suggest a modality-dependence of the effect, only observed in the visual modality. Results are discussed in terms of possible explanations and implications.

Financing: Funded by FONDECYT 3220044 to R.L.N. Support from ANID/ PIA/ Basal Funds for Centers of Excellence FB0003 is also gratefully acknowledged.

P87 Relationship of emotional facial reactivity to bimodal stimuli and the presence of depressive symptoms: A computerized analysis using FaceReader software.

Relación de la reactividad facial emocional ante estímulos bimodales y la presencia de síntomas depresivos: Un análisis computarizado mediante software FaceReader.

Andrés Liberona^{1,2}, Juan Pablo Salamanca¹, Eugenio Rodríguez¹, Marcela Osorio¹

(1) Pontificia Universidad Católica de Chile, Escuela de Psicología, Facultad de Ciencias Sociales, Vicuña Mackenna 4860, Macul, Región Metropolitana, Santiago de Chile, Chile

(2) Universidad de Chile, Facultad de Medicina, Av. Independencia 1027, Independencia, Región Metropolitana, Santiago de Chile, Chile

Emotional facial reactivity (FER) is important in the socio-affective life of people since it is present in daily interactions and could play a role in the sociopathogenesis of depression, producing a negative socio-environmental and personal-embodied response. thus perpetuating a state of sadness. It is necessary to investigate whether FER is altered in depressive disorders, thus contributing to the maintenance and progression of the disease. A total of 80 subjects participated in this remote study via Zoom. They answered the Beck Depression Inventory-II (BDI-II) and then they were shown two audiovisual stimuli associated with emotional content; happy (Clip Frozen + 1st movement 6th Symphony, Beethoven) and sad (Clip Up + Adagio for Strings, S. Barber). A video of his facial expression was recorded for later analysis using FaceReader software. Participants were asked to rate the emotion represented in each stimulus and its intensity (Likert scale from 1 to 5). Both stimuli proved to convey the expected emotion ($p < 0.05$). There were no significant correlations between depressive symptoms and felt emotion or facial expression ($p > 0.05$). When comparing both groups, they presented a higher report of the intensity of sad emotion with the sad stimulus ($p = 0.045$) compared to the group without depressive symptoms, but they did not show significant differences in facial expression. It remains to perform a temporary production of the emotional dynamics of facial expression to see if there may be differences.

Financing: Este trabajo contó con el financiamiento del Laboratorio de Observación y Análisis de la Conducta Humana de la Pontificia Universidad Católica de Chile.

P88 Emotions as Emergences of the Operating of “The Three Dimensions of Behavior”

Las emociones como emergencias del operar de las tres dimensiones de la conducta: cuerpo, relación y lenguaje

Alejandra Vasquez-Rosati^{1,2,3}, Carmen Cordero-Homad³

(1) Universidad Austral de Chile, Instituto de Aparato Locomotor y Rehabilitación, Medicina, Rudloff 1650, Valdivia, Chile

(2) Laboratorio de Fenomenología Corporal, Villarrica, Chile

(3) Centro de Integración Cognitivo Corporal, Luis Pasteur 5728, Santiago, Chile

En esta ponencia se propone el Modelo de la Tridimensionalidad de la Conducta, un modelo para el estudio de la conducta humana y su co-determinación con la experiencia del mundo vivido. Desde su perspectiva se busca explicar cómo se constituye la coherencia y unicidad de la conducta de un ser que habita dos mundos paralelos que se modulan entre sí: el mundo de su identidad viva en su medioambiente y el mundo de su identidad social, que se despliega en el aprender hacer y relacionarse con los demás dentro de los diferentes ámbitos de la cultura. Este modelo sistémico explica la conducta y experiencia de un individuo como dos fenómenos que emergen, en un presente, del operar interaccional de tres dominios operacionales de carácter disjuntos, que se modulan entre sí: cuerpo, relación y lenguaje.

La aplicación de este modelo, permite proponer una nueva perspectiva para la comprensión de los fenómenos emocionales al preguntarnos cómo

distinguimos en la conducta de un individuo un estado emocional, y cómo el individuo distingue estos en su experiencia.

Esta propuesta considera qué, en los fenómenos emocionales observados en la conducta de un individuo se distinguen dos órdenes: las emociones básicas y las emociones secundarias o sociales, en lo cual las primeras se corresponden con procesos de la identidad viva del individuo, y las segundas con procesos de su identidad social. Ambas identidades coexisten en el individuo y se modulan entre sí en el operar de la tridimensionalidad de su conducta, momento a momento.

Financing: FONDECYT POSTDOCTORADO 3210186

P89 Testing for an Integrated Intuitive Physics-Action Planning System in the Human Brain

Garrett Goldin¹, Jason Fischer²

(1) Johns Hopkins University, Krieger School of Arts and Sciences, Neuroscience, 3400 North Charles Street, Baltimore, United States of America

(2) Johns Hopkins University, Krieger School of Arts and Sciences, Psychological & Brain Sciences, 3400 North Charles Street, Baltimore, United States of America

Each day we make countless actions in order to navigate the world and achieve our goals. While such actions might feel effortless and automatic most of the time, they display a striking degree of sophistication with regard to their physical outcomes. For example, while unpacking groceries we rarely think about the precision required to stack objects in a stable way that won't damage the ones bearing the most weight. Humans' fluid actions reveal that they are experts at intuitive physics, anticipating the physical outcomes of possible actions in order to select those that will best achieve the desired outcomes. Just how tightly integrated are the intuitive physics and action planning systems in the brain? Does precise physical prediction require the engagement of naturalistic action? I will describe a series of psychophysical experiments that test physical predictions in two ways: using descriptive reports as is currently standard in the field, and using action-based reports in which participants generate real-time, real-world actions to express their predictions. By comparing the accuracy and precision of physical predictions expressed via actions vs. descriptive reports, I evaluate the hypothesis of an integrated intuitive physics / action planning system in the human mind and brain.

Financing: The Dynamic Perception Lab

P90 Primary and secondary signatures of psychomotor dysfunction in experimental models of normal aging and Alzheimer's disease (3xTg-AD)

Marcadores primarios y secundarios de disfunción psicomotora en modelos experimentales de envejecimiento normal y enfermedad de Alzheimer (3xTg-AD)

Lidia Estefany Castillo Mariqueo^{1,2}

(1) Universidad Católica de Temuco, Procesos Terapéuticos, Ciencias de la Salud, Manuel Montt 056, Temuco, Chile

(2) Autónoma de Barcelona, Psiquiatría y Medicina Legal, Medicina, Avda de Can Domènech, Edifici M, s/n, Bellaterra, Barcelona, España

La enfermedad de Alzheimer (EA) es un trastorno neurodegenerativo progresivo donde las disfunciones psicomotoras siguen estando poco exploradas. El presente trabajo tiene como objetivo la caracterizaron los marcadores psicomotores primarios y secundarios de disfunción psicomotora en el envejecimiento normal y la EA. Esta investigación está enmarcada en un trabajo de Tesis Doctoral y se sustenta de 7 artículos científicos previamente publicados.

El estudio ha incluido el modelo experimental de ratón 3xTg-AD (PS1M146V, APPSwe, tauP301L) que posee un patrón neuroanatómico y expresión de la EA similar a lo que ocurre en humanos. Se incluyeron ratones machos y hembras 3xTg-AD y NTg (no transgénicos / C57BL/6) de diferentes edades y estadios de la EA (inicial, intermedio y avanzado). Se utilizaron pruebas psicomotoras que evaluaron el rendimiento a partir de la marcha espontánea, actividad exploratoria, fuerza muscular y resistencia física. Además, se incluyó un fenotipo de fragilidad geotaxis y reflejo patológico de cierre de patas.

Se detectó disminución de la longitud de la zancada, la velocidad y la cadencia, en ratones macho 3xTg-AD que se modifica y empeora con las alteraciones posturales como la cifosis estructural. Además, el reflejo de cierre de patas indicó severidad de la enfermedad al igual que la cifosis. El fenotipo de fragilidad acompaña al deterioro psicomotor general en todos los ratones y aumenta con la edad. La resistencia física medida fue sensible al sexo, donde las hembras presentan un alto rendimiento. Sin embargo, mostraron los indicadores más altos de fragilidad, sarcopenia y alteración del eje HPA.

P91 Heterogeneous CaMKII-dependent synaptic compensations in CA1 pyramidal neurons from acute hippocampal slices

Pablo Vergara¹, Gabriela Pino¹, Jorge Vera¹, Felipe Arancibia¹, **Magdalena Sanhueza**¹

(1) Cell Physiology Laboratory, Department of Biology, Faculty of Sciences, Las Palmeras 3425, Santiago, Chile

Prolonged changes in neural activity trigger homeostatic synaptic plasticity (HSP) that allows neuronal networks to operate within functional ranges. Cell-wide or input-specific adaptations can be induced by pharmacological or genetic manipulations of activity, or by sensory deprivation. Reactive functional changes caused by axonal deafferentation may partially share mechanisms with HSP. Acute hippocampal slices is a suitable model to investigate relatively rapid (hours) pathway-specific modifications occurring after denervation and explore the underlying mechanisms. As Schaffer collaterals constitute a major glutamatergic input to CA1 pyramidal neurons, we conducted whole-cell recordings of miniature excitatory postsynaptic currents (mEPSCs) to evaluate changes over 12 hours after slice preparation and CA3 dissection. We observed an increment in mEPSCs amplitude and a decrease in decay time, suggesting synaptic AMPA receptor upregulation and subunit content modifications. Sorting mEPSC by rise time, a correlate of synapse location along dendrites, revealed amplitude raises at two separate domains. Frequency increases were also observed in these domains, in addition to a global, unspecific raise. Amplitude and frequency increments were lower at sites initially more active, consistent with local homeostatic compensations. Transient preincubation with a specific Ca^{2+} /calmodulin-dependent kinase II (CaMKII) inhibitor either blocked or occluded amplitude and frequency upregulation in different synapse populations. Results are consistent with the concurrent development, in the same neuronal population, of different CaMKII-dependent HSP processes. Our observations support that deafferentation causes rapid and diverse activity adjustments resembling classical slow forms of adaptation to inactivity. These results may contribute to understand fast-developing homeostatic or pathological events after brain injury.

Financing: Fondecyt Grant 1140700

P92 Glutamate and early functional NMDA Receptors contribute to hippocampal axonal elongation through Rac1 activity, which modulates both actin cytoskeleton dynamics and NOX2-mediated H_2O_2 production.

Ernesto Muñoz-Palma^{1,2}, Carlos Wilson^{2,3}, Cecilia Hidalgo⁴, Christian González-Billault^{1,2,5}

(1) Universidad de Chile, Department of Biology, Faculty of Sciences, Santiago, Chile

(2) Geroscience Center for Brain Health and Metabolism (GERO), Santiago, Chile

(3) Centro de Investigación en Medicina Traslacional Severo R. Amuchástegui (CIMETSA)-IUCBC, Córdoba, Argentina

(4) Universidad de Chile, Department of Neuroscience and BNI, Faculty of Medicine, Santiago, Chile

(5) The Buck Institute for Research on Aging, Novato, California, United States

NMDA Receptors (NMDARs), which are essential for the development, maturation, and functionality of the nervous system, mediate Ca^{2+} influx following activation by the neurotransmitter glutamate. However, the role of glutamate and NMDARs during early neuronal development has not been described. Here, we found that functional NMDARs were expressed during neuronal polarity acquisition. In addition, endogenous and ectopically expressed NMDARs were distributed to the axonal compartment early in development. Interestingly, during early development neurons released glutamate. Moreover, pharmacological and genetic NMDARs loss- and gain-of-function altered neuronal polarization and axonal elongation by a mechanism that involved actin cytoskeleton rearrangement at the neuronal growth cone and regulation of the intracellular hydrogen peroxide content, via the GTPase Rac1. Thus, NMDARs signaling promotes dual Rac1 functions, which mediate actin cytoskeletal remodeling and H_2O_2 production by the NOX2 complex. Altogether, these findings suggest that early spontaneous glutamate release activates NMDARs to support neuronal development before synapse formation, indicating that glutamate is necessary for neurotransmission and also for early neuronal development and axonal growth.

Financing: ANID doctoral fellowship 21201556 to EM-P, ANID/FONDAP/15150012, ANID/Fondecyt (1180419, 1220414) to CG-B.

P93 Atypical anatomical traits in the olfactory bulb of the Fmr1-KO mice.

Rasgos anatómicos atípicos en el bulbo olfatorio de los ratones Fmr1-KO

Marcela Navarrete^{1,2}, **Laura Orellana-García**¹, Alexia Nunez-Parra¹, Jorge Mpodozis²

(1) Physiology Laboratory, University of Chile, Department of Biology, Faculty of Sciences, Las Palmeras 3425, Santiago, Chile

(2) Biology of Cognition Laboratory, University of Chile, Department of Biology, Faculty of Sciences, Las Palmeras 3425, Santiago, Chile

Fragile X Syndrome (FXS) is a neurodevelopmental disorder characterized by the absence of the Fragile Mental Retardation Protein. Individuals with FXS show intellectual disability, difficulties in social interaction and atypical sensory perception, among others features. Whether and how the lack of FMRP affects early stages of sensory processing remains poorly explored. Here, we compared the anatomical traits of the olfactory bulbs of *Fmr1*-KO and WT adult mice. We did not find differences between WT and *Fmr1*-KO mice in the main olfactory bulb, a brain region that mostly processes non-social odors. Interestingly, even though the volume of the accessory olfactory bulb (AOB), a brain region that process information of social odors, was not different, the volumetric ratio between the anterior and posterior division of the AOB (aAOB/pAOB) was smaller in the *Fmr1*-KO compared to the WT. This difference was related to a decrease in the volume of the aAOB glomerular layer and to an increase in the volume of the pAOB granular cell layer. Accordingly, in the behavioral test, we found that WT mice spent more time exploring social odorants than common odorants, a difference that was not found *Fmr1*-KO. Our results suggest that the *Fmr1* mutation leads to specific morphological abnormalities at the initial stages of the olfactory pathways, which could partially explain the atypical social behaviors described in the *Fmr1*-KO mice.

Financing: National Agency for Research and Development (ANID) / Scholarship Program / DOCTORADO NACIONAL/2020 – 21200657 and Project FONDECYT Regular 1210069.

P94 Comparing methods to quantify histone post-translational modifications

Comparación de métodos para cuantificar las modificaciones post-traduccionales de histonas

Javiera Gallegos¹, Maria Estela Andrés¹, Marcela Gonzalez¹

(1) Pontificia Universidad Católica de Chile, Biología celular y molecular, Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, 8331150, Región Metropolitana, Santiago, Chile

LSD1 is a demethylase enzyme that demethylates mono- and dimethylated lysine 4 of histone H3 (H3K4me/me2), associated with transcriptional repressor activity. In addition, interacting with nuclear receptors such as the estrogen receptor, LSD1 demethylates H3K9me/me2, but this configuration is related to transcriptional activation. LSD1 has a neurospecific splicing variant (neuroLSD1), with dominant negative activity with respect to the ubiquitous LSD1 and associated with H4K20me/me2 demethylation. This work focuses on determining the changes in LSD1 and neuroLSD1 epigenetics substrates in the brain of mice challenged with amphetamine. To this end, first, we installed a robust method to quantify the mentioned epigenetics in brain tissue. The results show that histone extraction is more efficient by using a commercial kit than by using RIPA buffer. When evaluating in cells in culture, the commercial kit allows obtaining higher signals of the expression levels of H3K4me2 compared to RIPA buffer when evaluated by Western blot. Similarly, the kit is efficient in evaluating changes in the expression levels of H3K4me2 in hippocampal tissue of mice treated with amphetamine. Also, the optimization of the Western blot technique was performed based on the characteristics of histones, small size and high basicity. These results allowed the generation of an efficient protocol to evaluate the changes in the expression levels of histone post-translational modifications in cultured cells and in neuronal tissue.

Financing: Financiado por fondecyt 1191152

P95 Locus coeruleus atrophy is associated with the increase in white matter hyperintensities in cognitively healthy subjects.

Atrofia de locus cerúleo está asociado al incremento de hiperintensidades de sustancia blanca en sujetos cognitivamente sanos.

Víctor Vidal Cuevas¹, Vicente Medel¹

(1) Universidad de Chile, Departamento de Neurociencias, Facultad de Medicina, Avenida Independencia 1027, Santiago, Chile

White matter hyperintensities (WMHs) are frequently seen on FLAIR MRI images of the brain in older people. The prevalence and severity of WMHs are in association with arterial hypertension and increase with age and lead to cognitive decline and have a role in the aetiology of dementia. The Locus Coeruleus (LC) nuclei, responsible for more than half of the brain's capacity to synthesize norepinephrine (NE), are involved in the regulation of a wide range of higher cognitive functions, such as working memory and learning. Astrocytes are the main cellular target of norepinephrine (NE) terminals in the brain, and they are an essential metabolic support for neurons and their white matter axons, picking up vascular glucose, stores it as glycogen, and provides glycogen-derived lactate for axonal function through astrocytic Beta-2 adrenergic receptor activation. Therefore, structural and functional changes in the human LC leading to NE deficiencies could contribute to the pathophysiology of WMHs. Using structural MRI images in cognitively healthy subjects, we found that LC atrophy is related to an increase of WMHs, and the degree of relationship between LC and WMH is spatially coupled with beta 2-adrenergic receptor expression. We theorize that LC atrophy and subsequent decreased NE release disrupts normal astrocyte function through the beta 2 adrenergic receptor, leading to defective axonal metabolism and ultimately to axonal degeneration.

Financing: Fondo de Fomento al Desarrollo Científico y Tecnológico, FONDEF Concurso IDeA I+D 2020

P96 Approaching consciousness from high-order informational metrics in *C. elegans*'s sleep-wake dynamics

Aproximaciones al estudio de la consciencia mediante métricas informacionales de alto orden en la dinámica sueño-vigilia de *C. elegans*

Diego Becerra¹, Manuel Zimmer², Andrea Calixto¹, Patricio Orio¹

(1) Universidad de Valparaíso, Facultad de Ciencias, Valparaíso, Chile

(2) University of Vienna, Department of Neuroscience and Developmental Biology, Vienna, Austria

Sleep is ubiquitous within Metazoa, but consciousness is traditionally attributed to few animal lineages. *Caenorhabditis elegans*, a 302-neuron nematode, displays spontaneous bouts of locomotor quiescence and developmentally-timed, stress-induced, and hypoxia-induced quiescence. These quiescent states are regarded as true sleep. Given the relationship between sleep and shifts in consciousness, measuring dynamic variations in neural activity during sleep-wake dynamics is a promising paradigm to assess consciousness in distant branches of the phylogenetic tree. Here, using requested data from Nichols et al. (2017), different informational metrics were implemented in a hypoxia-induced quiescence experiment with *npr-1* *C. elegans* mutants expressing a genetically encoded calcium-sensor (NLS-GCaMP5K) that allows the recording of calcium dynamics from several individual neurons. Their functional connectivity was characterized using graph topological metrics, as well as high-order interdependences to unveil synergistic and redundant interactions.

No differences in functional network topology, nor in functional segregation and integration metrics were found to distinguish sleep from wakefulness. Yet, S-information, which measures the total interaction among three or more time series, enabled that distinction. By looking at the n-plets of neurons that maximize S-information values as the order of interaction increases, we found that the system is redundancy-dominated, and the increase in redundancy is sharper when awake. The 10-plet of neurons with the highest values in synergy and S-information, partially overlaps with a previously documented motor circuit crucial for the induction of sleep. The relation between high-order statistics and consciousness will be explored through related informational metrics such as the Integrated Information Theory of consciousness' Phi.

Financing: Beca doctoral, Agencia Nacional de Investigación y Desarrollo (ANID). Folio: N° 21210914.Fondecyt regular 1211750 Financiamiento Basal FB0008: Centro Avanzado de Ingeniería Eléctrica y Electrónica

P97 Effect of adaptive currents on the local field potential from networks of spiking neurons

Pamela Illescas-Maldonado^{1,2}, Vicente Medel^{3,4}, Patricio Orio^{1,5}

(1) Universidad de Valparaíso, Centro Interdisciplinario de Neurociencia de Valparaíso, Valparaíso, Chile

(2) Universidad de Valparaíso, Doctorado en Ciencias, Mención Biofísica y Biología Computacional, Facultad de Ciencias, Valparaíso, Chile

(3) The University of Sydney, Brain and Mind Centre, Sydney, Australia

(4) Universidad de Chile, Department of Neuroscience, Santiago, Chile

(5) Universidad de Valparaíso, Instituto de Neurociencias, Facultad de Ciencias, Valparaíso, Chile

The nervous system needs to adapt flexibly to the changing demands of the environment to perform information processing while maintaining homeostasis. Neurons are known to have intrinsic adaptation mechanisms consisting of slow somatic potassium currents activated by both subthreshold and spike-dependent mechanisms. At macroscale level, the slope of the $1/f$ relationship found in the power spectrum of EEG and LFP recordings has been proposed to reflect the level of intrinsic adaptation and the excitation/inhibition (EI) balance. However, the relationship between these intrinsic adaptation mechanisms, excitation/inhibition (EI) balance, and electrical activity of networks or whole brain is not fully known. The aim of this work is to relate the changes of the adaptation currents, at the level of a single neuron, with their effect on the electrical activity of the network, through numerical simulations implementing a computational model of the adaptive exponential integrate-and-fire (adEx) neuron network. The local field potential (LFP) was estimated, and the slope of the power law distribution of spectral density power was calculated. By changing the parameters of either the subthreshold-dependent or spike-dependent adaptations, we found that an increased adaptation current reduces network synchronization also reduces the slope of the $1/f$ relationship. These results allowed us to relate the neuromodulation of adaptation currents with the network synchronization state and the slope of $1/f$.

Financing: Beca ANID Doctorado Nacional 2021 (Pamela Illescas).Fondecyt Regular 1211750 (Patricio Orio).

P98 Nutritional dependence of the synaptic physiology of the *Drosophila* neuromuscular junction (NMJ)

Andres Köhler-Solís¹, Andres González-Gutierrez¹, Jimena Sierralta²

(1) Biomedical Neuroscience Institute (BNI), Neuroscience, Santiago, Chile

(2) Universidad de Chile, Neuroscience Department, Santiago, Chile.

The neuronal synapse is a very active structure, physiologically and metabolically; therefore, it requires a regular supply of metabolites as energy source. Various glial and neuronal transporters allow glucose, monocarboxylates and other metabolites to be supplied energy requirements. In *Drosophila*, the blood-brain barrier allows the transport of nutrients to meet the high neuronal energy demand, with trehalose being the main source of glucose for nervous system. However, the energy requirements of the synapse and how it affects synaptic physiology in conditions of high neuronal activity, have been more difficult to reveal. The neuromuscular junction (NMJ) has functional and structural similarities with the glutamatergic synapse of vertebrates; so we hypothesize that, under conditions of high neuronal activity, the synaptic physiology of the NMJ is dependent on the presence of appropriate energy metabolites. We analysed evoked (EPSCs) currents, asynchronous currents, and kinetics of EPSCs during neuronal stimulation trains using Voltage-clamp 2-electrode in the NMJ of WT larvae, modifying the source of polysaccharides in HL3.1 extracellular solution, with subsequent nerve stimulation. We observed that the kinetics of currents during neuronal stimulation are sensitive to extracellular energy source. Moreover, even without carbon source, the activity is sustained for several minute, although the asynchronous release and frequency of spontaneous events, indicators of presynaptic intracellular calcium homeostasis, were altered. These data will be complemented with direct measurements of glucose and pyruvate levels in neurons, muscle and glial cells with the goal of understand the flux of metabolites and the expenditure of energy in the *Drosophila* NMJ.

Financing: Fondecyt 1210586

P99 Altered cardiorespiratory function in Alzheimer's disease; characterizing sleep-disordered breathing and autonomic cardiac imbalance in APP/PS1 transgenic mice.

Alteraciones de la función cardio-respiratoria en la enfermedad de Alzheimer; caracterizando trastornos respiratorios del sueño y el desequilibrio cardíaco autonómico en ratones transgénicos APP/PS1.

Camilo Toledo¹, Karla Schwarz¹, Alejandra Álvarez², Nibaldo Inestrosa^{2,3}, Rodrigo Del Rio^{1,2,3}

(1) Pontificia Universidad Católica de Chile, Fisiología, Ciencias Biológicas, Alameda 340, Santiago, Chile

(2) Pontificia Universidad Católica de Chile, Center for Aging and Regeneration, Ciencias Biológicas, Alameda 340, Santiago, Chile

(3) Universidad de Magallanes, Centro de Excelencia de Biomedicina, Punta Arenas, Chile

Alzheimer's disease (AD) is the most common cause of dementia worldwide. While therapeutic approaches targeting neurodegenerative mechanism associated with cognitive impairment have been intensively explored, others critical comorbidities, such as cardiorespiratory abnormalities have not been thoroughly investigated. Importantly, sleep-disordered breathing and autonomic dysfunction are both typical early physiological symptoms of AD pathology and closely linked to poor prognosis. Hence, we aim to study hemodynamic, respiratory and sleep function in experimental AD (APP/PS1 mice; 15-month-old) to fully determine cardiorespiratory alterations in AD and their relationship with hyperactivation of the brainstem cardiorespiratory neural circuitry. Whole-body plethysmography, echocardiography and blood pressure recordings were used to study cardiorespiratory function. Immunoblot for FosB obtained from brainstem micropunches was used to determine neural activation. Compared to wild type (WT), APP/PS1 mice (WT vs. APP/PS1) display: elevated resting heart rate and sympathoexcitation as evidence by a higher HR response (~55%) following acute administration of beta-blocker propranolol. Importantly, a higher incidence of cardiac arrhythmias was found in APP/PS1 mice compared to WT (32.5±4.5 vs 10.5±1.5 events/hr). In addition, APP/PS1 mice display sleep fragmentation and a high incidence of breathing disorders compared to WT mice. Finally, we found overt signs of neuronal hyperactivation in brainstem cardiorespiratory control center including the NTS, PVN, LC and RVLM in APP/PS1 mice compared to WT as evidenced by 1.5-3-fold increase in FosB protein expression levels. Our results shows that AD mice display sleep-related cardiorespiratory alterations and brainstem cardiorespiratory circuitry hyperactivation. The molecular mechanisms involved in cardiorespiratory pathway hyperactivation in AD deserves future investigations.

Financing: FONDECYT 3190659, 1220950 and CARE AFB 170005.

P100 Differential nicotine effects on bursting activity of substantia nigra pars compacta and ventral tegmental area dopamine neurons

Rafael Gatica¹, Pablo Henny¹

(1) Pontificia Universidad Católica de Chile, Departamento de anatomía normal, Facultad de medicina, Avda. Libertador Bernardo O'Higgins 340, Santiago, Chile

Dopamine neurons (DANs) are key regulators of various functions like movement, learning and motivated behavior. These neurons are principally located in two midbrain regions: the substantia nigra pars compacta (SNc) and the ventral tegmental area (VTA). The cholinergic system is a relevant regulator of DANs activity. Activation of nicotinic receptors is a mechanism that allow the induction of burst firing in DANs. Evidence has shown that VTA DANs are mainly excited after nicotine administration. However, data is still lacking regarding SNc DANs. In this work, we studied the effect of nicotine administration on DANs activity. Using anesthetized C57BL/6J mice, we performed in vivo juxtacellular recordings of SNc and VTA DANs before and after an intravenous nicotine 30 µg/kg injection. Neurons were labeled with Neurobiotin and confirmed as DANs with tyrosine hydroxylase immunofluorescence and located in their respective region. We found that, on basal conditions, SNc and VTA DANs showed similar firing rate and bursting activity. After nicotine injection, DANs from both regions increased burst firing. Interestingly, a higher increase in firing rate after nicotine was observed in VTA compared to SNc neurons. Also, we found that the position of the DANs cell bodies in the dorsoventral axis positively correlated with the percentage of change in spikes in burst. In summary, our results indicate that nicotine effect on DANs depends on the location of their cell bodies in the midbrain. Currently, we are performing studies to determine whether the distribution of cholinergic inputs on DANs explain these differences in nicotine effects.

Financing: Funded by Fondecyt 1191497.

P101 Brainstem localization of d-serine synthesis and d-serine effects on atp-induced respiratory rhythm responses in mouse brainstem slices.

Localización de la síntesis de d-serina y efecto de la d-serina en las respuesta respiratoria inducida por atp en rebanadas de troncoencéfalo de ratón.

Nicolás Abarca¹, Jaime Eugén¹

(1) Universidad de Santiago, Departamento de Biología, Facultad de Química y Biología, Santiago, Chile

Central chemoreception is a main sensory modality regulating breathing. Astrocytes, in response to increased PCO_2/H^+ levels, can release ATP or D-serine, which in turn, activate the respiratory neural network. Notoriously, the selective degradation of ATP or D-serine can block almost completely the respiratory response to hypercapnia. If we assume that both gliotransmitters are released during hypercapnia, why the reduction in one of them affects the response of the other? In addition, there is a controversy about the cells that synthesize D-serine in the brainstem. Here, we addressed whether the respiratory responses induced by ATP on brainstem slices depend on D-serine levels. Besides, we study the cellular location of D-serine racemase, the enzyme that converts L-serine into D-serine.

Fictive respiration was recorded with glass suction electrodes in caudal brainstem slices from CF1 mice (P0-P4), superfused with artificial cerebrospinal fluid equilibrated with $O_2/CO_2 = 95\%/5\%$, (pH 7.4, $30 \pm 1^\circ C$).

Concentration-response curves for the increase in fR induced by ATP (1-1000 µM) were performed in the presence and absence of D amino acid oxidase (DAAO), an enzyme that degrades extracellular D-serine. Immunodetection of D-serine racemase was performed using immunofluorescence and confocal microscopy.

DAAO superfusion for 45 min reduced the ATP-induced increase of fR. D-serine racemase could be localized in a fraction of astrocytes and microglia, being more abundant in neurons at caudal medullary brainstem.

Our results indicate that the respiratory effect of ATP depends on the presence of D-serine, suggesting a functional interaction between both gliotransmitters.

Financing: Support: Grant FONDECYT 1211359 (JE)

P102 Impairs of circadian fluctuations on sleep-wake cycle and cardiorespiratory parameters in heart failure rat model

Maria Jose Olivares¹, Camilo Toledo¹, Ignacio Bernal-Santander¹, Rodrigo Del Rio^{1,2,3}

(1) Pontificia Universidad Católica de Chile, Departamento de Fisiología, Facultad de Ciencias Biológicas, Av. Libertador Bernardo Ohiggins 340, Santiago, Chile

(2) Center for Aging and Regeneration (CARE-UC), Pontificia Universidad Católica de Chile, Santiago, Chile

(3) Centro de Excelencia de Biomedicina de Magallanes (CEBIMA), Universidad de Magallanes, Punta Arenas, Chile

Heart failure (HF) is a public health problem worldwide. Cardiorespiratory disturbances, including sympathoexcitation, disordered breathing, and sleep dysregulation, are all considered hallmarks of HF pathophysiology and are closely related to disease progression. On the other hand, sleep disorders have been linked to impaired autonomic nervous system function and alterations in breathing function regulation, both considered hallmarks of HF pathophysiology. In this context, we study circadian fluctuations of sleep-wake cycle and cardiorespiratory parameters in HF rats. Experimental chronic HF will be surgically created to induce volume overload in adult Sprague Dawley rats (CHF). Breathing function was determined by unrestrained whole-body plethysmograph, blood pressure (BP) telemetry device in aortic artery, and awake-sleep transition were assessed in electroencephalogram and electromyogram recordings obtained for chronic implanted leads. CHF and SHAM rats were constantly recorded for 36 h. We found that there are differences in dynamic ranges of the circadian curves of BP (SHAM, SBP: $-6.244 \pm 1.552^*$, DBP $-6.971 \pm 1.345^*$, MAP $-6.480 \pm 1.115^{**}$), ventilation (SHAM, $-7.521 \pm 1.421^{**}$) and respiratory rate (CHF $-16.96 \pm 2.915^{**}$) during day-night transition. Interestingly, we don't observe physiological BP dipping during this transition. We also observed greater sleep fragmentation in HF rats (3.4 ± 0.3 vs. 2.2 ± 0.2 min*, $*P < 0.05$, $**P < 0.01$). These results directly correlate with those observed in HF patients. Studies related to sleep alterations presented by HF patients are necessary because discovering the role of altered cardiorespiratory function in sleep regulation in the context of HF may help open new avenues for more comprehensive treatments aimed at improving the quality of life of HF patients.

Financing: Supported by FONDECYT 3220627 and 1220950, CARE AFD170005.

P103 Astroglial glutamate and d-serine mediates the development of chronic stress-induced depression

Glutamato y D-serina astroglial median el desarrollo de depresión inducida por estrés crónico.

Tabita Barrientos Barrientos¹, Daisy Quintana¹, Yordan Lemunao¹, Yessenia Santibañez¹, Jimmy Stehberg¹

(1) Universidad Andres Bello, Laboratorio de Neurobiología, Facultad de Medicina, República 330, Santiago, Chile

Depression is associated to increased glutamate in the hippocampus. Glutamate is released by both neurons and astrocytes. The latter regulate glutamatergic transmission by releasing gliotransmitters, including glutamate, ATP and D-serine, mainly through connexin 43 (Cx43) hemichannels. Chronic stress-induced depression in rodents is associated to increased activity of Cx43 HCs in hippocampal astrocytes and Cx43 hemichannel-dependent release of ATP and glutamate. This study aims to determine whether the role of astroglial gliotransmitters in chronic stress-induced depression. We found that chronic stress induces depressive-like symptoms in rats through the Cx43 hemichannel-dependent release of glutamate and D-serine, leading to the overactivation of postsynaptic glutamatergic NMDA receptors. The present results suggest that astroglial Cx43 hemichannels could be used as a pharmacological target to treat and prevent depression.

Financing: Fondecyt grant N°1200452

P104 Mitochondrial analysis and phosphorylation state of tau from hTau mice

Camila Gudenschwager Ruiz^{1,2}, Sandra Niño^{1,2}, Christian Gonzalez-Billault^{1,2,3}

(1) Laboratory of Cellular and Neuronal Dynamics, Faculty of Sciences, Universidad de Chile.

(2) Geroscience Center for Brain Health and Metabolism (GERO), Santiago, Chile.

(3) Buck Institute for Research on Aging, California, USA.

Millions of people worldwide live with the burden of tauopathy-associated neurological diseases. The pathological hallmark of tauopathies is an aberrant intracellular accumulation of neurofibrillary tangles composed of hyperphosphorylated tau protein, a molecular feature that is characteristic to several neurodegenerative diseases (NDD), including Alzheimer's disease and Frontotemporal dementia. In recent years, increasing evidence supports the idea of a toxic gain of tau function that could induce mitochondrial impairment and abnormalities, but the mechanisms are not entirely understood. Moreover, mitochondrial dysfunction drives decreased brain metabolism, and such bioenergetic impairment is one of the hallmarks of

NDD. Dermal fibroblasts derived from NDD patients showed disease-associated phenotypes, therefore, being a good biological system to model early events in tauopathies. In this work, we explore the effects of human phosphoisoforms of tau over mitochondrial functions in dermal fibroblast and brain tissue from transgenic human Tau mice (hTau). We obtained primary cultures of dermal fibroblasts and collected brain tissue samples from young (6-8 months old) and old (20-24) WT and hTau mice. We assessed changes in mitochondrial mass, mitochondrial proteins, membrane potential, tau phosphorylation state, and senescence-associated markers in fibroblasts and brain tissue. The present work represents a valuable model for studying the mitochondrial function at the cellular level regarding tau protein implications.

P105 The neuronal variant of Lysine Specific Demethylase 1 modulates dopaminergic response to psychostimulant

La variante neuronal de la desmetilasa específica de lisinas 1 modula la respuesta dopaminérgica a los psicoestimulantes

Guillermo Carrasco Faus¹, Jorge Castillo¹, Marcela González¹, María Estela Andrés¹

(1) Pontificia Universidad Católica de Chile, Departamento de biología celular y molecular, Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, 8331150, Región Metropolitana, Santiago, Chile

Lysine-specific demethylase 1 (LSD1) is a histone-modifying enzyme that represses gene transcription by demethylating mono- and dimethylated lysine 4 on the N-terminal tail of histone H3. The neurospecific splicing isoform of LSD1 (neuroLSD1) acts as a dominant negative of LSD1, curtailing its repression action. LSD1 and neuroLSD1 mRNAs are expressed in a similar proportion in neurons, a proportion that changes during neuronal maturation, depolarization, and stress response. In stress paradigms in animal models, changes in mesolimbic dopaminergic neurotransmission are important for coping with stress. Given this relationship between LSD1/neuroLSD1 modulation in stress, we decided to study how LSD1/neuroLSD1 ratio is regulated in dopaminergic activity paradigms and how neuroLSD1 deficiency affects dopaminergic neurotransmission. Using in vivo microdialysis in the nucleus accumbens, we observed that amphetamine, an indirect dopamine agonist, induces less dopamine release in neuroLSD1 KO mice. This data suggest that neuroLSD1 has a role in dopaminergic neurotransmission.

Financing: Funded by FONDECYT regular grant 1191152

P106 Brain derived neurotrophic factor (BDNF) induced central sensitization and its interaction with the Pannexin-1 (Panx-1) channel

Jonathan Aranguiz Barrera¹, Ana María Moreira¹, Nicolás Oneto¹, Katherine Zepeda¹, Teresa Pelissier¹, Alejandro Hernandez¹, Luis Constandil¹

(1) Universidad De Santiago de Chile, Laboratorio de Neurobiología, Facultad de Química y Biología, Avenida Libertador Bernardo O'Higgins n° 3363, Santiago, Chile.

Intrathecal administration of brain-derived neurotrophic factor (BDNF, 100ng/10ul) to adult rats (naïve) induces hyperalgesia sustained over time generated by several changes in the spinal neural substrate known as central sensitization. (Constandil et al., 2012; Marcos et al., 2017). On the other hand, our research group has shown that the Panx-1 channel is essential in maintaining hyperalgesia induced by a neuropathy model (Bravo et al., 2014). This work aimed to study the relation between BDNF and Panx-1, specifically if the hyperalgesia induced by BDNF depends on Panx-1 activation. For this, we evaluated if the hyperalgesia induced by BDNF could be inhibited or blocked by Panx-1 blocker (10panx), SRCKinase inhibitor (PP2) and TrkB receptor antagonist (ANA12). Hyperalgesia was evaluated as the withdrawal threshold in the paw pressure test (Randall-Selitto).

The results showed that BDNF administration reduced the withdrawal threshold from 215.3 g/cm2 to 153.9 g/cm2. Reaching its minimum on day 5, then staying for at least two weeks. The administration of 10panx, PP2 and ANA12 can prevent the effect of BDNF, but only during the first 4 hours, after which hyperalgesia returns between days 3 and 5. Taken together, these data show that the opening of Panx-1 mediates the effects of the activation of the BDNF receptor (TrkB).

Financing: Proyectos: CEDENNA FB0807; DYCIT 021543CC.

P107 A physiological fibromyalgia rat model induced by neonatal stress

Ana Maria Moreira¹, Nicolas Oneto Neira¹, Katherine Zepeda¹, Jonathan Aranguiz¹, Teresa Pelissier¹, Georgina Renard², Alejandro Hernández¹, Luis Constandil¹

(1) Universidad Santiago de Chile, Laboratorio de Neurobiología, Facultad de Química y Biología, Santiago, Chile

(2) Universidad de Santiago de Chile, Centro de Investigación Biomédica y Aplicada (CIBAP), Escuela de Medicina, Facultad de Ciencias Médicas, Santiago, Chile

Fibromyalgia (FM) is a pain syndrome characterized by generalized musculoskeletal pain without obvious lesions, of sudden onset and that intensifies during rest. Due to the unknown etiology of FM, standardizing a physiological animal model is extremely difficult. Any approach to an FM model must meet requirements such as mimicking symptoms, demonstrate a pharmacological profile analogous to clinical treatment of FM and being induced by a physiological stimulus. Ours aim was develop a new FM model in male and female adult rats induced by neonatal stress through nesting material restriction to the mother, over the post-natal days 2 to 9. The hyperalgesia was measured with the paw pressure test (Randall-Selitto) and the pharmacologic effect of duloxetine was evaluates in this rat. FM rats (male and female) between 150-200 g, presented a significative hyperalgesia (FM rat presented 117 ± 3 g/cm² of paw threshold withdrawal while control animal with same weigh presented 234 ± 13 g/cm²). This hyperalgesia was significantly reduced at 120 minutes after a unique dose of duloxetine 60 mg/kg i.p., when it achieved its peak of action, reversing the values of paw threshold withdrawal from 117 ± 3 g/cm² into 198 ± 6 g/cm² of FM rats. This data suggests that this neonatal stress model can be used as an FM model in adult rats, allowing the study of alterations in the neural tissue present in FM and helping to find more effective treatments.

P108 Pannexin 1 channel modulates synaptic plasticity through AMPA receptor insertion in the postsynaptic membrane of hippocampal neurons of Alzheimer's disease murine model.

Javiera Illanes-González^{1,3}, Carolina Flores-Muñoz¹, Stefany Órdenes^{1,3}, Elena Mery¹, Paula Mujica^{1,3}, Pablo Muñoz-Carvajal², Arlek Gonzalez-Jamett^{1,4}, Alvaro Ardiles-Araya^{1,2}

(1) Centro Interdisciplinario de Neurociencia de Valparaíso, Universidad de Valparaíso, Facultad de Ciencias, Valparaíso, Chile

(2) Centro de Neurología Traslacional, Universidad de Valparaíso, Facultad de Medicina, Valparaíso, Chile

(3) Programa de Doctorado en Ciencias, Mención Neurociencia, Universidad de Valparaíso, Valparaíso, Chile

(4) Universidad de Valparaíso, Escuela de Química y Farmacia, Facultad de Farmacia, Valparaíso, Chile

Alzheimer's disease (AD) is a neurodegenerative disorder characterized by memory loss and dementia that generally affects elderly individuals. These failures are related to synaptic plasticity (SP) alterations, which partly depend on a reduction of AMPA glutamate receptors (AMPA) in the postsynaptic membrane. It has been reported that Pannexin 1 is a transmembrane protein that participates in SP and memory in the hippocampus. Moreover, in the adult murine model of AD (APP/PS1) hippocampus, a higher protein expression and activity of Panx1 have been observed. In addition, the Panx1 blockade with probenecid (PBN) reestablishes SP to normal parameters in the adult hippocampus of this model. Here, we studied if Panx1 contributes to the insertion and exocytosis of AMPARs in a murine AD model. We used a combination of biochemical approach and confocal imaging in primary hippocampal culture neurons of APP/PS1 and WT. At DIV 14-15, we observed an increased expression and activity of Panx1 in APP/PS1 compared with WT neurons. Interestingly, the PBN treatment increases GluR1 expression in APP/PS1 neurons to basal conditions. Finally, chemical-LTP induction with PBN showed increased GluR1 inserts in surface of APP/PS1 neurons. These results suggest a novel contribution of the Panx1 channels in SP through the insertion of AMPARs in the plasma membrane of hippocampal neurons of the AD model.

Financing: This work was supported by Doctoral ANID fellowship grant #21191624 and Fondecyt grant #1201342

P109 Role of TRPM8 and Kv1 channels in orofacial cold allodynia

Ricardo Piña¹, Gonzalo Ugarte¹, Richard Pino¹, Katherine Valdebenito¹, Camilo Guevara^{1,2}, Sofía Romero^{1,3}, Víctor H. Cornejo^{3,4,5}, María Pertusa^{1,2,3}, Rodolfo Madrid^{1,2,3}

(1) Universidad de Santiago de Chile, Departamento de Biología, Facultad de Química y Biología, Av. Libertador Bernardo O'Higgins, Santiago, Chile

(2) Millennium Nucleus of Ion Channel-Associated Diseases - MiNICAD

(3) Millennium Nucleus for the Study of Pain - MiNuSPain

(4) Universidad de Chile, Instituto Milenio de Neurociencia Biomédica, Facultad de Medicina, Independencia 1027, Santiago, Chile

(5) Columbia University, Department of Biological Sciences, NY 10027, New York, USA

Cold allodynia is a frequent symptom of orofacial neuropathic pain resulting from trigeminal nerve damage. The molecular and neural bases underlying this sensory alteration are still poorly understood. We explored the mechanisms underlying the altered orofacial cold-sensitivity resulting from axonal damage of the infraorbital branch of the trigeminal nerve, using chronic constriction injury (CCI) in mice, combined with behavioral analysis, Ca^{2+} imaging, patch-clamp recordings of infraorbital nerve (ION) neurons in culture, immunohistochemistry, and AAV vector-based gene delivery *in vivo*. We found that cold allodynia induced by ION-CCI is linked to an increase in the proportion of cold-sensitive neurons (CSNs) contributing to this branch, and a shift in their thermal thresholds to higher temperatures. These changes are related to a reduction of the $\text{Kv}1.1$ -1.2-dependent brake current I_{KD} and an augmented TRPM8 channel expression in ION-CSNs. These findings suggest that painful cold hypersensitivity is linked to recruiting silent nociceptive afferents that became cold-sensitive in response to nerve damage, due to a combined effect of TRPM8 upregulation and a functional reduction of I_{KD} . Notably, AAV transduction with $\text{Kv}1.1$ channels reverted the nociceptive phenotype of injured mice. Thus, our results unveil a key role of TRPM8 and $\text{Kv}1$ channels in damage-triggered orofacial cold allodynia in neuropathic pain, suggesting that the overexpression of potassium channels underlying I_{KD} can be an effective tool to revert this sensory alteration induced by peripheral nerve damage.

Financing: Supported by Millennium Nucleus for the Study of Pain (RM,MP), Millennium Nucleus of Ion Channel-Associated Diseases (RM,MP), DICYT VRIDel-USACH 022143PP (MP,RM) and by VRIDel-USACH-021843MM (RM).

P110 Abnormal mGluR expression and synaptic function early in development lead to altered inhibitory plasticity in the somatosensory cortex of an adult mouse model of FXS

La expresión y función anormal en el desarrollo temprano de mGluRs lleva a una plasticidad inhibitoria cortical alterada en un modelo murino adulto de FXS

Vania Murga¹, Elias Leiva-Salcedo², Alexia Francisca Núñez Parra³, Christian Cea-Del Rio¹,

(1) Universidad de Santiago de Chile, Laboratorio de Neurofisiopatología, Centro de Investigación Biomédica y Aplicada (CIBAP), Escuela de Medicina, Facultad de Ciencias Médicas

(2) Universidad de Santiago de Chile, Departamento de Biología, Facultad de Química y Biología

(3) Universidad de Chile, Laboratorio de Fisiología, Departamento de Biología, Facultad de Ciencias

Fragile X Syndrome (FXS) is a neurodevelopmental disorder and the most common cause of inherited intellectual disability and autism spectrum disorders. FXS etiology is determined by the loss of expression of Fragile X Mental Retardation Protein (FMRP). The best-known process that is affected by this dysfunction is the metabotropic glutamate receptors (mGluR) mediated synaptic plasticity in both excitatory and inhibitory synapses. Despite this evidence it is not clear at what developmental stages these plasticity phenomena begin and whether altered developmental trajectories in mGluR expression and function determine the synaptic alterations seen in the adult FXS phenotype. More importantly, how this would contribute to the proper structural and functional maturation of FXS neuronal network. In this work we use a combination of molecular and electrophysiology approaches to test the molecular levels of mGluR and its modulatory effects on excitatory and inhibitory synapses during critical period of the synaptic plasticity in the somatosensory cortex of a murine model of FXS. We show that the trajectory of mGluR expression in the somatosensory cortex is altered during development, with mGluR activation failing to positively modulate spontaneous activity (sIPSC) and mediate long-term depression at inhibitory synapses (I-LTD) in cortical pyramidal cells during early postnatal development of a *Fmr1* KO mice model. This data suggests that abnormal development of mGluR-mediated synaptic activation begin as early of juvenile stages of development and is key determining the hyperexcitable phenotype seen in the adult somatosensory cortex of *Fmr1* KO animals.

Financing: Universidad de Santiago de Chile, DICYT 022001CDR, Vicerrectoría de Investigación, Desarrollo e Innovación

P111 Neuromodulators regulate astroglial gliotransmission through connexin 43 (Cx43) hemichannels

Ivanka Jiménez-Dinamarca¹, Rachel Reyes-Lizana¹, Kevin Cárdenas¹, Juan Zegers-Delgado², Katia Gysling², Jimmy Stehberg¹

(1) Universidad Andrés Bello, Laboratorio de Neurobiología, Instituto de Ciencias Biomédicas, Facultad de Medicina, Republica 330, Santiago, Chile

(2) Pontificia Universidad Católica de Chile, Department of Cellular and Molecular Biology, Faculty of Biological Sciences, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

Astroglial Cx43 hemichannels are one of the main mechanisms for astroglial release of gliotransmitters into synapses, like glutamate and ATP, contributing to the regulation of synaptic activity. Previous studies have shown that neurotransmitters like glutamate, GABA and glycine, as well as neuromodulators like noradrenaline, dopamine, histamine and glucocorticoids can all induce increases in astroglial intracellular calcium. However,

to the date no study has evaluated whether gliotransmission is modulated by different neurotransmitters and neuromodulators, and by which mechanism they are released. Here we incubated the rat astroglial cell line DI TNC1 with different neuromodulators under conditions that open Cx43 hemichannels (no extracellular calcium) or in conditions in which Cx43 hemichannels are closed (normal extracellular calcium), to screen for the effects of different neurotransmitters and neuromodulators on Cx43 hemichannel activity and on the release of glutamate, GABA and ATP. Our results demonstrate that astrocytes respond to Glutamate, GABA, noradrenaline, serotonin, dopamine, histamine, glycine, and corticosterone by increasing Cx43 hemichannel-mediated release of glutamate and ATP but showing possible permeability differences that may be related to the type of G-coupled receptors expressed and the intracellular signaling cascades triggered. These results suggest that neuromodulators may exert effects on glutamatergic transmission via the activation of astroglial Cx43 hemichannels and Cx43 hemichannel-dependent release of glutamate and ATP.

Financing: Fondecyt N°1200452Beca ANID N°21221905

P112 Hippocampal PARP1 and SIRT1 as novel targets to prevent synaptic plasticity impairment and cognitive dysfunction in Delirium.

Tatiana Guncay^{1,4}, Jorge Concha-Cerda¹, Daniela P Ponce¹, Jamileth More¹, Genaro Barrientos³, Cecilia Hidalgo^{2,3,4}, Felipe Salech^{1,2}

(1) Centro de Investigación Clínica Avanzada (CICA), Hospital Clínico Universidad de Chile, Santiago, Chile

(2) Departamento de Neurociencias, Facultad de Medicina, Universidad de Chile, Santiago, Chile

(3) Programa de Fisiología y Biofísica, ICBM, Facultad de Medicina, Universidad de Chile, Santiago, Chile

(4) Instituto de Neurociencias Biomédicas (BNI), Facultad de Medicina, Universidad de Chile, Santiago, Chile

Delirium is a state of acute altered cognition and consciousness level induced by injuries such as sepsis or trauma. Delirium affects up to 61% of older adults with hip fractures, causing severe negative consequences, including mortality and increased risk of dementia. The pathophysiological mechanisms of delirium are unclear. The nuclear enzyme PARP1 participates in DNA damage response, regulates IL-1b expression, and interacts negatively with SIRT1, a deacetylase related to anti-inflammatory responses and aging. We investigated the effects of bone fracture on IL1b, PARP1, and SIRT1 levels, synaptic plasticity, and hippocampal cognitive function in a murine model of delirium using 22-month-old wildtype mice, which received intra-peritoneal injections of the PARP1 inhibitor nicotinamide (NAM) or saline. The levels of IL1b, PARP1, and SIRT1 were assessed using RT-PCR and western blotting; long-term potentiation (LTP) was measured to assess hippocampal-synaptic plasticity, and cognition was assessed using the Y-maze test. Increased hippocampal IL-1b and SIRT1 levels, decreased LTP induction and deteriorated hippocampal-dependent memory was found 72 hours after a fracture. NAM treatment prevented the rise of IL-1b, restored LTP, and mitigated cognitive decline. Additionally, NAM treatment increased hippocampal PARP1 levels after fracture and decreased the SIRT1 rise. Our findings present evidence for a novel mechanism of delirium-associated cognitive impairment, leading to new potential therapeutic targets.

Financing: BECA DOCTORADO ANID-21201129, FONDECYT-11190882. FONDECYT-1170058.

P113 Features of hippocampal SWR and its coupling with prefrontal activity patterns during planning are related to navigation strategies during spatial memory formation

Nelida Lopez Quilodran¹, Lorena Chacana¹, Robert Stevenson¹, Ignacio Negron¹

(1) Universidad Valparaíso, Centro de Neurobiología y Fisiopatología Integrativa, Facultad de ciencia, Av. Gran Bretaña N° 1111, Playa Ancha., Valparaíso, Chile

During spatial memory formation, subjects gradually progress from less efficient non-spatial navigation strategies to more efficient spatial strategies. It has been suggested that planning, the generation of prospective behaviors based on past, occurs just before starting and after finishing the navigation task. Importantly, hippocampal Sharp Wave Ripples (SWRs) oscillatory patterns that emerge during reduced attentional demand, has been observed before and after the navigation task, suggesting that could be related to planning of navigation strategies. Interestingly, SWRs are coupled with the activity of the prefrontal cortex (PFC), a brain area involved in navigation strategy selection. However, it is unknown if the physiological features of SWRs, as well as their coupling with prefrontal activity, is related to the navigation strategies. Our aim is to evaluate the relationship between the physiological characteristics of the SWRs during planning stages with the implementation of spatial and non-spatial strategies during navigation. We simultaneously recorded local field potential from the hippocampus and PFC in rodent models before, during, and after navigation trials in a goal-oriented navigation task. Our preliminary results show that the physiological features of SWRs do not change during navigation according to spatial memory formation. However, there were significant changes in the incidence and duration of SWRs before and after navigation trials, in which the incidence before navigation is higher than after navigation. Therefore, these results may relate the physiological characteristics of the SWRs, belonging to the planning stages, with the implementation of navigation strategies.

P114 Oscillatory coupling in the mPFC-HPC and mPFC-PPC axis during spatial memory formation

Acoplamiento de las oscilaciones en los ejes mPFC-HPC y mPFC-PPC durante la formación de la memoria espacial.

Francisca Javier García Rojas¹, Lorena Chacana¹, María-José Torres¹, Pablo Fuentealba², Ignacio Negrón¹

(1) Universidad de Valparaíso, Instituto de Fisiología, Facultad de Ciencias, Avenida Gran Bretaña 1111. Playa Ancha, Valparaíso, Chile

(2) Pontificia Universidad Católica de Chile, Centro de Neurociencias, Facultad de Medicina, Avda. Libertador Bernardo O'Higgins 340, Santiago, Chile

Spatial memory formation is a cognitive process that requires the gradual integration of several sets of information represented in distributed neural networks. Spatial representation is supported by the hippocampus (HPC), whereas the posterior parietal cortex (PPC) and the prefrontal cortex (PFC) represent available paths and strategy selection, respectively. It is suggested that integration of information is supported by oscillatory coupling. It has previously described the functional relevance of PFC-HPC oscillatory coupling during spatial memory formation, but it is unknown if PFC-PPC coupling occurs during this cognitive operation. Therefore, we aim to investigate the specificity of frequency-dependent coupling of mPFC, HPC and PPC at meso-scale level in a rodent model during a spatial memory formation. We used a combination of single-unit and field potential recordings of activity patterns in freely-moving rodents performing a spatial goal-oriented navigation task. Our results evidence that PFC-HPC and PFC-PPC synchronize at different frequency bands. Specifically, LFP recordings from PFC and HPC during spatial navigation shows a synchrony in the slow gamma frequency (20-40 Hz), which was accompanied by a peak of coherence at this frequency. In addition, cross-frequency coupling analyses between PFC-HPC showed a modulation of slow gamma power (40-60 Hz) by theta phase (8-10 Hz). On the other hand, analyses between the PFC-PPC revealed a synchrony in the high gamma frequency and the modulation of fast gamma power (80-120 Hz) by theta phase. These results suggest differential frequency-dependent coupling among brain regions involved in spatial memory formation.

Financing: Proyecto ANILLO ACT210053. Título proyecto: "Sensory and Electric Brain Stimulation for Neurorehabilitation: from Mechanisms to Clinical Practice"

P115 State-dependent functional connectivity between supramamillar nucleus and dentate gyrus.

Ariel Lara-Vasquez^{1,2}, Mauricio Caneo Contreras^{1,2}, Nelson Espinosa Vergara^{1,2}, Pablo Fuentealba Durand^{1,2}

(1) Pontificia Universidad Católica de Chile, Psiquiatría, Medicina, Marcoleta 391, Santiago, Chile

(2) Pontificia Universidad Católica de Chile, Centro Interdisciplinario de Neurociencias UC, Santiago, Chile

The sleep-wake cycle is a neurobiological phenomenon that shows intervals of activity alternating with restfulness. The evidence regarding neural systems controlling wakefulness and sleep is still under discussion. The supramammillary nucleus (SUM) and hippocampus appear as secondary players in the regulation and induction of the sleep-wake cycle. Besides, the SUM and the hippocampus are anatomically connected through the dentate gyrus (DG), and CA2, and it has been suggested that SUM participates in the regulation and induction of the theta rhythm (4-8 Hz). Yet, it is unknown how these areas interact during the sleep-wake cycle.

We evaluated the functional coupling between SUM and DG neuronal populations in rats ($n = 4$) during active exploration and REM sleep, both states highly enriched in theta activity. Chronic recordings showed that both areas presented an accentuated coherence in the theta band during both exploration and REM sleep. However, the theta band in SUM coordinated higher frequency bands such as beta (10-20 Hz) and gamma (40-80 Hz) in the DG during the awake state. Whereas the coupling during REM sleep was restricted to the gamma band.

Here, we show that neurons of the SUM coordinate sustained modulated activity over DG in a behaviorally-dependent manner. It is possible that this might be the case since the molecular layer contains an unusual number of SUM terminals on the proximal dendrites of dentate granule cells, which may result in an effect on the temporal precision of "dentate gating" and possibly contribute to wakefulness, attention, and memory process.

P116 A subpopulation of neurons in the Anterior Insular Cortex encodes empathic decisions in a new operant task in rats.

Benjamin Carrasco^{1,2}, Marco Contreras^{1,3}, José Luis Valdés^{1,2}

(1) Universidad de Chile, Departamento de Neurociencias, Facultad de Medicina, Independencia 1027, Santiago, Chile

(2) Universidad de Chile, Biomedical Neuroscience Institute (BNI), Facultad de Medicina, Independencia 1027, Santiago, Chile

(3) University of Arizona, Department of Neuroscience, 1040 E 4th Street PO Box 210077, GS-611, Tucson, AZ 85721, USA

The anterior insular cortex is an area involved in interoceptive processing that can play an essential role in prosocial behaviors. For example, previous studies with fMRI in humans have shown that the insular cortex activity is modulated in response to pain experienced on by others. In addition, it has been associated with retrospective valence coding against pleasant and unpleasant experiences to allow optimal decision-making.

We hypothesize that empathic decisions could be encoded in the Insular cortex. To test this idea, we performed in vivo high-density electrophysiological recordings in rats during a novel operant conditioning task, where rats can decide whether or not to cause distress to a conspecific to receive a reward.

We obtain 610 neurons coming from 38 recording sessions in 4 rats. We found 24% of neurons in the anterior insular cortex encode different operant behavior moments. Moreover, subsets of those neurons were selectively modulated when rats chose to cause distress or not to their conspecific.

Understanding the mechanisms involved in decision-making associated with prosocial behaviors may be crucial for developing future interventions in neuropsychiatric pathologies characterized by an altered perception of emotions, lack of empathy, or psychopathic-like behaviors.

Financing: The Pew Innovation Fund Grant #34503

P117 Disruption of long-range theta-gamma cross-frequency coupling in schizophrenia during free exploration of natural scenes

Alteración del acoplamiento theta-gamma de larga distancia en esquizofrenia durante la exploración libre de imágenes naturales

Enrique Tabilo Romero¹, Rocio Mayol-Troncoso³, Roberto Verdugo¹, Pablo A. Gaspar^{2,3,4}, Pedro E. Maldonado^{1,5}, Jose Egaña Tomic^{2,5}, Christ Devia Manríquez^{1,5}

(1) Universidad de Chile, Dept. de Neurociencia, Facultad de Medicina, Santiago, Chile

(2) Univ. de Chile, Dept. de Anestesiología y Medicina Perioperatoria, Santiago, Chile

(3) Clínica Psiquiátrica Universitaria, Univ. Chile, Dept. de Psiquiatría, Facultad de Medicina, Santiago, Chile

(4) Univ. de Chile, Dept. de Psiquiatría, Facultad de Medicina, Santiago, Chile

(5) Biomedical Neuroscience Institute, Santiago, Chile

The pathophysiological basis of schizophrenia remains a mystery for modern neuroscience. The two leading hypotheses to explain it, the GABAergic and glutamatergic hypotheses, predict alterations in the excitation/inhibition balance of synaptic transmission, which is thought to be crucial in the dynamic coordination of brain oscillations and gamma band synchrony in particular. On a higher level, several perceptual processes correlate with gamma band oscillations, like perceptual binding and background segregation. As expected, evidence shows that cognitive and perceptual symptoms of schizophrenia, particularly on visual perception, relate to gamma band disruption. Moreover, theta-gamma Cross-Frequency Coupling (CFC) has shown to be reduced in patients in several experimental conditions. Thus, we hypothesize that in an ecological visual task patients will show a diminished coordination on gamma band oscillations. To test this hypothesis, we study long-range theta-gamma CFC in electroencephalography recordings of schizophrenia patients during free visual exploration of natural scenes and compared their results with control subjects. We performed our analysis over two different datasets (Dataset 1: 11 patients, 9 healthy controls; Dataset 2: 15 patients, 15 healthy controls). We found on each dataset that patients have a significant decrement in the CFC between occipital theta phase and fronto-central gamma amplitude compared to controls. Our results suggest that diminished theta-gamma CFC is an ubiquitous alteration in schizophrenia, underpinned by low-level neural mechanisms of visual perception. These results open a window to the use of this ecological task to early detection of schizophrenia, and to the future development of cognitive remediation therapies.

Financing: BNI, Iniciativa Científica Milenio ICN09_015 PROYECTO ACE 210007; Fundación Guillermo Puelma; Centro Nacional de Inteligencia Artificial CENIA FB210017, Financiamiento Basal ANID

P118 ¿Gatillamiento del tinnitus vía estructuras subcorticales? Un estudio de volumetría cerebral y tinnitus en una cohorte de adultos mayores chilenos.

Simon San Martin^{1,6}, Vicente Medel^{1,6}, Chama Belkhiria⁶, Alexis Leiva⁴, Rodrigo Vergara², Mauricio Cerda⁶, Gonzalo Farias^{1,3,6}, Carolina Delgado^{1,3,6}, Paul Delano^{1,4,5,6}

- (1) Departamento de Neurociencia, Facultad de Medicina, Universidad de Chile, Santiago, Chile.
- (2) Departamento de Kinesiología, Facultad de Artes y Educación Física, Universidad Metropolitana de Ciencias de la Educación, Santiago, Chile.
- (3) Departamento de Neurología y Neurocirugía, Hospital Clínico de la Universidad de Chile, Santiago, Chile.
- (4) Departamento Otorrinolaringología, Facultad de Medicina, Universidad de Chile, Hospital Clínico Universidad de Chile, Santiago, Chile.
- (5) Centro Avanzado de Ingeniería Eléctrica y Electrónica, AC3E, Universidad Técnica Federico Santa María, Valparaíso, Chile.
- (6) Instituto de Neurociencia Biomédica, Facultad de Medicina, Universidad de Chile, Hospital Clínico Universidad de Chile, Santiago, Chile.

Tinnitus is the persistent phantom perception of sound with no external auditory stimuli present. Its prevalence in the population reaches up to 14%, it increases with age and is commonly accompanied by hearing loss and cognitive decline. Although tinnitus has traditionally been considered a peripheral inner-ear problem, an increasing body of evidence from animal and human studies has shown that the central nervous system's neuroplasticity is key to understanding its pathophysiology. Neuroimaging studies have suggested that cortical networks involved in auditory processing are implicated in tinnitus, and may have a causal effect in shaping spontaneous neural activity in auditory cortical structures. As the auditory pathway depends on subcortical structures that modulate the gain and the cortical activity, we hypothesize that tinnitus is associated with neuroplastic changes in subcortical structures. We test this by analyzing subcortical volume on an MRI dataset from the Chilean ANDES cohort of elderly subjects (N=106). We found no significant differences between age and hearing loss between groups. Interestingly, a significant interaction between age and hearing loss was found in the left and right pallidum ($p=0.011$ and $p<0.001$ respectively) for the tinnitus group, suggesting that older and more hearing impaired subjects had gradually bigger pallidum. Overall, our results show a broader picture of tinnitus pathophysiology, suggesting subcortical pathways and possible impaired gain mechanisms underlying the phenomenology of auditory phantom perception.

Fondecyt 1220607, ANID BASAL FB0008, Proyecto ICN09_015, y Fundación Guillermo Puelma.

Estudios financiados por ANID-Subdirección de Capital Humano/Doctorado Nacional/2022-21221090

P119 The role of mitochondrial β -oxidation genes in the integrity of *Drosophila* neurons

El papel de los genes de β -oxidación mitocondrial en la integridad de las neuronas de *Drosophila*

Lesley Pow-Hing Lucero¹, Nicole Sanhueza Cubillos¹, Guilherme Gischkow Rucatti¹, Francisco Muñoz-Carvajal¹, Mario Sanhueza Cubillos²

- (1) Universidad Mayor, Escuela de Biotecnología, Santiago, Chile
- (2) Universidad Mayor, Centro de Resiliencia y Mitigación, Temuco, Chile

Lipid metabolic dysregulation in the brain is a commonality between the aging process and the onset of neurodegenerative disorders. Despite the emerging evidence linking altered lipostasis with pre-symptomatic stages of neurodegeneration, so far no molecular mechanism has been associated with these observations. Furthermore, the mitochondrial β -oxidation has not been fully studied in the context of degenerative processes of the nervous system. Here we perform a comprehensive in silico analysis of *Drosophila melanogaster* genes involved in β -oxidation, and we functionally characterize their role in the nervous system. Using publicly available databases, we explored sequence homology, interaction networks and expression maps to filter 75 candidate genes, and obtained a *bonafide* group including the most relevant proteins for each enzymatic step of β -oxidation. We then analyzed their expression in *Drosophila* brains and identified that the whole pathway is down-regulated in aged flies. To study a functional role of these genes in the nervous system, we down-regulated their expression in neurons and confirmed that they are required not only for neuronal integrity as observed through immunofluorescence, but also for functional adult flies after measuring lifespan and motor performance. These phenotypes correlated with an altered distribution and concentration of neuronal lipids, as observed with neutral lipid dyes in brains down-regulating selected genes. Finally, we observed that these mutant brains also carried altered mitochondria number and morphology compared to controls. These data suggest a non-canonical role of β -oxidation in neurons that could provide clues on pathomechanisms of neurodegenerative diseases.

Financing: Fondecyt iniciación #11200981

SESIÓN DE POSTERS II



P1 Computational identification of inhibitory molecules of monocarboxylate transporters and their validation as targets for inhibition of tumor cell proliferation

Andres Ibacache^{1,3}, **Andres Esparza**^{3,4}, Andreas Schüller^{1,2}, Jimena Sierralta^{3,4}

(1) Department of Molecular Genetics and Microbiology, School of Biological Sciences, Pontificia Universidad Católica de Chile.

(2) Institute for Biological and Medical Engineering, Schools of Engineering, Medicine and Biological Sciences, Pontificia Universidad Católica de Chile.

(3) Department of Neuroscience, School of Medicine, Universidad de Chile.

(4) Biomedical Neuroscience Institute, School of Medicine, Universidad de Chile

Cancer is the second leading cause of death worldwide, accounting for more than 9.6 million deaths each year. The metabolic adaptation that tumor cells show by increasing lactate production allows them to ensure their proliferation and maintain the acidity of the tumor microenvironment. The diffusion of lactate in these cells is mediated by monocarboxylate transporters (MCTs). In humans, there are 14 MCTs, but only MCT1 and MCT4 represent attractive therapeutic targets for the treatment of this pathology, given their relevance in lactate transport.

The antagonist drugs development for MCTs has been hampered by the scarce availability of three-dimensional structures for these transporters. This is particularly relevant for MCT4, for which no selective inhibitors have been found and little information exists about the residues that mediate its transport function.

Here, we performed a search for potential inhibitors of MCT1 and MCT4 by virtual screening based on chemical similarity of ligands, evaluating their activity in HEK293 and MDA-MB-231 cells transfected with a FRET-like lactate sensor (Laconic). In addition, using MTS, trypan blue and wound healing assays, we evaluated the activity of the inhibitors on the proliferation and migration of SiHa and MDA-MB-231 cancer cell lines, expressing MCT1 and MCT4, respectively.

Of the ligands identified, a group of resveratrol-derived stilbenes inhibited the proliferation and migration of SiHa and MDA cells. However, within this group, piceatannol was the most promising in blocking lactate transport, inhibiting the incorporation of this metabolite by more than 60% in cells expressing one or both of the MCTs studied

Financing: Beca Doctorado Nacional ANID 21201294

P2 Phenolic content and antioxidant effect of *Haplopappus grindelioides* aqueous extract from aerial parts and roots

Polette Acevedo Tari¹, Carlos Schneider¹, Eduardo Navarrete¹

(1) Universidad de Concepción, Departamento de Ciencias y Tecnología Vegetal, Juan Antonio Coloma 0201, Los Ángeles, Chile

Haplopappus grindelioides (Less.) DC. (Asteraceae) is a native subshrub of Chile, and grows on dry and volcanic soils, between 600 and 2.500 metres above sea level. This species is found in the Región Metropolitana of Santiago until the Región of the Araucanía, in areas with a high solar radiation during summer time, and with snow and low temperatures in winter time. The above mentioned conditions indicate the existence of abiotic stress, and phenols has been suggested as playing key functions as antioxidants in stressed plants. There are not phytochemical studies of *H. grindelioides*, and its antioxidant capacity has not been studied. In this study, a quantitative analysis of phenolic compounds, and antioxidant assays from *H. grindelioides* aerial parts and roots, were done. The above mentioned assays were done using spectro-photometric methods in aqueous extracts obtained from *H. grindelioides*. Antioxidant activity was assessed using DPPH (2,2-Diphenyl-1-picrylhydrazyl) and ABTS (2,2-Azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)). Results of antioxidant activity were expressed as gallic acid and trolox (6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid) equivalents for DPPH and ABTS, respectively. The IC₅₀ value of the aerial parts extract was 1,56 mg/ml and 1,39 mg/ml for the roots extract, obtained by means of DPPH. On the other hand, the IC₅₀ value of the aerial parts extract was 0,61 mg/ml and 0,72 mg/ml for the roots extract, obtained by means of ABTS. The observed antioxidant activity of aqueous extracts obtained from *H. grindelioides* is related with the phenolic content in this plant.

P3 Comprehensive characterization of mouse skin derived from regenerative versus reparative stages: a comparative analysis.

Caracterización de piel de ratón derivada de estadios regenerativo versus reparativo: un análisis comparativo.

Valentina Castillo Salgado¹, Pamela Díaz², Rocio Corrales Orovio^{1,3}, Sebastián San Martín², Jose Tomás Egaña¹

(1) Pontificia Universidad Católica de Chile, Institute for Biological and Medical Engineering, Schools of Engineering, Biological Sciences and Medicine, Vicuña Mackenna 4860, Santiago, Chile

(2) Universidad de Valparaíso, Biomedical Research Center, School of medicine, Angamos 655, Viña del Mar, Chile

(3) LMU, Division of Hand, Plastic and Aesthetic Surgery, Medicine, Munich, Germany

Tissue regeneration capacities vary significantly in the course of life. For instance, some organism like mammals can fully regenerate only until determined fetal stages, after that tissue repairs take place without reestablish normal tissue architecture and function. The high regenerative potential of embryos has been attributed to several factors, such as stem cells, immune system, inflammatory response, cell-response to specific growth factors, secretion of matrix-degrading proteases and the presence of particular extracellular matrix molecules upon damage. In order to contribute to better understand the changes that locally occurs in the transition between regenerative and reparative stages, in this work we carried out a comparative analysis between skin derived from mice at regenerative (E16.5) and reparative (6-8 weeks) stages. For this purpose, molecular, structural, histological, mechanical and functional analysis were performed. Here, we found that fetal skin composition differs not only in their molecular composition and distribution but also in their structure and functionality. Our results showed increased nuclei acid, collagen III and glycosaminoglycans content in regenerative versus reparative stages, while, differential lipid distribution, pore size and proteoglycans amount were observed too. Moreover, we also found that regenerative skin has significantly higher porosity, metabolic activity, fluid capacity and elasticity than reparative skin. This work provides a great knowledge about molecular, structural and functional hallmarks of skin derived from stages with regenerative abilities. Moreover, our results give insights for the development of new scaffolds with clinical potential able to mimic both structure and composition here described.

Financing: Fondecyt 1200280

P4 Short-chain fatty acids prevent the inflammatory response induced by *Vibrio parahaemolyticus* in intestinal epithelial cells in vitro.

Diliana Pérez-Reytor¹, Sebastián Cornejo¹, Katherine García¹, Eduardo Karahanian¹

(1) Universidad Autónoma de Chile, Instituto de Ciencias Biomédicas, Facultad de Ciencias de la Salud, Llano Subercaseaux 2801, Santiago, Chile

Tight junctions (TJ) are located in lateral membrane of epithelial cells, controlling the diffusion of macromolecules and the entry of pathogens from the extracellular fluid into the tissues. However, enteric microorganisms invade or disrupt the TJs by the action of their secreted toxins, thus colonizing the intestine and triggering inflammation. On the other hand, short-chain fatty acids (SCFA), such as butyrate, propionate and acetate, have been shown to be effective in increasing transepithelial resistance (TEER) of intestinal cells through the activation of their GPR109A and/or GPR43 receptors, decreasing inflammation and thus improving intestinal barrier function. This evidence makes them excellent candidates for the treatment of diseases involving damage to the intestinal epithelium. Therefore, the aim of this work is to determine if the activation of GPR109A and/or GPR43 receptors by SCFAs decreases the production of cytokines induced by *Vibrio parahaemolyticus* in HT-29 cells. To test whether butyrate-induced activation of GPR109A and/or GPR43 has an anti-inflammatory effect on HT-29 cells, we measured pro-inflammatory cytokines expression by RT-qPCR in cells exposed to *Vibrio parahaemolyticus* strain PMC53.7. Treatments included different concentrations of butyrate in the presence and absence of receptor antagonists. The results obtained will allow us to propose a possible therapeutic utility for butyrate in the recovery of intestinal epithelium deteriorated by infection with bacterial pathogens that secrete toxins that affect the epithelial barrier.

Financing: Universidad Autónoma de Chile DIUAV 02-2022

P5 Lifelong partners: The evolutionary history of Cortinarius sect. Cortinarius and Nothofagus (Nothofagaceae)

Un compañero fiel: La historia evolutiva de Cortinarius sect. Cortinarius y Nothofagus (Nothofagaceae)

Pierina Latorre¹, Luis Felipe Hinojosa¹

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

It is proposed that plant and fungi interaction has been known to date back millions of years, being the mutualistic symbiosis that configures the mycorrhizae present today in about 85% of plants. However, the evolutionary history is yet uncertain for some interacting plant-fungi lineages. For example, the *Cortinarius* genus is the most diverse genera in the Agaricales order, and it presents high mycorrhizal dominance in different gymnosperms and angiosperms around the world, like the *Nothofagus* genus, which is characteristic of the southern hemisphere. It's been proposed in other studies that the *Cortinarius* sect. *Cortinarius* started its diversification process in Australasia together with one of the main angiosperm lineages. Therefore, since *Cortinarius* sect. *Cortinarius* shows an actual mycorrhizic relation with angiosperms, *Nothofagus* included, and considering that both genera display a Gondwanan origin, it is expected a shared, cophylogenetic, history between both lineages, with a high probability of host switching along the history because of the global diversification of *Cortinarius* sect. *Cortinarius*. For this, phylogenetic trees of both genera will be used, with *Fagus* as an outgroup, and will be analyzed in TREEDUCKEN R package.

Financing: Acknowledges: FONDECYT 1221214; 1211765

P6 Comparison between climate layers: An approach to the development of SDMs in Chile

Comparación entre capas climáticas: Una aproximación al desarrollo de SDMs en Chile

Felipe Figueroa¹, Luis Felipe Hinojosa¹

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

Species distribution models have been broadly used to estimate the answer of species under different scenarios of climate change and used as a tool to decision makers for design or implement conservation plans for wild areas. High resolution climate databases like Worldclim or Chelsa play a fundamental role in this labor, with Worldclim and Chelsa being the most used databases. These models try to represent reality as precisely as possible but they have strength and weakness, and local evaluations are necessary to evaluate their accuracy.

This research seeks to compare three climate models (Worldclim, Chelsa and Pliscoff et al. 2014) with climatic stations for the last 30 years (1990-2020) in Chile and part of its neighboring countries, considering specifically data of mean annual temperature (MAT) and annual precipitation (AP), to estimate the accuracy of the models and the best performance for the develop of the models of distribution of species in Chile. We performed a regression analysis from observed and modeled (Worldclim, Chelsa and Pliscoff et al. 2014) for both MAT and AP climatic variables for Chileans climatic stations.

Financing: Acknowledges: FONDECYT 1221214; 1211765

P7 Geographical patterns of taxonomic, phylogenetic and functional β -diversity of the perennial flora in the aridity gradient of Chile

Patrones geográficos de la diversidad β Taxonómica, Filogenética y Funcional de la Flora perenne en el gradiente de aridez de Chile

Paola Poch¹, Luis Felipe Hinojosa¹, Elie Poulin¹

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Santiago, Chile

Beta diversity and its components (turnover and nestedness) in plant communities arises from taxonomic analysis (T β D), where all species are considered as equivalent units and ignores differences in evolutionary relationships and functional traits. To address these limitations, indices such as phylogenetic (P β D) and functional (F β D) beta diversity have been incorporated. In this research we ask which components (turnover and nestedness) contribute to the spatial patterns of beta diversity (T β D, P β D and F β D) of the perennial Flora of arid and semi-arid areas of northern Chile?

Floristic survey was carried out from Arica-Parinacota to Coquimbo regions. Phylogenetic reconstruction (using matK, rbcL and ITS gene marker) was proposed and a total of 12 functional traits were selected. Species Composition Interpolation (SCI) was used to identify patterns of beta diversity. The main results indicate that T β D consisted mainly of the turnover component, whereas P β D and F β D would be composed of the joint contribution of turnover and nestedness. The nesting of the P β D and F β D would indicate: 1) The loss of lineages and traits from the communities of Coquimbo to the absolute desert, and 2) the loss of lineage and function diversity from the northern Andean communities to the desert extension.

Financing: Acknowledges: Fondo de Bosque Nativo 023/2017, FONDECYT 1221214; 1211765

P8 Ontogenetic changes trophic niche width and levels of individual specialization in *Zonotrichia capensis* in central Chile

Cambios ontogenéticos en la amplitud del nicho trófico y niveles de especialización individual en *Zonotrichia capensis* en Chile central

Sara Bustamante Rizzo¹, María Lucía Málaga Cerpa¹, Natalia Ricote Martínez², Pablo Sabat¹, Karin Evelyn Maldonado Pacheco²

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Santiago, Chile

(2) Universidad Adolfo Ibáñez, Departamento de Ciencias, Facultad de Artes Liberales, Diagonal Las Torres 2640 - Peñalolén, Santiago, Chile

El fenómeno conocido como especialización individual (EI) se genera cuando los individuos consumen un pequeño subconjunto de los recursos de la población total, dado diferencias en la fisiología, conducta y/o morfología. Estudios recientes, proponen que los niveles de EI también variarían entre grupos etarios (e.g., juveniles vs. adultos), debido a diferencias en las habilidades adquiridas en la manipulación de los recursos. En este estudio, proponemos que los requerimientos alimenticios de cada etapa de crecimiento en combinación con la disponibilidad de recursos del ambiente serían los factores determinantes en la diferenciación ontogenética en los niveles de IS. Mediante el uso de isótopos estables ($d^{15}N$) presente en tejidos con distinta tasa de recambio (glóbulos rojos, plasma y uñas) se estimó la variación individual y poblacional de la dieta de individuos juveniles y adultos de *Zonotrichia capensis*. La estimación de la EI se realizó en estaciones de alta (primavera) y baja diversidad (verano) de recursos para ambos grupos etarios. Los juveniles presentaron niveles tróficos similares entre estaciones y mayores a los adultos en verano. Por otra parte, la EI fue similar entre juveniles y adultos en primavera, sin embargo ambos disminuyeron sus valores en verano, siendo menor para juveniles. Los resultados sugieren que la diversidad de recursos disponibles sería el factor clave en las diferencias en los niveles de EI. Además, en momentos de baja disponibilidad de recursos se privilegiaría la mantención del nivel trófico (asociado a la ingesta de proteínas) en los juveniles por medio del aumento del generalismo en la dieta.

Financing: Financiado por FONDECYT REGULAR N°1200513

P9 Plant diversity and paleoclimate of filaret formation (middle miocene?), tierra del fuego, chile.

Diversidad florística y paleoclima de formación filaret (mioceno medio?), tierra del fuego, chile.

Carolina Angélica Sandoval¹, Luis Felipe Hinojosa^{1,2}

(1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Chile, Las Palmeras 3425, Ñuñoa, Santiago, Chile

(2) Universidad de Chile, Instituto de Ecología y Biodiversidad (IEB), Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Santiago, Chile

Several plant fossils outcrops have been recorded in Tierra del Fuego with ages ranging from the Eocene to Pliocene time. The Miocene is especially well represented, so it would be possible to evaluate how the plants responded to the climate change that occurred in that time, associated with the Middle Miocene Climatic Optimum (MCO) and the Andean uplift. This research presents preliminary results of analysis from Filaret Formation taoflora, located in the central area of Tierra del Fuego, and dated between the middle to late Miocene. We reported the presence of at least 20 morphotypes, highlighting Nothofagaceae, Atherospermataceae, and Anacardiaceae families. Physiognomic-climatic analysis indicates mean annual precipitations (MAP) of 814 mm, ~200 mm higher than today, probably due to less interference from the Andes to the westerlies during the Miocene. Mean annual temperature (TMA) estimate is 7° C, ~4-6°C lower than present days. This is contrary to global temperature models, which indicate higher temperatures during the middle Miocene. The estimated temperatures are the result of the high percentage of leaves with a toothed margin in the assemblage (90.7%), that doesn't have an analog in modern calibration sites with which the predictive models are generated. Today, the forests that develop between 52-54°S and that present a high percentage of toothed margin, occur under TMA of ~6°C, so it's necessary to increase the modern calibrations set, including these sites, to generate more robust predictive models

Financing: FONDECYT N° 1221214 and Beca Doctorado Nacional Año 2020.

P10 Comparison between vegetational composition of the Miocene-Pliocene period and the current composition of the Puna biome through analysis of palynological records of the Lauca Formation.

Comparación entre la composición vegetacional del periodo Mioceno-Plioceno y la composición actual del bioma Puna mediante análisis de registros palinológicos de la Formación Lauca.

Luis Fernando Retamal Pacheco¹, Luis Felipe Hinojosa¹

(1) Universidad De Chile, Departamento De Ciencias Ecologicas, Facultad De Ciencias, Las Palmeras 3425, Santiago, Chile

The central Andes (15-27°S) reached their current altitude during Upper Miocene in different pulses from south to north, intensifying the South American summer monsoon and giving way to the formation of the Puna biome. Currently, the Lauca basin is in the extreme north of Chile at 4400 masl, being the westernmost sub-basin of the Miocene-Pliocene fluvial basins in the altiplano. In this region, rain occurs mainly during the southern summer (>300 mm), with an average annual temperature of approximately 5 °C and daily averages of 25 °C. Fossil records from the Lauca basin (~5.57 Ma - ~5.44 Ma in age) suggest that the vegetation was characterized by seasonal forests and open grasslands, with plant families that nowadays are not present in the Puna biome, growing under more humid conditions than today. In this study, we worked on palynological samples obtained from the Lauca basin, covering an approximate time range of 4.86 to 4.74 Ma. The objective is to determine the composition of the palynological community, carry out a taxonomic observation at the family or genus level, and evaluate whether this section deposited under mesic conditions but drier than the previous period associated with the Andean uplift.

Financing: Acknowledges: FONDECYT 1221214; 1211765

P11 Evaluation of neurotoxicity and hepatotoxicity of okadaic acid (OA) in zebrafish (*Danio rerio*) larvae

Evaluación de neurotoxicidad y hepatotoxicidad por ácido okadaico (AO) en larvas de pez cebra (*Danio rerio*)

Piera Pepe-Vargas^{1,2}, Patricio Yañez-Bailey¹, Nicolás O. Zambrano¹, Javiera F. De la Paz^{1,3}, **Alejandra Llanos-Rivera¹**

(1) Laboratorio de Toxicología Acuática (LTxA-UdeC), Universidad de Concepción, Departamento de Oceanografía, Facultad de Ciencias Naturales y Oceanográficas, Concepción, Chile

(2) Programa de Magister en Ciencias con mención en Oceanografía, Universidad de Concepción, Departamento de Oceanografía, Concepción, Chile

(3) Laboratorio de Embriotoxicología e Interacción Desarrollo Ambiente (LEIDA), Universidad de Concepción, Facultad de Ciencias Biológicas, Concepción, Chile

Okadaic acid is the main biotoxin involved in the Diarrhetic Shellfish Poison, causing human intoxication after harmful algal blooms (HAB). Its mechanism of toxicity is related to inhibition of phosphatases (PP1 and PP2A), while also inducing liver damage and neurotoxicity, therefore it can generate socio-environmental repercussions when humans are exposed.

This study evaluates two methods with potential application for detection of AO through bioassays with zebrafish as a model. 5 days-post-fertilization zebrafish larvae were exposed to AO, using ethanol as a positive control for toxicity and AO standards at regulatory relevant concentrations. Effects at the behavioral, tissue and molecular levels were analyzed to assess neurotoxicity and hepatotoxicity. The pattern of locomotor activity in response to light/dark transitions was evaluated using a semi-automated movement recorder; the gene expression level for acetylcholinesterase and myelin basic protein was quantified by RT-qPCR, and steatosis was detected by measuring the size of liver lipid droplets after wholemount Red-Oil staining.

Our results showed a decrease in locomotor activity and a decrease in the expression of genes associated with neurotoxicity in larvae exposed to increasing concentrations of AO. Also, when using limit concentration of AO for food safety (160 and 240 ng/mL) the results suggest a significant decrease in the normal function of larval hepatic system. These results demonstrate that AO hepatotoxic and neurotoxic effects in zebrafish could be useful in bioassays to detect AO and related biotoxins, as a cheap and novel complementary technique in comparison with official methods.

P12 Sexual genotyping of *Megaptera novaeangliae* specimens in the feeding area of the Strait of Magellan, Chile.

Genotipado sexual de especímenes de *Megaptera novaeangliae* en el área de alimentación del Estrecho de Magallanes, Chile.

Alanis Huañaco Garrido¹, Alejandro Piñeiro¹, Yerko A Vilina³, Juan Capella³, Franco Cruz⁴, **Luis Pastenes**^{1,2}

(1) Laboratorio de Genética y Microevolución. Facultad de Ciencias Básicas, Universidad Católica del Maule.

(2) Departamento de Biología y Química, Facultad de Ciencias Básicas, Universidad Católica del Maule.

(3) Consultora Biolog. Santiago, Chile.

(4) Facultad de Recursos Naturales y Medicina Veterinaria, Universidad Santo Tomás.

Sex ratios affect birth, mortality and population migration rates, thus affecting growth rates and evolutionary trajectories. The absence or scarce sexual dimorphism in many wild species makes population-genetic studies difficult. In the case of *Megaptera novaeangliae*, a migratory mysticete cetacean, it is complex to visually identify the sex of individuals. The aim of this research was to determine the sex ratio in the *Megaptera novaeangliae* population, which feeds in the Francisco Coloane Marine Park, located in the Strait of Magellan. Between the years 2010 and 2017, skin samples from 64 individuals, identified by natural markings, were collected, while DNA from each individual was isolated. Moreover, sex was determined by amplifying a chromosomal fragment of the ZF gene and subsequent treatment with TaqI endonuclease, producing a sex-specific digestion pattern. Forty-nine of the 64 individuals were genotyped, resulting in a sex ratio of 0.51/0.49 (*i.e.*, 25 males/24 females). It has been reported that the sexual ratio for this species at birth is 1/1, but when a migratory event occurs, this ratio leans towards males, presumably due to the interannual migration of females. Since the sex ratio is directly related to the spatio-temporal sampling interval, our results suggest a good participation of females during the annual migration to this feeding area. The information obtained in relation to the degree of fidelity, arrival and departure times, along with temporary residence for each of the individuals according to their sex, is discussed.

Financing: Funded by "Laboratorio de Genética y Microevolución" - UCM

P13 Preclinical development and evaluation of a humanized monoclonal anti-N antibody as a therapy to prevent the disease caused by the human respiratory syncytial virus

Desarrollo y evaluación preclínica de un anticuerpo monoclonal anti-N humanizado como una terapia para prevenir la enfermedad causada por el virus respiratorio sincicial humano

Benjamín Diethelm Varela¹, Jorge Soto Ramírez^{1,2}, Alejandra Pereira Serrano¹, Robinson Ramírez Inostroza¹, Catalina Andrade Parra¹, Alexis Kalergis Parra^{1,3}

(1) Millennium Institute of Immunology and Immunotherapy, Departamento de Genética Molecular y Microbiología, Facultad de Ciencias Biológicas, Pontificia Universidad Católica de Chile, Santiago, Chile

(2) Departamento de Ciencias Biológicas, Facultad de Ciencias de la Vida, Universidad Andrés Bello, Santiago, Chile

(3) Departamento de Endocrinología, Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile

The human respiratory syncytial virus (hRSV) is a pathogen of global concern, causing seasonal epidemics associated with significant morbidity and mortality, especially in preterm infants and the elderly. No vaccines against hRSV have been approved, and the only licensed prophylactic agent, the monoclonal antibody palivizumab, is a high-cost drug with moderate effectiveness. Two other monoclonal antibodies, motavizumab and nirsevimab, are undergoing clinical research. Like palivizumab, they are anti-fusion antibodies with neutralizing capabilities. Novel prophylactic and therapeutic agents which tackle alternative mechanisms of action are thus needed. An attractive hRSV target is the nucleoprotein (N-hRSV), which is expressed on the surface of hRSV-infected cells, so antibodies against it could mobilize the immune system to clear infected cells and elicit immune memory. Our laboratory produced a monoclonal antibody specific for N-hRSV, which has been humanized. Four clones of this antibody are currently undergoing preclinical evaluation to characterize their mechanism of action, pharmacokinetics, and protective efficacy against hRSV. Here, we show that all four clones display binding kinetics against both purified N-hRSV and infected Hep-2 cells by indirect ELISA. Additionally, we provide proof that N-hRSV is expressed on the surface of infected Hep-2 cells, validating this cell line as an *in vitro* infection model. Lastly, we show that administering 50 or 100 µg of antibody prior to hRSV inoculation in a murine infection model reduces viral loads and prevents immune cell infiltration in lung tissue. These findings show a promising preclinical profile and warrant further mechanistic and therapeutic research into these antibodies.

Financing: ANID/CONICYT National Doctoral Scholarship #21221163COPEC-UC 2019-R-1169FONDEF IDeA 2022 ID22110252 P14 Citizen science for orchid research and conservation: Results from three years of Chilean orchids monitoring project.

P14 Citizen science for orchid research and conservation: Results from three years of Chilean orchids monitoring project.

Ciencia ciudadana para el estudio y la conservación de Orchidaceae: Resultados de tres años del monitoreo ciudadano de orquídeas chilenas

María Isabel Mujica^{1,2,3}, Gabriela Narváez Guínez^{1,2}, Mauricio Cisternas Báez^{2,4,5}, Diego Vega²

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Valdivia, Chile

(2) Centro de Conservación de Orquídeas Chilenas (Cecorch)

(3) Instituto de Ecología y Biodiversidad, IEB

(4) Jardín Botánico Nacional, Viña del Mar, Chile

(5) Centro Regional de Investigación e Innovación para la Sustentabilidad de la Agricultura y los Territorios Rurales, Quillota, Chile

La ciencia ciudadana (CC) es una herramienta muy valiosa para estudiar la ecología de una especie, ya que incrementa la escala temporal y espacial de una investigación, más allá de lo que alcanzarían investigadores por sí mismos. La CC es especialmente útil en grupos altamente diversos, para los cuales es difícil obtener información ecológica. Tal es el caso de la familia Orchidaceae, cuyas especies suelen tener distribuciones parchosas o extremadamente acotadas, y de las cuales solo se ha evaluado el estado de conservación del 3.3%. Asimismo, en Chile solo han sido evaluadas 12 de las 72 especies de orquídeas nativas, todas estas resultando en alguna categoría de amenaza según el Reglamento de Clasificación de Especies (RCE). Para poder conocer el estado de conservación de las especies restantes, desde el año 2020 se realiza el "Monitoreo ciudadano de orquídeas chilenas", a través de la plataforma iNaturalist, donde se busca determinar rangos de distribución, tamaños poblacionales y amenazas de las orquídeas nativas. Hasta el momento han participado más de 360 monitores, logrando un total de 1606 observaciones correspondientes a 43 especies de orquídeas. Se obtuvieron registros entre los 20°S (*Myrosmodes nervosa*) y los 67°S (*Gavilea lutea*), concentrados principalmente entre la V y X región. Resultados preliminares indican que el 88% de las observaciones se encuentran fuera de áreas protegidas, lo que sugiere un alto grado de amenaza a estas poblaciones. Este proyecto es un ejemplo de cómo la participación ciudadana puede aportar en proyectos de investigación y conservación de la biodiversidad.

Financing: FONDECYT Postdoctorado 3200774

P15 A reservoir of fungus diversity in the valley of central-south Chile: Updated data from Parque Rucamanque

Un reservorio de diversidad de hongos en el valle del centro-sur de Chile: Datos actualizados del Parque Rucamanque

Camila Fernández Urrutia^{1,3}, Leonardo Almonacid Muñoz²

(1) Universidad de La Frontera, Laboratorio de Biometría, Facultad de Ciencias Agropecuarias y Medioambiente, Francisco Salazar 01145, Temuco, Chile

(2) Universidad de La Frontera, Departamento de Ciencias Forestales, Facultad de Ciencias Agropecuarias y Medioambiente, Francisco Salazar 01145, Temuco, Chile

(3) Pontífice Universidad Católica, Centro Nacional para la Industria de la Madera, Avda. Libertador Bernardo O'Higgins 340, Santiago, Chile

Fungi are quite diverse and essential organisms that help to keep the balance of ecosystems. They are able to assist plants in nutrient exchange and aid to degrade organic matter. Due to the little knowledge and gap in species identification, there is an underexplored potential for different industrial and ecological applications. The aim in this work was to compile the first record of macroscopic fungi from the relict forest in Parque Ecológico y Cultural Rucamanque (Temuco, La Araucanía). Rucamanque preserves the original vegetation that covered the valley of south-central Chile before the Spanish colonization, being mostly dominated by old-growth forests. In the fall of 2020 and 2021, three permanent plots were established to record and collect fungi samples. Extensive searches were also done by walking through different areas of the park, including meadows, native forest, as well as areas with exotic species and trails. Each individual mushroom found was recorded with a biological and ecological description. Once in the laboratory, technical photographs were taken to capture as many macroscopic details as possible. Spores were also obtained and analyzed under the microscope. A total of 187 taxa were found. From this, 79 species were identified: 9 species are endemic, 19 are native and the rest are cosmopolitan. This first detailed study shows that the park is highly diverse in macrofungi. It is important to continue research to expand this first record in order to advance in fungal conservation and their sustainable eco-bio-technological applications.

Financing: Administration of Parque Rucamanque; ANID National Doctoral Scholarship 2122257; ANID Basal FB210015 (CENAMAD); DIUFRO DIM22-0006; DIUFRO DI22-0027

P16 Identification of biodiversity's composition and abundance found in two types of substrate in artigas and shoa islets, antarctic peninsula

Identificación de la composición y abundancia de la biodiversidad encontrada en dos tipos de sustrato en los islotes artigas y shoa, península antártica

Amanda Valenzuela Valdés¹, Ignacio Garrido¹, Victoria Suescún¹, Leyla Cárdenas¹

(1) Centro de Investigación de Dinámica de Ecosistemas Marinos de Altas Latitudes (IDEAL), Avda. El Bosque 01789, Punta Arenas, Chile

Having a record of groups that inhabit Antarctica provides a baseline for assessing future alterations to biodiversity and establishing action plans. In this work we identify for the first time individual recruits of marine invertebrates from the Antarctic Peninsula. Main objective of this work is to establish an optimal sampling method for the study of biorecruiting in the area. In order to do this, a morphological analysis of the organisms found in two types of substrates (grass and tuff), which were exposed in two islets of the Peninsula (Artigas and Shoa), was carried out, and the ratios of abundance and diversity of species were measured. Among the individuals detected, groups belonging to *Arthropoda*, *Mollusca*, *Annelida*, *Chordata*, *Echinodermata* and *Bryozoa* were identified. In Artigas Islet, lawns shown a higher number of individuals and families than tuffies, suggesting that lawns provide a better refuge for reproduction and avoid predation. On Shoa Islet, same result was observed, however, it is not considered a representative sample since only one tuff was found at this site, making comparison difficult. For future expeditions, we suggested that the study could be complemented with additional molecular techniques, such as environmental DNA (eDNA), in order to achieve more complete results, and to analyze life cycles of dominant species to use this information in evaluation of conditions of environments they inhabit.

Financing: Proyecto FONDAP IDEAL 15150003

P17 Adaptive differences to post-fire resprouting in shrubs of coastal native forests

Diferencias adaptativas al rebrote post fuego en arbustos de bosques nativos de la Cordillera de Costa.

Rafael Andres García Araya^{1,2}, Nicole Sandoval¹

(1) Instituto de Ecología y Biodiversidad (IEB), Laboratorio de Invasiones Biológicas (LIB), Victoria 631, Concepción, Chile

(2) Universidad de Concepción, Departamento de Manejo de Bosques y Medio Ambiente, Facultad de Ciencias Forestales, Concepción, Chile

In Chile, wildfires have shown a steady increase in area and severity. Generating degradation processes that affect the composition and structure of native ecosystems. The mechanism and degree of adaptation of the species to fire will determine their persistence in these new conditions. Sampling in native forests of the Cordillera de la Costa recently affected by fire, determined that among the most abundant shrubs are the native species *Azara integrifolia*, *Escallonia pulverulenta* and the exotic *Teline monspessulana*. Among the adult individuals recorded in the field, in *A. integrifolia* 92% were completely burned shrubs with basal resprout, in *E. pulverulenta* they reached 98%. While *T. monspessulana* did not show resprout. Subsequently, a burning test was carried out on stumps of adult individuals of these species growing in unburned forests. The maximum temperature recorded inside the stumps varied according to the species. Inside stumps of *T. monspessulana* it was $104.7 \pm 23.2^\circ\text{C}$, which was significantly higher than that recorded in *A. integrifolia* and *E. pulverulenta*, which recorded maximum temperatures of $63.5 \pm 4.0^\circ\text{C}$ and $72.6 \pm 8.8^\circ\text{C}$, respectively. In relation to the total biomass (dry weight) accumulated per stump, evaluated 7 months after burning, *E. pulverulenta* was significantly higher than that recorded in *A. integrifolia* and *T. monspessulana*. The three species showed significantly different maximum resprout heights. *Escallonia pulverulenta* reached a height of 38.07cm, *A. integrifolia* 22.56 cm and *T. monspessulana* 5.86cm. There is a marked difference, where natives remain thanks to their ability to resprout, while exotics do so because of the post-fire persistence of their propagules.

Financing: FONDECYT 11170516, ANID/Basal FB210006

P18 Climate Change Microrefugia: use of sensors network for a novel approach in spatial prioritization for landscape conservation.

María de los Ángeles Marrero González^{1,3}, Carmen Rosa Ringeling², Micaela Poutay¹, Josefina Diaz¹, Yaracel Trapaiñan¹, Javier Borkosky¹, Carla Anfossi¹, Patricio Plischoff^{1,2,3,4,5,6}

(1) Proyecto Fondecyt 12201834, Chile

(2) Corporación Bosques de Zapallar, Chile

(3) Pontificia Universidad Católica de Chile, Departamento de Ecología, Facultad de Ciencias Biológicas

- (4) Pontificia Universidad Católica de Chile, Instituto de Geografía, Facultad de Historia, Geografía y Ciencia Política
 (5) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile
 (6) Pontificia Universidad Católica de Chile, Centro de Ecología Aplicada y Sustentabilidad (CAPES)

Global climate change represents one of the leading causes of biodiversity loss. When species cannot develop timely adaptive strategies to cope with change, migration to climatic refugia is the most viable alternative to survive. Microrefugia have the ability to maintain local environmental conditions suitable for the persistence of populations, so their detection is essential for biodiversity conservation. The spatial resolution of climate variables is a crucial factor in capturing local buffering capacity in the face of global changes, and the use of microsensors represents a methodological opportunity for characterizing environments at high spatial resolutions. In the present work, a fine spatial scale climatic network was developed through microsensors to detect microclimatic differences between forest and shrubland environments in a Mediterranean ecosystem. The results show a decoupling between the local climate obtained through the sensor network and the reference values of the nearest meteorological station. Additionally, the study evidences the existence of microclimatic differences between the two types of vegetation units; forests are characterized by minor maximum temperatures and lower thermal amplitude, although the average daily temperature does not present significant differences. The use of microsensors thus allows the detection of climatic differences between environments with a high spatial resolution. In the context of climate change is very useful in identifying microrefugia accurately and helps in decision-making related to the prioritization of areas for its conservation.

P19 Unrevealing the ecoclimatological changes of the ecosystems of Central Chile

Álvaro Salazar^{1,2}, Francisco Squeo^{1,2}, Marcus Thatcher³

- (1) Universidad de La Serena, Departamento de Biología, Facultad de Ciencias, Eduardo Bitrán, La Serena, Chile
 (2) Instituto de Ecología y Biodiversidad, Victoria 631, Barrio Universitario, Concepción, Chile
 (3) CSIRO, Oceans and Atmosphere, 107-121 Station Street Ascendale Victoria 3195, Melbourne, Australia

Vegetation in Mediterranean ecosystems is adapted to periods of recurrent drought. However, Central Chile is undergoing its 20th year of severe drought and its natural vegetation is showing signals of drying out. In this work, we use a variety of remote sensing products to disentangle the region's ecoclimatological changes (surface temperature, snow cover, rainfall and atmospheric moisture content) to understand the impacts of this long-term drought in a series of vegetation types across an aridity gradient (from shrublands to temperate forests) along Central Chile. In addition, we run a high-resolution climate model to disentangle current and future climate changes in the region that can further threads the region's ecosystems. We discuss the future of this area in the context of climate modelling studies and scenarios of water scarcity for people and ecosystems. This study shows the current impacts of the drying trend and possible mechanisms of changes in the components of the hydrological cycle in the only Mediterranean ecosystem of South America.

Financing: Fondecyt proyecto 3190563ANID proyecto FB210006

P20 Taxonomical clarification of *Paraphymatoceros diadematus*, an endemic tuberous hornworts from central Chile.

Clarificación taxonómica de *Paraphymatoceros diadematus*, un antocerote tuberoso endémico de Chile central.

Nicolás Ignacio Venegas Inostroza¹, Fernanda Pérez¹, Juan Larraín²

- (1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Av. Bernanrdo O'Higgins 340, Santiago, Chile
 (2) Sin afiliación

The hornworts, a division of bryophytes are the most unknown plant species on earth. Their diversity comprehends approximately 220 species that have been historically undersampled due to their small size and homogeneity of morphological traits that difficult their identification. Moreover, the scarcity of specialists on the taxa made the task of taxonomy harder. We choose as a case of study, the endemic hornwort species *Paraphymatoceros diadematus* from central Chile. Contrary to the common belief, this hornwort species was reported as a frequent organism living in the biological soil crust communities in central Chile during the winter season. The novel genus *Paraphymatoceros* was characterized by a different kind of tuber, spore ornamentation and number of antheridia compared with the previously described genus *Phymatoceros* (Phyma= tumor, keros=horns), however, it was placed into *Notothyladaceae*. Since then, different research on their morphology failed to find a consistent number of antheridia per chamber and their genetic traits still disagree with their morphology. In this research, we described *P. diadematus* phenology. We found a single antheridium enclosed on tubers using standard dissection protocols on fresh material and the type collection. Our finding recognizes a key trait for easy identification of an endemic hornwort species, closing a 16 years-old gap of miss-classification.

We proposed that their original description might be confounded with sympatrical species from the *Phaeoceros* genus living together on the same sites and we suggest that the tubers might be a convergent trait for hornworts in dry sites.

Financing: Beca ANID folio 211082074 Fondecyt convocatoria 2020 numero del proyecto 1211765

P21 Spatio-temporal relationship between the high-grade use of *Nothofagus alpina* and its regeneration in a forest of the Coihue-Raulí-Tepa forest type in Panguipulli.

Relación espacio-temporal entre el floreo de *Nothofagus alpina* y su regeneración en un bosque del tipo forestal Coihue- Raulí- Tepa en Panguipulli.

Bárbara Lara Riquelme¹, Mauro González¹

(1) Universidad Austral de Chile, Laboratorio de Ecología de Bosques, Instituto de Conservación, Biodiversidad y Territorio, Facultad de Ciencias Forestales y Recursos Naturales, Independencia 631, Valdivia, Chile

Uno de los principales métodos de extracción maderera utilizados en Chile fue el floreo, actividad que consistía en extraer las especies forestales de mayor valor comercial del bosque, dejando los individuos de menor calidad y peor forma. Esta práctica generó cambios en la estructura y composición de los bosques, especialmente en los del tipo forestal Coihue- Raulí- Tepa, en donde se utilizaba de manera indiscriminada para extraer principalmente grandes individuos de *Nothofagus alpina* (raulí), generando una liberación de recursos y condiciones que en combinación con las características autoecológicas de la especie, fueron aparentemente propicias para el establecimiento de nuevos individuos de la misma especie, mediante semillas o rebrotes de tocón. Para verificar si existe una relación positiva entre el floreo y el establecimiento de los individuos de la misma especie, se determinó la relación espacio-temporal entre los individuos jóvenes de raulí considerados como aquellos establecidos post floreo y los tocones de la misma especie, en un bosque antiguo de Coihue- Raulí- Tepa que fue floreado hace aproximadamente 50 años y se encuentra en la comuna de Panguipulli, Región de Los Ríos.

P22 Justicia ambiental en la ciudad: Influencia del nivel socioeconómico sobre la ocurrencia del picaflor (*Sephanoides sephaniodes*)

Nélida R. Villaseñor^{1,2}, Martín A. H. Escobar¹

(1) Universidad de Chile, Gestión Forestal y su Medio Ambiente, Facultad de Ciencias Forestales y de la Conservación de la Naturaleza, Santiago, Chile

(2) Universidad Bernardo O'Higgins, Departamento de Ciencias Químicas y Biológicas, Salud, Santiago, Chile

Las ciudades impactan fuertemente los ecosistemas, sin embargo, también pueden proporcionar hábitat para especies nativas, contribuyendo a conservar biodiversidad y restaurar el vínculo entre las personas y la naturaleza. Un problema común en las ciudades Latinoamericanas es su segregación socioambiental. Aunque existe evidencia creciente sobre la relación entre la riqueza económica y la biodiversidad en ciudades, ha sido poco investigada en animales, en particular con aves migratorias. En esta conferencia mostraremos los resultados de una investigación recientemente publicada, donde estudiamos la influencia del nivel socioeconómico sobre un ave migrante austral del Neotrópico, que es considerada una especie clave. Evaluamos si el nivel socioeconómico del vecindario y las variables del hábitat se relacionan con la ocurrencia del picaflor (*Sephanoides sephaniodes*) en Santiago de Chile. Hipotetizamos que el nivel socioeconómico del vecindario influiría positivamente en la ocurrencia del picaflor a través de un efecto mediador de la cobertura de la vegetación leñosa. Encontramos que la ocurrencia del picaflor aumentó con el nivel socioeconómico del vecindario y la cobertura leñosa. Específicamente, encontramos que el nivel socioeconómico influyó indirectamente en la ocurrencia del picaflor a través de la cobertura leñosa y arbustiva. Nuestros resultados muestran que los vecindarios donde viven los más ricos presentan una mayor cobertura leñosa y una mayor presencia de picaflores que los vecindarios más pobres, obteniendo mayores oportunidades para experimentar la naturaleza cerca del hogar. Incrementar la cobertura de árboles y arbustos donde viven personas de nivel socioeconómico más bajo promoverá una ciudad ambientalmente más justa.

Financing: Fondecyt iniciación 11201045: Understanding the relationship between socioeconomic status and biodiversity to promote an ecologically just city (NRV)

P23 Browning of the Chilean matorral: ecological collapse or just another concerning warning?

Browning del Matorral Chileno: ¿Colapso ecológico o sólo otra advertencia preocupante?

Gerardo E. Soto¹

(1) Universidad Austral de Chile, Instituto de Estadística, Facultad de Ciencias Económicas y Administrativas, Calle Viel sin número, Campus Isla Teja, Valdivia, Chile

Since 2010, central Chile has experienced a so-called mega drought. While precipitation levels continued to decline, during the Austral spring of 2019, sclerophyllous vegetation experienced widespread browning of their leaves. Browning can be defined as the opposite of greening, driven by the drying of leaves in the absence of enough water supply. This creates a risky environment in which the likelihood of massive fire occurrences increases. Since 2020, there has been an increase in precipitation with vegetation greening again. This work intends to explore the proportion and total area of sclerophyllous vegetation that has not recovered from this browning event. Using a common descriptor for greening, the Normalized Difference Vegetation Index based on harmonized Landsat 7 and 8 collections, I generated a 30m-spatial resolution time series. I masked this time series using land cover information from CONAF, filtering by sclerophyllous-dominated patches only, totaling an area of ~700,000 ha. I calculated the Sen's slope for two periods, corresponding to browning (2018-2021) and greening (2020-2022), and the statistical significance of trends by using the Mann-Kendall test. A total of 613,097 ha (90.17%) of sclerophyllous vegetation presented significant browning in the 2018-2020 period. Of this area, 41,229 ha (6.72%) showed non-increasing greening following the event, indicating the inability of such vegetation to recover. In conclusion, with more than 90% of this vegetation experiencing the physiological consequences of water deprivation, only a small percentage has not recovered. As encouraging as this might sound, the current climatic trends provide unpromising scenarios for these ecosystems.

P24 Characterization of leaf phenology of the salar de atacama vegetation using 35 years of landsat satellite images

Caracterización de la fenología foliar de la vegetación del salar de atacama utilizando 35 años de imágenes satelitales landsat

Ignacio López Acevedo¹, Roberto Chavez Oyanedel^{1,3}, Matias Olea¹, Manuel Prieto Montt²

(1) Pontificia Universidad Católica de Valparaíso, Instituto de Geografía, Facultad de Ciencias del Mar y Geografía, Brasil 2241, Valparaíso, Chile

(2) Universidad Tarapacá, Departamento de Ciencias Históricas y Geográficas, Facultad de Educación y Humanidades, Avda. 18 de Septiembre #2222, Campus Saucache, Arica, Chile

(3) Instituto de Ecología y Biodiversidad, Santiago, Chile

El salar de Atacama en el Norte de Chile constituye una de las mayores reservas mundiales de Litio, un insumo clave para sostener la industria de electromovilidad, una alternativa al uso de combustibles fósiles para el transporte. El aprovechamiento industrial del Litio supone al mismo tiempo una amenaza para el ecosistema existente en el Borde Este del Salar de Atacama. A la fecha, existe un desconocimiento de la dinámica natural de los tipos de vegetación presentes, necesaria para la adecuada interpretación de un sistema de monitoreo basado en imágenes satelitales. En este estudio, utilizamos series de tiempo de NDVI de los satélites Landsat 5TM, 7ETM+ y 8-OLI de resolución espacial 30 x 30 metros para cuantificar la fenología anual usando un enfoque estadístico no paramétrico (npphen R-package) para tres tipos de vegetación: Matorral de Brea (*Pluchea absinthioides*), Praderas de Grama (*Distichlis spicata*) y vegetación higrófila o Juncal (*Juncus conglomeratus*). Npphen permite estudiar anomalías al comportamiento fenológico anual de las distintas especies e implementar un sistema de monitoreo para evaluar si las anomalías son extremas considerando su variabilidad fenológica histórica. Nuestros resultados muestran un comportamiento fenológico estacional del NDVI dentro del rango de 0.15 a 0.35, con un periodo de crecimiento que va entre enero y abril. Temporalmente destaca un fenómeno de “reverdecimiento” de la vegetación del Borde Este durante la última década, siguiendo una tendencia general observada para el Altiplano chileno.

Financing: Proyecto Fondecyt n° 1201527 :“Dimensiones socioecológicas de los bofedales en el norte de Chile: Manejo local, variabilidad climática y extractivismo”

P25 Spatio-temporal evaluation of irrigation patterns in agricultural areas of the Petorca river basin using MODIS EVI satellite images and hydro-climatic records.

Evaluación espacio-temporal de patrones de irrigación en zonas agrícolas de la cuenca del río Petorca a partir de imágenes satelitales MODIS EVI y registros hidro-climáticos.

Gabriel B. Castro¹, Roberto O. Chavez^{1,5}, Ariel A. Muñoz^{2,3,4}

(1) Pontificia universidad católica de Valparaíso, Laboratorio de geo-información y percepción remota PUCV., Instituto de Geografía, Brasil 2241, Valparaíso, Chile

(2) Pontificia universidad católica de Valparaíso, Laboratorio de dendrocronología y estudios ambientales PUCV., Instituto de Geografía, Brasil 2241, Valparaíso, Chile

(3) CENTRO DE CIENCIA DEL CLIMA Y LA RESILIENCIA (CR)2, Av. Alameda, Blanco Encalada 2002, Santiago, Chile

(4) Centro de acción climática PUCV, Av. Brasil N° 2950, Valparaíso, Chile

(5) Instituto de ecología y biodiversidad (IEB), Santiago, Chile

La cuenca del río Petorca se ha caracterizado durante las últimas dos décadas por ser una zona de producción y exportación agrícola de frutas de alto valor económico, donde el uso de agua para irrigación juega un papel fundamental. El uso desmedido del agua puede acarrear consecuencias negativas relevantes para los ecosistemas de la cuenca, ya amenazados por la Mega-sequía que afecta la zona central de Chile. A partir del análisis de imágenes satelitales MODIS EVI es posible detectar zonas agrícolas irrigadas ya que solo estas alcanzan valores de "verdor" altos ($EVI > 0.3$) durante la época seca (verano) dentro de la cuenca, a diferencia de la vegetación natural (bosques esclerófilo, matorrales y praderas). Considerando toda el área agrícola de la cuenca de Petorca, se observó una disminución del 30% de la superficie altamente irrigada (SAI) con un EVI estival > 0.3 , entre 2010 (inicio de la Mega sequía) y 2015 (mínimo histórico de la SAI). Si bien en todas las secciones de la cuenca (alta, media y baja) la SAI disminuyó durante la Mega-sequía, fue la parte alta la que mantuvo una mayor proporción de SAI (9%) en comparación con la parte media (2%) y baja (1%) para el verano de 2015, constatando que la mayor concentración en la irrigación se ubica en la zona alta de la cuenca. El método satelital propuesto constituye una herramienta costo-eficiente para el monitoreo del uso del agua en ambientes como Chile Central donde se proyectan más extensas y frecuentes sequías debido al cambio climático.

Financing: FONDECYT Regular N°1201714: "ASSESSING HISTORICAL CHANGES OF WATER EXTREME EVENTS AND THEIR IMPACTS ON VEGETATION, WATER ACCESS AND INFRASTRUCTURE PLANNING IN MEDITERRANEAN AND SEMI-ARID BASINS OF CHILE"

P26 Two types of blooming desert: Spatio-temporal evaluation of extreme vegetation anomalies in the Atacama Desert using 22 years of MODIS NDVI satellite images

Dos tipos de Desierto Florido: Evaluación espacio-temporal de anomalías extremas de vegetación en el Desierto de Atacama usando 22 años de imágenes satelitales MODIS NDVI

Javiera Aguayo¹, Roberto O. Chávez^{1,2}, Matías Olea¹

(1) Pontificia Universidad Católica de Valparaíso, Laboratorio de Geo-Información y Percepción Remota, Instituto de Geografía, Avenida Brasil 2241, Valparaíso, Chile

(2) Instituto de Ecología y Biodiversidad, Santiago, Chile

En el Desierto de Atacama, uno de los desiertos más áridos del mundo ocurre esporádicamente un fenómeno natural espectacular conocido como "Desierto Florido". Si bien este fenómeno ha sido ampliamente estudiado por botánicos, geógrafos y ecólogos, su distribución geográfica ha sido escasamente documentada y comúnmente asociada solo a las regiones de Atacama y Coquimbo. Un estudio espacio-temporal reciente con imágenes satelitales que consideró criterios de aridez y de "enverdecimiento" extremo se pudo identificar por primera vez un segundo tipo de desierto florido en el extremo noreste del Desierto de Atacama, ocurrido durante el año 2012, el que se extiende entre las regiones de Arica y Parinacota y de Tarapacá.

Este estudio busca evaluar en mayor detalle espacial los patrones espacio temporales de los dos tipos de desierto florido usando una serie de tiempo de imágenes satelitales del Moderate Resolution Image Spectroradiometer (MODIS NDVI) entre los años 2000 y 2021, a partir de la construcción de una línea base fenológica del Desierto de Atacama utilizando el paquete de R "npphen", el cual usa un enfoque probabilístico para cuantificar la fenología anual de la superficie terrestre y su variabilidad temporal. Esto permite detectar anomalías extremas de verdor de la vegetación, a una resolución espacial de 250 metros. Este método permitirá evaluar los eventos de desierto florido en términos de su extensión espacial, duración temporal e intensidad de "verdor". Además, se busca relacionar estos resultados con datos grillados de precipitación que también son evaluados en

términos de su dinámica espacio-temporal.

Financing: Proyecto FONDECYT regular N°1211924A spatiotemporal assessment of major disturbances on Chilean vegetation phenology, productivity and resilience using 40 years of continuous remote sensing records

P27 Carnivores and landscapes in the Coastal mountain range of central Chile. Comparative assessment of its richness, diversity and abundance.

Carnívoros y paisajes en la Cordillera de la Costa de Chile central. Evaluación comparativa de riqueza, diversidad y abundancia.

Diego Ramírez Alvarez¹, Constanza Napolitano Valenzuela^{2,3,4}, Gabriel Arriagada⁵, Ivan Salgado¹, Simon Cox⁵

(1) Unidad de Vida Silvestre, Servicio Agrícola y Ganadero (SAG), Región de O'Higgins, Rancagua, Chile.

(2) Departamento de Ciencias Biológicas y Biodiversidad, Universidad de Los Lagos, Osorno, Chile.

(3) Instituto de Ecología y Biodiversidad (IEB), Concepción, Chile.

(4) Centro Internacional Cabo de Hornos (CHIC), Puerto Williams, Chile.

(5) Instituto de Ciencias Agroalimentarias Animales y Ambientales (ICA3), Universidad de O'Higgins, San Fernando, Chile.

Carnivores play an important role in the functioning of ecosystems as apex predators. Landscape characteristics and resource availability determine the composition and abundance of co-occurring carnivores. Between March 1, 2021, and March 31, 2022, we conducted a comparative assessment of richness, diversity and abundance of native carnivores in three different landscapes of central Chile Coastal range: a) Monoculture plantation of exotic *Pinus radiata* (MP); b) Mediterranean coastal thorny forest (TF); and c) Mediterranean coastal sclerophyllous forest (SF). In each landscape, we monitored an area of 1000 ha, and installed ten camera traps (total 30 camera traps). We used a monitoring grid with unbaited camera traps separated by 1 km, with a total photo-trapping effort of 10,046 camera days. Classification, organization and analysis of camera trap data was conducted using CameraSweet softwares. The total number of native carnivore species independent events (photos separated >60 minutes) recorded in each landscape were: 1564 in SF, 1412 in TF and 775 in MP. Richness and diversity were the same in all three landscapes. There were differences in the total relative abundance of carnivores registered between landscapes, with SF and TF having the highest records; however, differences were not significant. By species relative abundance showed significant differences between SF and MP landscapes for *Leopardus guigna*, *Conepatus chinga* and *Galictis cuja*, and also between TF and MP landscapes for *L. guigna*. Our results contribute to inform management strategies for the conservation of native carnivores at the landscape level in the biodiversity hotspot of Central Chile.

P28 State and interactions of rhythmic bacteria in circadian-related diseases

Pamela Ubilla Gutiérrez¹, Pablo Marquet¹, Evandro Ferrada¹

(1) Pontificia Universidad Católica de Chile, Departamento de Ecología, Facultad de Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

Due to the important influence of the human gut microbiome on human health, much research has been done to understand the connections between microorganisms and human metabolic states. Recently, it was shown that variations in bacterial abundances in the gut microbiome correlate with the human circadian clock. In this context, it was postulated that diseases related to circadian desynchronization, could be mediated by the gut microbiome. However, this possible connection has not been explored in detail. Here, we looked for evidence that connects rhythmic bacteria with gut microbiome alterations in people with circadian desynchronization-related diseases. First, we searched in published articles for taxonomic groups of bacteria having a circadian pattern in their daily relative abundance variation (rhythmic bacteria). Next, we estimated the interaction network of species in a healthy microbiome and identified taxa directly interacting with rhythmic bacteria. Then we compare publicly available data from gut microbial communities of healthy people vs. those with Type 2 diabetes, Hypertension, ACVD, CRC, or IBD. We looked for differences with Analysis of Similarity and then identified the species contributing to dissimilarity and taxa with significant differences between groups with a Kruskal-Wallis test. We found a few rhythmic bacteria and their interacting pairs among the species explaining the differences between healthy's and diseased's microbiomes. So far, results suggest that if there is a connection between circadian disruption, microbiome, and the development of diseases, this connection does not seem related to changes in rhythmic bacteria and their interacting partners in the gut microbial community.

Financing: Beca Anid Doctorado Nacional 21180581

P29 Use of Species Distribution Model as a habitat estimator , the case of *Ugni molinae*

Uso de Modelo de Distribución de Especies como estimador de hábitat , el caso de *Ugni molinae*

Renato Otárola Orellana¹, Paulette I. Naulin¹

(1) Laboratorio Biología de Plantas, Facultad de Ciencias Forestales y Conservación de la Naturaleza, Universidad de Chile, Santiago, Chile

La distribución natural de una especie es aquella área donde está presente e interactúa con el ambiente de manera no efímera. Los modelos de distribución de especies son herramientas capaces de estimar su distribución potencial utilizando ocurrencias y variables ambientales, esto nos permite analizar su hábitat, expresando un área espacialmente explícita, donde la especie pueda desarrollarse, en otras palabras, su nicho fundamental. No obstante, no es suficiente generar esta información, la validación de las zonas con mayor y menor idoneidad debe ser revisada directamente en terreno verificando su presencia o ausencia. En este estudio se realizó un modelo de distribución de especies con Random forest, utilizando ocurrencias depuradas de *Ugni molinae*, obtenidas de herbarios y GBIF, junto a variables socioambientales. Uno de los resultados del modelo es la representación gráfica de idoneidad de presencia, es decir, zonas con mayor probabilidad de presencia de la especie. Las zonas con mayor idoneidad fueron contrastadas con puntos de presencia verificados en terreno, validando la presencia en los extremos de la distribución y la ausencia en zona no idóneas. En *U. molinae* se verifica que los modelos de distribución de especies permiten estimar su área de distribución de manera más completa que los puntos de ocurrencia o las divisiones geográficas políticas, ya que el modelo descartó zonas con nula idoneidad y redujo la sobreestimación del área de distribución. Finalmente, al generar un espacio de probabilidad de ocurrencia continuo en el territorio, permitiría enfocar esfuerzos de muestreo e implementación de políticas públicas en conservación.

Financing: Fondecyt Regular 1211114

P30 The role of urban forests for saproxylic beetles conservation: A Valdivian study case

El rol de los bosques urbanos para la conservación de los escarabajos saproxílicos: Un caso de estudio en Valdivia

Cristobal Tello Arriagada¹, Francisco Tello Arriagada^{2,3}

(1) Escuela de Pregrado de Licenciatura en Ciencias con Mención en Biología, Universidad Austral de Chile, 5090000 Valdivia, Chile.

(2) Laboratorio de Salud de Bosques, Facultad de Ciencias Forestales y Recursos Naturales, Universidad Austral de Chile, 5090000 Valdivia, Chile.

(3) Fundación para el Estudio del Patrimonio Pleistocénico de Osorno, 5290000 Osorno, Chile

Saproxylic beetles (i.e., deadwood-dependent organisms) are taxonomically and functionally most diverse animals that inhabiting forest ecosystems. In recent decades, multiple saproxylic beetle-based studies have been conducted on diversity and conservation in both natural and monoculture plantations forest. However, this insects has been little studied in urban forests. Here, we analyzed the species richness, abundances, and species composition changes of urban saproxylic beetles assemblages in the seasonal gradient, using the Arboretum of the Valdivia city (Región de Los Ríos, Chile) as study case. Twelve standing dead trees were monitored monthly for 2 years (2020-2021). For this purpose, we used tree-trunk flight-interception traps. Additionally, we recorded qualitative and quantitative variables of the trees-trap, and environmental variables such as temperature and humidity. We obtained 1,241 individuals, belonging to 43 families and 217 saproxylic species/morphospecies. Regarding seasonal variations, we observed that the abundance of saproxylic beetles increased significantly in spring-summer compared to winter and autumn seasons, and changes in species composition. Finally, we found that diversity and species composition were strongly influenced by the degree of decomposition of dead wood, increasing diversity and abundance in highly decayed trees. This research provides evidence on the taxonomic diversity of saproxylic beetle assemblages in urban forests, which may be useful species indicators for the establishment of conservation and management in urban forests.

P31 Automatic recognition of Black-necked Swan (*Cygnus melancoryphus*) from UAV imagery

Reconocimiento automático del cisne de cuello negro (*Cygnus melancoryphus*) a partir de imágenes obtenidas de VANT

Marina Magdalena Jiménez Torres^{1,2,5}, Carmen Paz Silva³, Carlos Riquelme⁴, Sergio Estay^{3,4}, Mauricio Soto Gamboa^{1,2,3}

(1) Universidad Austral de Chile, Laboratorio de Ecología Conductual y Conservación, Facultad de Ciencias, Valdivia, Chile

(2) Universidad Austral de Chile, Programa Austral Patagonia, Facultad de Ciencias Económicas y Administrativas, Valdivia, Chile

- (3) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Valdivia, Chile
 (4) Pontificia Universidad Católica de Chile, Center of Applied Ecology and Sustainability (CAPES), Santiago, Chile
 (5) Universidad Austral de Chile, Programa de Doctorado en Ciencias mención Ecología y Evolución, Escuela de Graduados, Facultad de Ciencias, Valdivia, Chile

The use of drones in animal monitoring programs has two significant limitations. First, the increase of information requires a high capacity of storage, and second, time invested in data analysis. We present a protocol to develop an automatic object recognizer to minimize analysis time and optimize data storage. We used a Black-necked swan (*Cygnus melancoryphus*) as a model because it is abundant and has a contrasting color compared to the environment, making it easy detection. We conducted this study at the Cruces River, Valdivia, Chile, using a Phantom 3 Advanced drone with an HD-standard camera. The drone flew 100 m obtaining georeferenced images with 75% overlap and developing approximately 0.69 km² orthomosaics images. To build the recognizer, we estimated the swans' spectral signature and adjusted nine criteria for object-oriented classification. We obtained 140 orthophotos classified into three brightness categories. We found a Precision, Sensitivity, Specificity, and Accuracy higher than 0.93 and a calibration curve with R²= 0.991 for images without brightness. The recognizer prediction decreases with brightness but is corrected using ND8- 16 filter lens. We discuss the importance of this recognizer to data analysis optimization and the advantage of using this recognition protocol for any object in ecological studies.

Financing: ANID-Subdirección de Capital Humano/Doctorado Nacional/2022-21221530

P32 Effects of the variation in individual behavior on trophic niche partitioning of a *Zonotrichia capensis* population from central Chile

Efecto de la variación de la conducta individual sobre la partición del nicho trófico en una población de chincol de Chile central (*Zonotrichia capensis*)

María Lucía Málaga Cerpa^{1,2}, Yanina del Carmen Poblete Quintanilla², Sara Bustamante Riffo^{1,2}, Natalia Ricote Martínez², Pablo Sabat¹, Karin Maldonado Pacheco²

- (1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425 - Ñuñoa, Santiago, Chile
 (2) Universidad Adolfo Ibáñez, Departamento de Ciencias, Facultad de Artes Liberales, Diagonal Las Torres 2640 - Peñalolén, Santiago, Chile

La especialización individual (EI) se da cuando los individuos de una población consumen un subconjunto de los recursos utilizados por la población total, lo que podría contribuir a la supervivencia de los individuos ante la escasez de recursos. Se ha propuesto una relación positiva entre la diversidad de conductas de forrajeo y la diferenciación en el uso de recursos dentro de una población. Las conductas típicamente medidas en estudios de personalidad animal son: niveles de actividad, exploración, sociabilidad, audacia y agresividad. La exploración en términos de adquisición de alimento, podría ser un indicador confiable de cómo un individuo en un entorno conocido, donde se desconoce la ubicación de los alimentos, puede beneficiarse de explorar un área más grande, en lugar de solo explorar una parte del área disponible. Para estudiar si los niveles de exploración podrían influir en la amplitud de nicho trófico individual se estimó la varianza isotópica como proxy de la dieta ($\delta^{15}\text{N}$) presente en tejidos con distinta tasa de recambio (glóbulos rojos, plasma y uñas) en individuos de *Zonotrichia capensis* en Chile central. La conducta exploratoria se evaluó mediante grabaciones de los individuos en su medio natural y se obtuvieron medidas cuantitativas de éstas mediante la aplicación Jwatcher. La población analizada presentó niveles significativos de EI, encontrando individuos con diferentes amplitudes de nicho y ocupando diferentes posiciones del nicho poblacional total. Con respecto al conducta exploratoria, la población mostró una gran variabilidad entre individuos, sin embargo, ésta no estuvo significativamente asociada a la diversidad de alimentos consumidos.

Financing: Financiado por FONDECYT REGULAR N°1200513

P33 *Araucaria araucana*: new northern limit and niche differences between Andes and Nahuelbuta regarding its vulnerability to climate change

Araucaria araucana: nuevo límite norte y diferencias de nicho entre Andes y Nahuelbuta en relación con su vulnerabilidad al cambio climático

Diego Alarcón Abarca^{1,2}, Antonio Varas Myrik³, Mary T. K. Arroyo^{1,2}

- (1) Universidad de Chile, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Chile
 (2) Instituto de Ecología y Biodiversidad (IEB-Chile), Las Palmeras 3425, Ñuñoa, Chile
 (3) Universidad de Concepción, Departamento de Silvicultura, Facultad de Ciencias Forestales, Barrio Universitario, Concepción, Chile

Las poblaciones de *Araucaria araucana* presentan una distribución disyunta en las cordilleras de los Andes y Nahuelbuta en un rango latitudinal entre

37.5° y 39.8° de latitud sur. Recientemente se han reportado dos grupos ancestrales en su composición genómica, cuya proporción permite distinguir las poblaciones de cada sección disyunta (Varas-Myrik *et al.* 2022). Esto permite sospechar posibles diferencias en los nichos ecológicos de las divisiones de su población. En este trabajo, junto con reportar una población en Nahuelbuta que expande la especie hasta 37.1° de latitud sur, sometimos a prueba el conservatismo del nicho climático de ambas secciones disyuntas mediante los tests de cuantificación y superposición de nichos usando el R package ecospat (Di Cola *et al.* 2017) considerando datos climáticos de CHELSA V2.1 (Karger *et al.* 2021). Los resultados muestran sólo 7.2% de superposición según valor D de Schoener y 23.8% de superposición según valor I de Hellinger. Los test de equivalencia y similitud indican que no hay conservatismo de nicho climático significativo entre Andes y Nahuelbuta, aunque estas diferencias importantes no son suficientes para concluir en divergencia del nicho. Tanto la ampliación de su distribución conocida, como las diferencias en los nichos climáticos, resultan relevantes para modelar la distribución de las poblaciones y para evaluar la vulnerabilidad al cambio climático de este importante árbol amenazado en su conservación.

Financing: FONDECYT Postdoctorado 3200675 y FB 210006

P34 Phenotypic analysis of *Columba livia* under urbanization gradients: effects between the thermal heterogeneity of the city and plumage coloration.

Análisis fenotípico de *Columba livia* bajo gradientes de urbanización: efectos entre la heterogeneidad térmica de la ciudad y la coloración del plumaje.

Javiera Arcila Flores¹, Isaac Peña Villalobos^{1,2}, Catalina Muñoz Pacheco^{4,5}, Tomás Jiménez Fandiño¹, Verónica Palma², Pablo Sabat^{1,3}

(1) Universidad de Chile, Ecología, Ciencias, Las Palmeras 3425, Santiago, Chile

(2) Universidad de Chile, Biología, Ciencias, Las Encinas 3370, Santiago, Chile

(3) Pontificia Universidad Católica de Chile, Ecología, Center of Applied Ecology & Sustainability (CAPES-UC), Santiago, Chile

(4) Universidad de Chile, Facultad de Ciencias Forestales y de la Conservación de la Naturaleza, Av. Santa Rosa 11315, Santiago, Chile

(5) Universidad Central de Chile, Escuela de Arquitectura del Paisaje, Av. Toesca 1783, Santiago, Chile

El impacto antrópico en las ciudades ha generado diversos cambios en el ambiente, lo que ha resultado en fenómenos tales como la heterogeneidad térmica dentro de Santiago, provocando a su vez, la aparición e intensificación de islas de calor en el mismo.

Dentro de las distintas comunas que componen esta provincia, Puente Alto registra el punto más frío, mientras que curiosamente, La Florida presenta un punto caliente relativamente cercano al primero. Así, entre ambos lugares existe un gradiente de temperatura de 28°C.

Las palomas (*Columba livia*), son aves con polimorfismo en su coloración que pueden ser el resultado directo de diferencias genéticas y su interacción con el ambiente, existiendo antecedentes de una fuerte relación entre plumaje y temperatura. Por lo anterior, se espera que individuos avistados en distintos puntos de un gradiente térmico presenten variaciones en su fenotipo.

Para abordar esto, se realizaron 40 transectos aleatorios entre dos zonas presentes en ambas comunas y analizaron variables socioambientales a través de QGIS. Nuestros resultados indican que la abundancia de *C. livia* depende fuertemente de la condición socioeconómica y que el tamaño de la población de estas aves sería el principal factor que explica la variabilidad de fenotipos de coloración. Específicamente, se observó que los fenotipos Spread y T-Checker no presentan diferencias en la preferencia de uso del espacio. Además, las aves con mayor grado de melanismo aumentaron su proporción al incrementar la temperatura. Se proyecta analizar el carácter adaptativo de las coloraciones en el contexto de las variables ambientales.

Financing: FONDECYT iniciación N°: 11221062 (Feral pigeons and urban heat islands: relationship between color polymorphism and pleiotropy in melanocortin system)

P35 Analysis of the evolution of annuality in the native genus *Leucheria*.

Análisis de la evolución de la anualidad en el género nativo *Leucheria* (Asteraceae).

Daniela Jure Silva¹, Nicolás Lavandero¹, Fernanda Perez¹

(1) Pontificia Universidad Católica de Chile, Ecología, Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, Región Metropolitana

In angiosperms the evolution of annuality is described as a derived trait in response to evolutionary pressures caused by extreme climatic conditions, such as arid environments, thus evolved as an escape strategy. The study focuses on the analysis of the life history of native genus *Leucheria* (Asteraceae), which is distributed in a diverse range of environments, arid and cold, being spotted throughout the national territory. This genus presents both a perennial and annual life history, currently reporting 39 perennial and 6 annual species, the latter being a life history habit that would

have evolved in two lineages independently, as suggested by previous phylogenetic studies on the matter. Nevertheless, recent morphological studies question the annual character of these species, since some of them present growth rings, a characteristic that is typically attributed to perennial plants, thus assuming that they have been wrongly classified as annuals. In efforts to corroborate their annual nature, in this work we produce cross section samples of roots and stems of species belonging to distinct clades, which present perennial species and annual species that arise from the two different lineages as well as some species with particularities in their vascular organization. From these samples, the results suggest that within the genus in study (*Leucheria*) there are two forms of annuality corresponding to each lineage, presenting annual plants with isolated and organized vascular bundles, typical of the xylem of annual herbaceous plants and annual plants that display growth rings, which is rather unusual.

P36 Effects of experimental oceanic acidification on the physiological performance of the Chilean mussel *Mytilus chilensis*

Efectos de la acidificación oceánica en el desempeño fisiológico del mitílido *Mytilus chilensis*

Daniela Hughes^{1,2}, Nicolás Leppes^{1,2}, Sebastián Martel¹, Marco Lardies¹

(1) Universidad Adolfo Ibañez, Ciencias, Artes Liberales, Diagonal Las Torres 2700, Santiago, Chile

(2) P. Universidad Católica de Chile, Ciencias Biológicas, Alameda 340, Santiago, Chile

Ocean acidification is currently one of the main global change drivers, challenging marine ecosystems. Oceans moderate the human-driven rise in atmospheric CO₂ up to a third of emissions, which can be translated into chemical changes in the oceanic carbonate system. These changes impact the biological performance of marine species, affecting their energy budget and thus imposing restrictions and trade-offs on individual phenotypes. Current evidence suggests that calcifying species are among the most threatened by changes in oceanic pH after shell production; thus, their energy budget could be in unbalance. In the present work, we studied the effects of acidic conditions in individuals of the Chilean mussel *Mytilus chilensis*, a bivalve of ecological, economic, and social importance inhabiting the coasts of the country. In particular, in the laboratory, we studied the energetic compensations by phenotypic plasticity of this species after a 90-days exposition to two pH conditions (current and 2100-projected scenarios). Juvenile individuals collected in the locality of Caleta El Manzano, a renamed seeder of the species, showed a higher oxygen uptake when exposed to low pH compared to mussels under control conditions. However, morphological measurements did not differ between treatments. Our results suggest an energetic compensation to the stressful environment, possibly sustained by an increase in food intake. These findings could be useful to predict the responses of calcifying species to the rapid change in oceanic chemistry.

Financing: FONDECYT 1190444ANID–Millennium Science Initiative Program–Code ICN2019_015

P37 Inter-population phenotypic differences in the Chilean mussel *Mytilus chilensis* exposed to acidification conditions in the laboratory

Diferencias fenotípicas a nivel interpoblacional en el mitílido *Mytilus chilensis* expuesto a condiciones de acidificación del océano en laboratorio

Nicolás Leppes^{1,2}, Daniela Hughes^{1,2}, Sebastián Martel¹, Marco Antonio Lardies¹

(1) Universidad Adolfo Ibañez, Ciencias, Artes Liberales, Diagonal Las Torres 2700, Santiago, Chile

(2) P. Universidad Católica de Chile, Ciencias Biológicas, Alameda 340, Santiago, Chile

One of the main global change drivers affecting marine ecosystems is oceanic acidification. Calcifying species as bivalves are found among the most threatened species by changes in environmental pH because acidification can diminish the carbonate ion, essential to biomineralization and shell production. Currently, the artisanal fisheries and aquaculture systems are critical to human societies after they give food supply and livelihoods to millions of people. One of the most important and exploited marine species is the Chilean mussel *Mytilus chilensis*, an extended bivalve species in the south of the country. Nevertheless, in spite of its economic importance, its production is still rudimentary. Indeed, its extensive culture is not based on scientific knowledge regarding the geographical origin of the mussel seeds or their physiological phenotypes. In this work, we used juvenile *M. chilensis* individuals from two different localities showing contrasting environmental conditions to test for possible farming benefits in the current acidification context. After a three-month exposition in acidic conditions in a common garden experimental set-up, our results indicate an inter-population difference in energy expenditure (oxygen uptake) but not reflected in growth rates in a controlled temperature, salinity, and pH mesocosm set-up. Our results suggest differential phenotypic responses between populations of different origins (marine vs estuarine) with possible repercussions on aquaculture practices in the context of oceanic change.

Financing: FONDECYT 1140092ANID–Millennium Science Initiative Program–Code ICN2019_015

P38 Niche modeling to predict future threats and adaptation strategies to climate change in brown algae (*Lessonia* spp.)

Modelación de nicho para predecir futuras amenazas y estrategias de adaptación al cambio climático en macroalgas pardas (*Lessonia* spp.)

Milen Duarte^{1,2}, Natalia Sanhueza¹, Fadia Tala³, Julio Vásquez³, Alejandra González¹

(1) Departamento de Ciencias Ecológicas, Facultad de Ciencias, Universidad de Chile.

(2) Instituto de Ecología y Biodiversidad, Facultad de Ciencias, Universidad Austral de Chile. Campus Isla Teja. Valdivia.

(3) Departamento de Biología Marina, Centro de Investigación y Desarrollo Tecnológico en Algas (CIDTA), Instituto Milenio en Socioecología Costera (SECOS), Facultad de Ciencias del Mar, Universidad Católica del Norte.

El intermareal chileno está dominado por macroalgas pardas *Lessonia* spp., que son base de la pesquería artesanal, y proporcionan numerosos servicios ecosistémicos al ser organismos fundacionales. En este escenario, es crucial evaluar el impacto del cambio climático para *predecir futuras amenazas y estrategias de adaptación para L. berteroa* y *L. spicata*. Este trabajo evaluó la distribución bajo los cuatro trayectorias de circulación representativas de cambio climático. Se generaron modelos de distribución de especies en MaxEnt v.3.3.3., con 8 variables ambientales oceánicas (Bio-ORACLE), limitando la distribución por batimetría. Los modelos fueron consistentes con las actuales distribuciones genéticas y empíricas a lo largo de la costa, manteniendo una zona difusa en el área de solapamiento (30°-33°LS). Además, predicen que ambas especies serán dramáticamente afectadas por el cambio climático. *L. berteroa*, distribuida entre 15-30°LS, reduciría su distribución en un 66,62 %, con áreas de refugio de 33,38 % y una expansión de 225 km². En 2050, solo la zona central de Chile podría actuar como refugio climático (24°- 31°LS) con reducción dramática desde Ica-Perú hasta Taltal-Chile. Para *L. spicata*, distribuida al sur de los 29°LS, se predice una reducción del 54,79%, con un área de refugio del 45,21% y 2.765 km² de expansión. La zona centro-sur de Chile se pronostica como el área de refugio climático para *L. spicata* (35°-41°LS). Estos resultados son una línea de base para evaluar amenazas y resiliencia, permitiendo la planificación futura para reducir la vulnerabilidad a fluctuaciones ambientales al conservar y repoblar/restaurar estas especies.

Financing: Financiamiento: FONDEF ID2010167, Packard 2021- 73304Agradecimientos: Proyecto ANID/BASAL FB210006

P39 Evaluating the niche differentiation vs neutral-theory predictions to explain species richness in Oryzomyini tribe

Nicolás Espinoza-Aravena^{1,2}, Reinaldo Rivera Jara⁴, Alexander Pari^{1,3}, Enrique Rodríguez-Serrano³, Cristián Esteban Hernández Ulloa²

(1) Programa de Doctorado en Sistemática y Biodiversidad, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Concepción, Chile

(2) Laboratorio de Ecología Evolutiva y Filoinformática, Departamento de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Concepción, Chile

(3) Laboratorio de Mastozoología, Departamento de Zoología, Facultad de Ciencias Naturales y Oceanográficas, Universidad de Concepción, Concepción, Chile

(4) Universidad de Concepcion, Instituto milenio de Oceanografía

Although a wide range of hypotheses have been proposed to explain the origin and complexity of extant biodiversity, significant challenges remain. Scientific efforts have been focused on an ecological perspective and emphasize the importance of deterministic processes based on niche differences between species (niche theory), where competition can exclude species generating allopatric distributions and decrease richness. However, this view has been challenged by the "neutral theory", which provocatively states that biological differences between species, like competitive ability, are irrelevant (neutral) to their success within communities, predicting high species richness and sympatric distributions (positive associations). Here we evaluate these predictions (sympatric vs. allopatric distribution) between species of the tribe Oryzomyini, which occurs from the northeastern to southernmost of America, covering the entire neotropical zone. The results shows that species inhabiting highly diverse areas (tropical) are dominated by positives sympatric distributions (64 %) but high turnover in the space, and low diverse areas are dominated by random associations (subtropical 74% and temperate 53%) and highest nestedness; and almost null presence of negative allopatric distribution in all areas (< 1 %). These results suggest that the highly diverse areas can be the results of scenarios of low competition, but high turnover with positives associations in the space that can support neutral processes that maintains the diversity in these areas. On the other hand, low diverse areas can be the results of random associations in the space with colonization-extinctions dynamics playing a fundamental role to maintains its biodiversity.

Financing: FONDECYT-1201506

P40 Contribution of ecological criteria to selection of urban tree species in central Chile

Aportes de criterios ecológicos a la selección de especies del arbolado urbano en Chile central

Lidia González¹, Renato Otárola¹, Sergio Estay², Paulette I Naulin¹

(1) Laboratorio Biología de Plantas, Facultad de Ciencias Forestales y Conservación de la Naturaleza, Universidad de Chile, Santiago, Chile

(2) Instituto de Ciencias Ambientales y Evolutivas, Universidad Austral de Chile, Valdivia, Chile

Un aumento de la temperatura para la zona mediterránea de Chile implicaría estrés hídrico para las especies de sistemas naturales y mayores costos de mantención para las zonas urbanas. El riego es aproximadamente el 60% del costo de mantención de áreas verdes. La elección de los árboles urbanos debe considerar las especies con mejores respuestas estructurales y funcionales, minimizando los costos de mantenimiento y reemplazo, maximizando la vida útil de los árboles y así obtener un mayor beneficio socioambiental. *Schinus molle* es de las especies nativas más abundantes en el arbolado urbano del norte y centro de Chile. La especie se establece en una variedad de condiciones de requerimiento hídrico y alta contaminación del aire, sin embargo, se desconoce su desempeño en diferentes contextos socioeconómicos. 107 individuos de *Schinus molle* fueron muestreados en la Región Metropolitana, donde se midieron las variables alométricas, DAP, altura, y área de copa. También, variables climáticas (T° y pp) y socioeconómicas (valor de la superficie, densidad poblacional y gasto de mantención de áreas verdes). Los resultados muestran que las variables alométricas se relacionan directamente, es decir, mayor DAP implica mayor altura y tamaño de copa. Las variables climáticas no tienen incidencia en el crecimiento de *S. molle*. Tampoco hay relación entre el tamaño del árbol y las variables socioeconómicas. Especies como *Schinus molle* son una buena alternativa para el arbolado urbano en la RM, es lo suficientemente rústica para desarrollarse bien, independiente del clima y la inversión en manejo en las distintas comunas.

Financing: Proyecto Fondecyt regular 1211114.

P41 Slower, faster? The role of the phyllosphere in leaf litter decomposition in oak trees.

¿Más lento, más rápido? El rol de la filosfera en la descomposición de la hojarasca en roble

Rocío Mardoñez Pavez², Aurora Gaxiola Alcantar^{1,2,3}, Francisco I. Pugnaire⁴

(1) Institute of Ecology and Biodiversity, Alameda 340, Santiago, Chile

(2) Departamento de Ecología, Pontificia Universidad Católica de Chile, Alameda 340, Santiago, Chile

(3) Centro de Cambio Global, Pontificia Universidad Católica de Chile, Alameda 340, Santiago, Chile

(4) Estación Experimental de Zonas Áridas, Consejo Superior de Investigaciones Científicas (EEZA-CSIC), La Cañada, E-04120, Almería, España.

El término filosfera se remonta a la década 1960, identificando microorganismos en la superficie de las hojas. Sin embargo, recientemente comenzamos a entender el papel que tienen estas comunidades en los procesos ecológicos y su relación con los ciclos ecosistémicos. El reciclado de nutrientes a partir de descomposición de hojarasca puede representar más del 65% de disponibilidad de nutrientes en los ecosistemas; por lo tanto, entender la función de comunidades microbianas de la filosfera en el proceso ecosistémico es clave. La filosfera entra en contacto con las comunidades del suelo en el momento de abscisión foliar y pueden acelerar o disminuir la degradación de hojarasca. Una revisión bibliográfica reciente mostró que, de un total de 14 artículos, un 50% sugería que la filosfera incrementaba la tasa de descomposición; los incrementos se han relacionado con procesos de sucesión de grupos funcionales y complementariedad de nicho entre comunidades de la filosfera y del suelo. Sin embargo, otro 50% de los estudios reportó una disminución de la descomposición, relacionada con interacciones competitivas entre comunidades. En este trabajo, el objetivo fue evaluar el papel de la filosfera en la descomposición de la hojarasca de roble (*Nothofagus obliqua*), con el fin de dilucidar efectos de competencia entre las comunidades de la filosfera y las del suelo. En un experimento de descomposición usando suelo y hojarasca esterilizada y no esterilizada, encontramos que existe competencia entre las comunidades microbianas del suelo y de la hojarasca, y que las de la filosfera son más eficientes en la descomposición.

Financing: El Proyecto Fondecyt 1201643Proyecto español es PY20-0223, de la Junta de Andalucía.

P42 Polar and high mountain ecosystems under the impact of climate change: who benefits?

Ecosistemas polares y de alta montaña frente al impacto del cambio climático: ¿quiénes salen favorecidas?

Angélica Casanova-Katny¹, Gonzalo Barcaza², Jaime Nahuelvil¹, Luis Díaz Caamaño³, Francisco Cereceda Balic²

(1) Catholic University of Temuco, Faculty of Natural Resources, Rudecindo Ortega N° 03694, Temuco, Chile.

(2) Universidad Técnica Federico Santa María, Department of Chemistry, Avenida España 1680, Valparaíso, Chile.

(3) Dirección General de Aguas, MOP, Prat 501, Concepción Chile.

High mountain ecosystems as well as those of the polar tundra are highly sensitive to changes associated with climate change, where increases in air temperature lead to changes in the phenology and developmental stages of plants, but little is known about the impacts on the vegetation of the Chilean Andes. In the Antarctic polar tundra, an increase in vascular plant populations and greening of ice-free areas have been shown. The Andes is one of the most extensive mountain ranges in the world and presents a great diversity of ecosystems throughout the country. Our study is focused on the responses of vascular and cryptogamic plants to glacial retreat, as well as to the change in air humidity. In the Antarctic polar tundra, the greatest distribution of bryophytes can be identified in the areas of greatest flooding, while the summits and rocky areas are dominated by lichens. The results will allow us to understand how native high mountain communities advance in ice-free areas, and how the water regime favors the advance of vegetation. This project is funded by the ANILLO ACONCAGUA ATC210021 y FOVI 210043

Financing: ANILLO ACONCAGUA ATC210021 y FOVI 210043

P43 $\delta^{18}\text{O}$ sea surface temperature from coastal shell middens of the Atacama desert across the Holocene

Coastal shell middens of the Atacama desert across the Holocene: $\delta^{18}\text{O}$ sea surface temperature and changes in species composition

Bernardo R. Broitman¹, Laura Olgún², Verónica Alcalde², Javiera Guardia³, Mauricio Oróstica¹, Adrien Chevallier⁴, Carola Flores⁵

(1) Universidad Adolfo Ibañez, Departamento de Ciencias, Facultad de Artes Liberales

(2) Universidad de Tarapacá, Programa de Postgrado en Antropología, Arica, Chile

(3) Independiente, Santiago, Chile

(4) University of Montpellier, UMR MARBEC, IFREMER, IRD, CNRS, Montpellier, Francia

(5) Universidad Austral de Chile, Escuela de Arqueología, Puerto Montt, Chile

Humans have inhabited the desert coast of Chile and Peru for the last 12000 years and have consistently based their subsistence and economy on productivity fueled by the wind-driven upwelling of cold, deep and nutrient rich waters along the coastline. Using *Fissurella maxima* shells from multiple archaeological middens around Taltal, we reconstructed patterns of environmental variability in the coastal ecosystem using stable isotope analysis and examined the evolution of coupled social-ecological dynamics during the Holocene. Large changes in $\delta^{18}\text{O}$ SST across the Holocene were positively and significantly related to $\delta^{13}\text{C}$, suggesting changes in the intensity of upwelling, in agreement with paleoenvironmental observations from southern Peru. A model-based unconstrained ordination of archaeomalacological data chronologically associated with dated *F. maxima* shells showed that alternating environmental conditions across the early and mid Holocene were associated to distinct species assemblages. Archaeological assemblages from the cold early and late mid Holocene periods clustered together, and separated from the warmer mid and late Holocene periods. On the other hand, assemblages from the more variable environmental conditions beginning on the late Holocene were distinct from all periods. Shellfish diversity was higher during the warm mid and late Holocene period in association with human choices reflected by the appearance of new fishing technologies and other adaptive choices. Our results show that the Taltal coast experienced important changes in climate and paleoceanographic conditions that modulated human shellfish gathering decisions and probably the overall coupled social-ecological dynamics of the prehistoric coastal fisheries.

Financing: FONDECYT 1221699, Núcleo Milenio Upwell

P44 New evidences of fire-driven alternative stable vegetation states in Patagonia.

Nuevas evidencias del rol del fuego en la formación de estados alternativos estables de vegetación en Patagonia.

Diego Ramírez^{1,2,3}, Susana Paula^{1,2,4}, Sergio Estay^{1,5}, Alejandro Miranda^{6,7}

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Campus Isla Teja, Valdivia, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Barrio Universitario, Concepción, Chile

(3) Universidad Austral de Chile, Programa de Magíster en Ecología Aplicada, Escuela de Graduados, Facultad de Ciencias, Campus Isla Teja, Valdivia, Chile

(4) Universidad Austral de Chile, Center for Fire and Resilience of Socioecological Systems (FireSES), Campus Isla Teja, Valdivia, Chile

(5) Pontificia Universidad Católica de Chile, Center of Applied Ecology and Sustainability (CAPES), Santiago, Chile

(6) Center for Climate and Resilience Research (CR2), Santiago, Chile

(7) Universidad de La Frontera, Laboratorio de Ecología del Paisaje y Conservación, Departamento de Ciencias Forestales, Temuco, Chile

The theory of alternative stable states (ASS) in terrestrial ecosystems postulates that different vegetation-types can exist stable under the same set of environmental conditions. Studies conducted in Patagonia suggest that *Nothofagus pumilio* forest and *Nothofagus antarctica* shrublands are ASS modulated by fire-vegetation feedbacks: high fire frequency promotes the stability of shrublands, while infrequent fires maintain stable forests. The differences in flammability of these two types of plant formations is the only evidence so far supporting the existence of ASS in this system. Here, we hypothesize that the preponderance of *Nothofagus* forests and shrublands in the Patagonian landscapes depend on the fire frequency. Specifically, we predict that *N. pumilio* forests are more frequent than *N. antarctica* shrublands in landscapes with low fire frequency, while the opposite occurs in landscapes with frequent fires. Using GIS layers, forest and shrubland patches of the western Andes were identified. Then, micro-basins in which both formations coexist were selected. From historic records, the density of ignitions per micro-basin was calculated. Using ignition density as a proxy of fire regime, micro-basins were categorized as NoFire, LowFire, and HighFire. A contingency table was made to evaluate the area covered by forests and shrublands in each fire category, using the Pearson's chi-square test. The results indicate that shrublands are more abundant than expected by chance in LowFire and HighFire micro-basins, whereas forests predominate in NoFire micro-basins. These results suggests that contrasting fire regimes promote the stability of forests and shrublands, reinforcing the idea that both formations are ASS.

Financing: ANID FONDECYT 1190999, Proyecto ANID/BASAL FB210006 y Fundación Anglo American

P45 Origins of Life at the high school level in Chile: a promising pedagogical tool for integrated science learning.

EL ORIGEN DE LA VIDA EN LA ENSEÑANZA MEDIA EN CHILE: Una prometedora herramienta pedagógica para el aprendizaje integrado de las ciencias.

María José Vargas Álvarez¹, Ricardo Cabrera¹

(1) Universidad de Chile, Departamento de Biología, Facultad de Ciencias, Las Palmeras 3425, Ñuñoa, Chile

The Origins of Life (OL) is a multidisciplinary scientific research field that requires the merging of knowledge from biology, chemistry, geology, and astronomy. Therefore, in this multifaceted character resides an enormous potential to integrate topics that are separately delivered to students, in terms of teaching at the high school educational level. In this work, we analyse the context for the use of OL as an enriching resource for science teaching in the Chilean educational system and elaborate a didactic proposal. To this end, we first reviewed the Chilean science curricula searching for the use of OL as a teaching subject, revealing a clear omission during decades, although topics such as evolution have been highly considered. Importantly, the latest curricular update (2019) included OL as a whole unit. Since curriculum is a guide but not necessarily correlates with what happens in the classroom, we then applied a survey to first-year undergraduate students taking a Cell Biology course at the University of Chile, to explore what has been taught about OL in high schools in recent years. From their answers, it was clear that OL has been addressed, most commonly in biology classes, but with outdated content. Finally, considering the new curriculum demands and the current experience of students, we developed a didactic proposal including a sequence of knowledge progression and practical activities, highlighting the chemistry-biology relation and the role of minerals in hydrothermal systems, to be considered for teachers as an actualized tool to respond to new needs.

Financing: Proyecto FONDECYT 1221936

P46 Libre

P47 Relation between Organismal and Cellular metabolism: Mitochondrial enzymes of Red Blood Cells during juvenile developmental in *Gallus gallus*

Relación entre el metabolismo orgánico y celular: Actividad enzimática mitocondrial en eritrocitos durante el desarrollo juvenil en *Gallus gallus*.

Francisco Javier Del Basto Llancaqueo^{1,3}, Isaac Peña-Villalobos^{1,2}, Pablo Sabat^{1,3}

(1) Laboratorio de Ecofisiología Animal, Departamento de Ciencias Ecológicas, Facultad de Ciencias, Universidad de Chile, Las Palmeras 3425, Santiago, Chile

(2) Laboratorio de Células Troncales y Biología del Desarrollo, Departamento de Biología, Facultad de Ciencias, Universidad de Chile, Las Palmeras 3425, Santiago, Chile

(3) Center of Applied Ecology and Sustainability (CAPES), Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

Endotherm metabolism depends mainly of body size, mass of internal organs and the specific metabolic activity of this organs. Interestingly, the red blood cells of non-mammalian vertebrates have functional mitochondria, and intraspecific variability in their rates of oxygen consumption and in the enzymatic activity of citrate synthase (CS) and cytochrome C oxidase (COX) has been reported in bird. Previous studies suggest that activity of red blood cells could contribute to the total aerobic metabolism (organismal metabolism), however, the functional significance of this variation still controversial. The objective of this study was to evaluate the relationship between the metabolic intensity of red blood cell mitochondrion by measuring enzymatic activity of CS and COX, the mass-specific metabolic rate and the body size during post hatch development. These variables were measured in broiler chicks (*Gallus gallus*) within a mass range of 50 and 260 g. Our results revealed the existence of a positive association between whole-organism metabolic rate and mitochondrial enzymes, but without an significant effect of body mass. Our results suggest that mitochondrial metabolism from red blood cells it is a representation of the energetic requirements of the organism. This approximation represents an unique opportunity to estimate the metabolic rates of birds under natural condition.

Financing: Fondecyt 1200386.

P48 Hibernation energetics in the relict marsupial *Dromiciops gliroides*, under free-ranging conditions

Energética de la hibernación en el marsupial relicto *Dromiciops gliroides*, en condiciones naturales

Carlos Mejías^{1,4}, Tamara Abarzúa^{1,2,4}, Francesca Cáceres^{1,4}, Isidora Camus^{1,3,4}, Julian F. Quintero-Galvis^{1,4}, Roberto F. Nespolo^{1,3,4,5,6}

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Av. Rector Eduardo Morales s/n, Valdivia, Chile

(2) Pontificia Universidad Católica de Chile, Facultad de Ciencias Biológicas, Marcoleta 49, Santiago, Chile

(3) Universidad de Chile, Departamento de Ciencias Biológicas Animales, Facultad de Ciencias Veterinarias y Pecuarias, Av. Santa Rosa 11735, Santiago, Chile

(4) Millennium Nucleus of Patagonian Limit of Life (LiLi)

(5) Center for Applied Ecology and Sustainability (CAPES)

(6) Millennium Institute of Integrative Biology (iBio)

The cold season is a period of negative energetic balance, because of the scarce food availability and the increased cost of defending body temperature (T_b). Under these conditions, some endotherms (also known as "heterotherms"), express a form of metabolic depression known as seasonal torpor or hibernation, that allows them to avoid the cost of maintaining euthermy. Although hibernation has been extensively studied in placentals and Holarctic hibernators, few Non-Holarctic hibernators have been studied, especially under free-ranging conditions. Using surgically inserted miniature dataloggers for continuous T_b recording, we analyzed torpor patterns in the marsupial monito del monte (*Dromiciops gliroides*), released in their habitat at the Valdivian rainforest. After a whole hibernation cycle (120 days), it was revealed that *D. gliroides* exhibit a dynamic form of torpor that ranges from extreme drops in T_b s down to -0.2°C , and prolonging torpor episodes continuously for 12 days. Hibernating monitos reduce their T_b passively until reaching a critical temperature to where they start producing metabolic heat in torpor to avoid tissue freezing. We found that this critical temperature changed from 3.99°C in autumn, to 1.68°C in winter. Thus, monitos are not only flexible hibernators but also extreme hibernators, and comparable to what has been historically described for some Holarctic heterotherms. Our results support the principle of torpor optimization and reveal novel data about extreme adaptive abilities of monitos under cold conditions, which could be crucial for their survival in climate change context.

Financing: This study was funded by ANID - Millennium Science Initiative Program - Center Code NCN2021-050; ANID PIA-BASAL center FB0002; and FONDECYT 1221073.

P49 Unfulfilled sugar requirements relate to tree decay in evergreen angiosperms of a Mediterranean forest

Limitaciones a los requerimientos de azúcares por sequía como causa del decaimiento de los árboles en las angiospermas perennifolias de un bosque mediterráneo

Susana Paula^{1,2,3}, Frida Piper^{3,4,5}

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Campus Isla Teja, Valdivia, Chile

(2) Universidad Austral de Chile, Centro del Fuego y Sistemas Socioecológicos (FireSES), Campus Isla Teja, Valdivia, Chile

(3) Instituto de Ecología y Biodiversidad, Victoria 631, Barrio Universitario, Concepción, Chile

(4) Universidad de Talca, Instituto de Ciencias Biológicas (ICB), Av. Lircay s/n, Talca, Chile

(5) Universidad Austral de Chile, Núcleo Milenio Límites de la Vida Patagónica (Lili), Campus Isla Teja, Valdivia, Chile

Forests have the potential to mitigate climate change by converting CO₂ emissions into biomass. However, this potential is reduced by the drought-driven tree mortality and decay associated to climate change. We hypothesized that the recent decay of sclerophyll Mediterranean trees results from a fail to meet carbohydrate requirements for acclimation to drought. We tested this hypothesis by evaluating non-structural carbohydrates (NSC), nitrogen concentration (N) and isotopic discrimination ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$) of eleven co-occurring evergreen angiosperm species of a sclerophyll forest of central Chile in 2020, after c. 15 years of successive drought. The species assessed comprised contrasting levels of decline, quantified by combining the degree of leaf browning and the defoliation at population level. For each species, samples were obtained for apparently “affected” and “unaffected” individuals, including previous- and current-year twigs. NSC and its fractions -starch and soluble carbohydrates- were similar amongst the different categories of status decay. However, in species with severe decay, “affected” trees exhibited lower soluble sugars proportions than “unaffected” trees and higher $\delta^{18}\text{O}$, with no significant differences in $\delta^{13}\text{C}$. The species severely decayed tend to show lower $\delta^{13}\text{C}$, being this trait poorly related to $\delta^{18}\text{O}$. Our results indicate that the more resistant species to a severe long-term drought were those with higher water use efficiency (i.e., higher C fixation under similar stomatal conductance). Conversely, the most sensitive species appeared incapable to accumulate soluble carbohydrates in response to drought. Results suggest that forest decay in this Mediterranean forest is associated with unfulfilled osmotic requirements.

Financing: ANID FONDECYT1190999, ANID PIA/BASAL FB210006

P50 Photosynthetic limitation: comparison between five *Colobanthus quitensis* (Kunth) Bartl. populations from Chilean latitudinal gradient.

Limitación fotosintética: comparación de cinco poblaciones de *Colobanthus quitensis* (Kunth) Bartl. en un gradiente latitudinal en Chile.

Claudia Monserrat Reyes Bahamonde¹, **Fernanda Contreras Zúñiga**¹, Carolina Hernández Fuentes¹, Patricia Sáez Delgado^{2,3}, Lohengrin Cavieres González^{1,3}

(1) Universidad de Concepción, Departamento de Botánica, Facultad de Ciencias Naturales y Oceanográficas, Casilla 160-C, Concepción, Chile

(2) Universidad de Concepción, Departamento de Silvicultura, Laboratorio Cultivo de Tejidos Vegetales, Centro de Biotecnología, Facultad de Ciencias Forestales, Casilla 160-C, Concepción, Chile

(3) Instituto de Ecología y Biodiversidad-IEB, Las Palmeras 3425, Ñuñoa, Santiago, Chile

Colobanthus quitensis (Kunth) Bartling (Caryophyllaceae) is characterized by a wide latitudinal distribution ranging between the tropical high Andes and the Antarctic Peninsula. In Chile, this species is exposed to marked environmental gradients. From north to south, temperature decreases, whereas water availability increases. The latitudinal variation in environmental factors could affect the photosynthetic process. Hence, differences in photosynthetic performance could be expected among *C. quitensis* populations of differing latitude. We studied plants collected from five populations at different latitudes (19°S, 29°S, 33°S, 51°S y 63°S). Photosynthetic measurements were taken for each population. *C. quitensis* plants from 19°S and 51°S showed the lowest photosynthetic rate, stomatic conductance, electron transport rate compared with plants from other latitudes. In relation to the photosynthetic limitations, the results showed that, in all populations, the highest limitation is the mesophyll conductance. Plants from 33°S, presented higher mesophyll limitations compared to 19°S and 51°S plants. There are differences in the photosynthetic responses between the different populations of *C. quitensis*.

Financing: REDES170102, FONDECYT 1211197, ACT 210038, FB210006

P51 Genomic differentiation and gene flow models of the genus *Dromiciops* Thomas 1894 (Microbiotheria, Microbiotheriidae) in Chile and Argentina

Julian F Quintero-Galvis^{1,2,3,4}, Pablo Saenz-Agudelo¹, Guillermo D'Elía¹, Roberto Nespolo^{1,2,3,4}

(1) Instituto de Ciencias Ambientales y Evolutivas, Universidad Austral de Chile, Facultad de Ciencias, Valdivia, Chile

(2) Center of Applied Ecology and Sustainability (CAPES), Universidad Católica de Chile, Facultad de Ciencias Biológicas, Santiago 6513677, Santiago, Chile

(3) Institute for Integrative Biology (iBio), Santiago, Santiago, Chile

(4) Millennium Nucleus of Patagonian Limit of Life (LiLi), Valdivia, Chile

Marsupials of the genus *Dromiciops* ("monitos del monte"; Microbiotheria), inhabiting the temperate rainforests of Chile and Argentina ("Valdivian forest") depend on the conservation of this habitat for their persistence. These marsupials play an important role as dispersers of at least 22 plant species, and express conspicuous adaptation to the cold and seasonal of the forests (e.g., hibernation); but little is known regarding the microevolutionary processes that explains its actual genetic structuration. The recent proposal of a new *Dromiciops* species (*D. bocinovi*), together with new information on the origin and diversification of Microbiotheria in South America has changed the prevailing paradigm around the evolutionary history of these emblematic marsupials. We used classic genetic markers (mtDNA and nuclear markers) and a genomic approach (RADseq) to analyze the historical demography and population structure of *Dromiciops* across its ~1000 km latitudinal range (127 samples of 12 populations). We identified several interruptions to gene flow, mostly associated with geographic barriers which generated allopatry along the latitudinal gradient and between coastal and Andean populations. *D. bocinovi*, distributed to the northern range, exhibited lower genetic structuration and older history of stability compared to *D. gliroides* (at southern range). We also identified several sub-groups of *D. gliroides*, (including the subspecies *D. g. mondaca* at the coastal range of Valdivia); with decreasing genetic diversity towards the South. These results shed light on the role of landscape and historical events in shaping the evolutionary history of this emblematic marsupial.

Financing: ANID – Millennium Science Initiative Program – Center CodeNCN2021-050 ANID PIA/BASAL center FB0002 Fondecyt Postdoctorado Proyecto N° 3220269 Fondecyt Regular 1221073

P52 Plant - mycorrhizal association in shrubs of the Atacama Desert along an extreme aridity gradient

Asociación planta - micorrizas de los arbustos del Desierto de Atacama en un gradiente extremo de aridez

Cristian Delpiano^{1,2}, Andrea Loayza^{1,2}, Claudia Barraza¹, Melissa Pozo¹, Lorgio Aguilera¹, Rodrigo Ríos¹

(1) Universidad de La Serena, Biología, Ciencias, Raul Bitrán 1305, La Serena, Chile

(2) Instituto de Ecología y Biodiversidad

En desiertos, la baja disponibilidad de recursos en el suelo impone fuertes restricciones al crecimiento y a la supervivencia de las plantas. En estos ambientes, la simbiosis con micorrizas ha sido propuesta como un mecanismo crucial para incrementar la resistencia al déficit de agua y nutrientes que caracteriza a estos ecosistemas. Sin embargo bajo condiciones extremas, como las que existen en zonas híper áridas, la subsistencia de esporas en el suelo podría verse comprometida, y por lo tanto, la relación simbiótica con las plantas podría decaer significativamente. El rol que cumplen las micorrizas en las estrategias de adquisición de recursos de las plantas ha sido pobremente cuantificado, especialmente en ecosistemas áridos e híper áridos. En un gradiente de híper-aridez a lo largo de la costa del Desierto de Atacama establecimos seis localidades para estimar la abundancia de esporas en el suelo y el porcentaje de colonización e intensidad de infección en las especies de las especies más dominantes. Los resultados muestran que, a pesar de que la híper aridez reduce significativamente el número de esporas en el suelo, tanto el porcentaje como la intensidad de infección por micorrizas no se modifican significativamente. Esta contradicción podría explicarse en parte porque la híper-aridez no reduce significativamente el diámetro de las raíces finas (rasgos funcional considerado fundamental para la asociación con micorrizas), y a que especies pertenecientes a familias consideradas como no micorrízicas, presentan en efecto porcentajes importantes de infección.

Financing: FONDECYT Postdoctorado 3210356, FONDECYT Regular 1211181, FB210006

P53 Endophytic bacteria associated with juvenile *Sophora cassioides* (Phil.) Sparre plantlets reveals specific tissue interactions

Cristiane Sagredo Saez², Camila Fernandez¹, Leonardo Amonacid¹, Hector Herrera¹

(1) Universidad de la Frontera, Departamento de Ciencias Forestales, Ciencias Agropecuarias y Medioambiente, av. Francisco Salazar 01145, Temuco, Chile

(2) Universidad de la Frontera, Carrera de Biotecnología, Ciencias Agropecuarias y Medioambiente, Av. Francisco Salazar 01145, Temuco, Chile

Land plants interact with several beneficial microorganisms that directly influence their growth and development in nature. However, few experiments have characterized the specific endophytic interactions of endemic plants in the germination-plantlet stage. This study aimed to isolate and characterize the endophytic microorganisms associated with the endemic medicinal/ornamental plant *Sophora cassioides* (Phil.) Sparre (Fabaceae) plantlets in Temperate Rainforest of Region de la Araucanía, Southern Chile. Two-month-old germinated plantlets (n=10) were selected to isolate endophytic bacteria from young roots, young leaves, and seeds in germination (endosperm). The endophytic bacteria were isolated after surface disinfection and were molecularly identified based on the 16S rRNA gene. A total of 45 bacterial colonies were obtained and classified into 20 different isolates based on phenotypic characteristics. Of them, 4 strains were isolated from roots, 9 from leaves, and 7 from the endosperm. Four of the identified isolates belong to the phyla Proteobacteria (*Pseudomonas*, *Herbaspirillum*, *Pantoea*, *Paraburkholderia*), whereas one genus was related to Firmicutes (*Paenibacillus*). *Pseudomonas* spp. were the most abundant, followed by *Herbaspirillum chlorophenolicum*, *Pantoea vagans*, and *Paenibacillus taichungensis*. *Pseudomonas* spp. were conserved in all the plantlet organs, whereas specific genera were associated with endosperm (*Pantoea*), roots (*Herbaspirillum*), and shoots (*Paraburkholderia* and *Paenibacillus*). Most of the identified genera are well known as plant growth-promoting microorganisms and are commonly considered bioinoculants. Therefore, the interaction of seeds with a set of beneficial microorganisms can contribute to effective germination and plantlet establishment. Further studies must evaluate the inoculation of such seed-associated endophytes in native plants with low establishment rates.

Financing: FONDECYT POSTDOCTORADO 3200134

P54 Mycorrhizal type and status of three species that form vegetation patches in volcanic soils under different substrate conditions

Tipo y estatus micorrízico de tres especies de plantas formadoras de parches vegetacionales en suelos volcánicos bajo distintas condiciones de sustrato

Renato Agustín Sandoval Aguilera¹, Alejandra Zúñiga¹, María Isabel Mujica^{1,2,3}

(1) Universidad Austral de Chile, Instituto de Ciencias Ambientales y Evolutivas, Facultad de Ciencias, Independencia 631, Valdivia, Chile

(2) Instituto de Ecología y Biodiversidad

(3) Centro de conservación de Orquídeas Chilenas

La actividad volcánica ha dado origen a suelos con muy baja disponibilidad de nutrientes. Para enfrentar estas condiciones, las plantas han desarrollado diversas adaptaciones radicales, como la exudación de carboxilatos a través de raíces especializadas o la asociación con microorganismos del suelo. Una de estas asociaciones son las micorrizas, una simbiosis entre hongos y raíces, en las que las plantas entregan carbono a los hongos y éstos a su vez entregan nutrientes a las plantas. La presencia de micorrizas en los ecosistemas volcánicos chilenos ha sido muy poco explorada, siendo aún desconocido el tipo de micorrizas que forman varias de las especies y su estatus micorrízico (si son facultativas o obligadas). En este estudio se evaluó el tipo y estatus micorrízico de tres especies que habitan suelos volcánicos en Chile: *Orites myrtoidea* (Proteaceae), *Adesmia emarginata* (Leguminosae) y *Gaultheria poeppigii* (Ericaceae). Para esto se colectaron semillas de las tres especies en Antuco y se cultivaron en sustrato volcánico de baja disponibilidad de nutrientes y en un sustrato volcánico enriquecido con nitrógeno y fósforo. Se colectaron raíces de tres réplicas de cada especie por tratamiento, las que fueron teñidas para luego evaluar la presencia de estructuras micorrízicas y cuantificar el nivel de colonización. Mientras que *Adesmia* y *Orites* no presentaron ningún tipo de colonización de hongos micorrízicos, se observó la presencia de micorrizas ericoidales en raíces de *Gaultheria*, las que presentaron un menor porcentaje de colonización en los sustratos enriquecidos. Futuros estudios nos permitirán identificar los hongos que forman estas micorrizas.

Financing: Fondecyt postdoctorado 3200774

P55 Use of yellow indices for multitemporal detection of *Ulex europaeus* cover in an urban macrozone

Uso de índices de amarillo para la detección multitemporal de la cobertura de *Ulex europaeus* en una macrozona urbana

Elisabeth Rehbein¹, Gerardo E. Soto²

(1) Universidad Austral de Chile, Escuela de Ingeniería y Sistemas, Facultad de Ciencias de la Ingeniería, Jyfyi, Valdivia, Chile

(2) Universidad Austral de Chile, Instituto de Estadística, Facultad de Ciencias Económicas y Administrativas, Calle Viel sin número, Campus Isla Teja, Valdivia, Chile

El incremento en los eventos de incendios urbanos catastróficos en las regiones del sur de Chile se ha desarrollado de la mano del cambio climático y la expansión de especies propagadoras de fuego como el *Ulex europaeus* (ulex). En este trabajo exploramos el uso de un índice de amarillo para la detección multitemporal de la cobertura de ulex en una macrozona urbana, la ciudad de Puerto Montt, Los Lagos, Chile (72.9° W, 41.5° S). Se usaron imágenes satelitales de la constelación Landsat de la NASA/USGS (resolución espacial: 30m), desde el año 2000 al 2021 en un área de 50.755 ha. Se compararon diversos clasificadores usando una combinación de la información espectral obtenida por el satélite, NDVI y un índice de amarillo. Los clasificadores usaron como base el algoritmo de Random Forest. Generamos 3.796 puntos de referencia para las clases "ulex", "pasturas", "urbano", y "bosque", que fueron separados en 70% para entrenamiento y 30% para validación de los modelos. Las precisiones resultantes fueron desde 54.91% para el modelo con sólo NDVI, hasta el más alto con 86.75% para el clasificador con información espectral e índice de amarillo. La cobertura de *Ulex* no muestra un incremento a través de los años, con un promedio de 15.093 ha, pero muestra alta variabilidad (desviación estándar: 2.409 ha). Nuestros resultados muestran que el uso de índices de amarillo mejora la detección de la cobertura de *U. europaeus* además que permitirá también el análisis fenológico de su floración en el espacio.

P56 Analysis of the governance and institutional systems that regulate the prevention and management of invasive plant species

Análisis de los sistemas de gobernanza e institucionalidad que regulan la prevención y manejo de especies vegetales invasoras

Antonia Rey-Aguirre Martínez^{1,2}, Aníbal Pauchard Cortés^{1,2}, Verónica Delgado Schneider³

(1) Universidad de Concepción, Laboratorio de Invasiones Biológicas (LIB), Facultad de Ciencias Forestales, Victoria 500, Concepción, Chile

(2) Instituto de Ecología y Biodiversidad (IEB), Las Palmeras 3425, Ñuñoa, Casilla 653, Santiago, Chile

(3) Universidad de Concepción, Departamento de Derecho Económico, Facultad de Ciencias Jurídicas y Sociales, Barrio Universitario s/n, Concepción, Chile

La globalización ha permitido un aumento importante en el transporte de especies exóticas, un porcentaje de estas especies ha logrado invadir generando múltiples impactos, bajo este contexto, es que las especies exóticas invasoras han sido catalogadas como los principales impulsores del cambio ambiental global. Dentro de este contexto, surge la necesidad de contar con estrategias, marcos legales y planes de manejo que interactúen para combatir esta amenaza compartida de forma eficiente. El objetivo de este trabajo es analizar los marcos regulatorios sobre especies exóticas invasoras de Chile y otros países para proponer mejoras a nivel nacional.

Realizamos una revisión bibliográfica sistemática de las diferentes políticas y estrategias de gobernanza a nivel global, además de identificar los sistemas de gobernanza que diversos países y regiones tienen asociados para cumplir sus obligaciones internacionales de prevención y manejo de especies vegetales invasoras.

Para esto se utilizaron distintos buscadores bibliográficos como WOS, Scopus, Google Scholar y el buscador jurídico Vlex. Los resultados indicaron que pese al avance en políticas para el manejo de EEI, existen debilidades importantes en el régimen jurídico internacional que dificultan su uso como herramienta para prevenir y solucionar problemas, principalmente debido a que no brinda suficientes elementos para exigir a otros países el cumplimiento de sus obligaciones por afectaciones derivadas de EEI. Finalmente, planteamos posibles estrategias a seguir para el manejo de especies vegetales invasoras en Chile, basado en los marcos nacionales de otros países, considerando sus contextos sociales, económicos y ecológicos.

Financing: Trabajo financiado por Fondecyt Regular 1180205 y ANID/Basal FB210006.

P57 Evaluation of the effectiveness of herbicides to eliminate *Pinus radiata* D. Don., in the context of native forest restoration in the Nahuelbuta pre-mountain range, Chile

Evaluation of the effectiveness of herbicides to eliminate *Pinus radiata* D. Don., in the context of native forest restoration in the Nahuelbuta pre-mountain range, Chile

Natalia Alejandra Cáceres Novoa¹, Mauro E González¹

(1) Universidad Austral de Chile, Instituto de Conservación Biodiversidad y Territorio, Facultad de Ciencias Forestales y Recursos Naturales, Independencia 631, Valdivia, Los Ríos, Valdivia, Chile

Biological invasions are considered one of the main drivers of biodiversity loss. They can alter community structure and function and ecosystem processes, and change ecosystems to alternative states. This is why invasive species correspond to one of the most critical barriers to restoring native ecosystems and have become a global challenge for restoration and a great threat to the conservation of natural ecosystems.

The objective of this study was to evaluate different doses of herbicides (glyphosate and metsulfuron) in the death of the invasive exotic species *Pinus radiata* for the restoration of native forest. Three different doses of both herbicides were applied in three stands. The vigor of the vegetation was calculated through the NDVI index and an affectation guideline was applied with percentage ranges associated with the yellow-reddish color of the foliage of the selected individuals. The results showed that 90 days after the application of herbicides, all the treated stands decreased their NDVI values, between 10% and 23%, with the high doses of glyphosate and metsulfuron showing the greatest decrease, reaching average values of 0.66 and 0.67, respectively. Correspondently, the stands with high doses showed more than 55% of foliage affectation in that period. Likewise, after 149 days elapsed, the stands showed between 49% and 86.5% affectation, with the highest values being found in the stands with high doses, being greater than 63% affectation. The evaluation of different herbicides is key for making decisions related to the control and elimination of invasive alien species.

Financing: Mininco forestry company.

P58 The role of roads to drive the distribution of non-native plants across altitudinal and latitudinal gradients in the Chilean Andes.

El rol de los caminos para impulsar la distribución de plantas introducidas a través de gradientes altitudinales y latitudinales en los Andes de Chile.

Alejandra Andrea Jiménez Hernández^{1,2}, Eduardo Fuentes-Lillo^{1,2}, Aníbal Pauchard Cortés^{1,2}

(1) Instituto de Ecología y Biodiversidad (IEB), Santiago, Chile.

(2) Instituto de Ecología y Biodiversidad (IEB), Santiago, Chile.

One of the main disturbances in mountain ecosystems are roads, which are present across wide elevation gradients and different ecosystems. Analyzing the impact of the presence of roads on the distribution of non-native plants is key to understanding plant invasion, especially in high elevation areas. In this context, the objective of this work is to evaluate how the presence of the road explains the richness and abundance of non-native plants in elevation gradients of the Chilean Andes. The MIREN protocol was used, consisting of 3 plots (1 parallel to the road and 2 perpendiculars to the road), which were installed on 12 roads across a latitudinal gradient from 33°S to 54°S. Using GLMM, the importance of the road in explaining the distribution patterns of non-native plants was analyzed. Results indicated that both richness and abundance of non-native plants decreased with elevation for all 12 roads. For the 12 elevation gradients, roads presented higher richness and abundance of non-native plants compared to plots perpendicular to the road. Regarding latitudinal patterns, we observed that richness and abundance decreased with latitude, showing a peak of richness and abundance between latitudes 33°S and 35°S. These results demonstrate that roads function as a vector for the redistribution of non-native plants to higher elevations.

Financing: AJ, EFL and AP funded by Fondecyt 1180205 and ANID/BASAL FB210006.

P59 Longitudinal and altitudinal transect effects across the treeline on the yeast genetic variability

Efecto del transecto longitudinal y altitudinal a través del límite arbóreo sobre la variabilidad genética de las levaduras

Christian Oporto^{1,2}, Kamila Urbina^{1,2}, Luis Saona^{1,2}, Francisca Grene¹, Jose Benavides¹, Roberto Nespolo², Frida Piper², Juliana De Abreu², Francisco Cubillos^{1,2}

(1) Universidad de Santiago de Chile, Biología, Química y Biología, Avenida Libertador Bernardo O'Higgins n° 3363. Estación Central, Santiago, Chile

(2) Núcleo Milenio. Límite de la vida Patagónica: restricciones ambientales en genética y ecofisiología, Chile

Various studies on microbiological diversity in temperate forests have managed to isolate yeasts belonging to different genera and species, reaching the conclusion that yeasts are omnipresent in this type of ecosystem. *Saccharomyces eubayanus* has been isolated at a high frequency from *Nothofagus pumilio* temperate forests in the Chilean-Argentinean Patagonia. However, these studies have focused on the use of enrichment cultures for yeast isolation, leading to a significant bias in our knowledge about how this species thrives in this habitat. Additionally, these studies have focused on specific sampling sites, ignoring factors such as latitude and altitude, and the seasonal conditions of temperate forests that could impact both, the genetic and phenotypic portrait of the species. Thus, ignoring these factors can lead to an incomplete picture of the habitat and/or distribution areas, as well as the genetic diversity of *S. eubayanus* isolates from the temperate forests of Patagonia. Therefore, we compared yeast isolation from *N. pumilio* tree bark samples using enrichment cultures versus an alternative protocol that does not exert selective pressure with ethanol. We obtained an average isolation frequency of 62.8% and 87.4% under enrichment versus non-enrichment strategies, indicating that enrichment cultures might provide strong selective pressures. On the other hand, it has also been possible to observe that the season of the year and the altitude at which the sampling is carried out directly impacts yeast frequency, demonstrating that these variables are directly linked to the presence of yeasts in the temperate forest.

Financing: Núcleo Milenio. Límite de la vida Patagónica: restricciones ambientales en genética y ecofisiología. FONDECYT Regular 1180161 y iBio ICN17_022 ICM-ANID

P60 The adaptation of cyanobacterial isolates from biological crusts to a culture medium depends on both environmental and intrinsic factors.

La adaptación de aislados de cianobacterias de costras biológicas a un medio de cultivo depende tanto de factores ambientales como intrínsecos

Darlyng Pontigo Gallardo¹, Claudia Ortiz Calderón¹, Marcela Wilkens Anwandter¹

(1) Universidad de Santiago de Chile, Facultad de Química y Biología, Av. Lib. Bernardo O Higgins 3363, Santiago, Chile

Las cianobacterias son microorganismos fotoautotróficos capaces de colonizar suelos semiáridos, mejorando su calidad y favoreciendo el establecimiento de otros microorganismos y plantas. La asociación suelo-cianobacterias-microorganismos genera costras biológicas (SBC), fundamentales en la sucesión ecológica. Gran parte de los estudios con cianobacterias de SBC emplean medio BG-11 para su aislamiento. Sin embargo, no todas crecen igualmente en él, comportamiento que podría estar determinado por la diferencia entre el contenido nutricional de los sitios de aislamiento y del medio de cultivo. Para evaluar lo anterior, el crecimiento en medio BG-11 de 4 aislados de cianobacterias, obtenidos desde SBC de la Región de Coquimbo, fue caracterizado mediante cuantificación de biomasa. Los resultados mostraron crecimientos dispares e independientes del sitio de aislamiento. Al comparar 7 elementos componentes del medio BG-11 y de los suelos en los sitios de muestreo, se observó que el contenido nutricional del medio era 1000 veces inferior al de los suelos, de manera que la diferencia observada en el crecimiento no se relaciona con la composición elemental de los suelos. Sin embargo, se observó una relación entre el contenido de Mn del sitio de aislamiento de *Trichormus* sp., con un perfil de consumo de Mn por parte del cultivo similar al de una biosorción del elemento. Los resultados sugieren que el desarrollo de aislados de cianobacterias en medio BG-11 estaría determinado en parte por su capacidad de adaptación intrínseca y en parte por aclimatación al ambiente de origen.

Financing: Esta investigación fue financiada por el proyecto FONDEF ID20I10356

P60a IPBES: ¿Cómo podemos ser parte de este proceso desde Chile?

Aníbal Pauchard Cortés^{1,2}

(1) Laboratorio de Invasiones Biológicas (LIB), Facultad de Ciencias Forestales, Universidad de Concepción, Concepción, Chile.
(2) Instituto de Ecología y Biodiversidad (IEB), Santiago, Chile.

La Plataforma Intergubernamental Científico-normativa sobre Diversidad Biológica y Servicios de los Ecosistemas (IPBES) es un organismo intergubernamental independiente, creado por los Estados miembros en 2012, contando actualmente con cerca de 140 países miembros. El objetivo de este poster es presentar algunos antecedentes claves sobre las oportunidades de participación para la comunidad científica chilena en IPBES, como también resaltar la conexión entre las evaluaciones IPBES y las políticas públicas y la gestión de la biodiversidad en Chile. IPBES proporciona a los responsables políticos evaluaciones científicas objetivas sobre el estado del conocimiento sobre la biodiversidad del planeta, los ecosistemas y los beneficios que proporcionan a las personas, así como las herramientas y métodos para proteger y utilizar de manera sostenible estos recursos naturales. La misión de IPBES, es fortalecer, a través de la ciencia, las bases del conocimiento para mejorar las políticas, para la conservación y el uso sostenible de la biodiversidad, el bienestar humano a largo plazo y el desarrollo sostenible. Para ilustrarlo de manera simple, IPBES hace por la biodiversidad lo que el IPCC hace por el cambio climático. En Chile, el punto focal de IPBES se encuentra en el Ministerio del Medio Ambiente. Si bien, científicas y científicos chilenos han participado en varias de las evaluaciones regionales y globales de la biodiversidad, existen aún innumerables oportunidades de seguir participando, para científicos(as) jóvenes y experimentados. Chile tiene el desafío de usar las evaluaciones IPBES en el desarrollo de sus políticas públicas de biodiversidad. Información oficial en [HYPERLINK "http://www.ipbes.net/"](http://www.ipbes.net/) www.ipbes.net.

Financing: AP financiado por ANID/BASAL FB210006.

P61 A new protein with functions in nervous system: Characterization of Drospondin protein from Drosophila Melanogaster

Una nueva proteína con funciones en el sistema nervioso: Caracterización de la proteína Drospondina de Drosophila melanogaster

Candy B Roa¹, Francisca Rojo-Cortés¹, Jorge M Campusano¹, María-Paz Marzolo¹

(1) Pontificia Universidad Católica de Chile, Departamento de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Portugal 49, Santiago, Chile

Reelin is a large vertebrate secreted glycoprotein crucial for the development of laminated brain structures depending on the correct neuronal migration and differentiation. Reelin also participates in synaptic plasticity in adulthood. Impairments in Reelin have been associated with neuropsychiatric

disorders, such as schizophrenia, autism, and Alzheimer's disease. Reelin induces its functions through binding VLDLR and ApoER2. *Drosophila melanogaster* has orthologs for Reelin's receptors named Lipophorin Receptors (LpRs), and for several downstream signaling pathway proteins. However, no reelin-like protein has been described in flies. Primary mice hippocampal cultures increase neurite growth after treatment with Reelin. Interestingly, we have previously demonstrated that primary cultures of an important fly brain association structure, the mushroom body region (MB), respond to treatment with mammalian Reelin (mReelin), increasing their neurite arborization. From a sequence homology study, we proposed a previously uncharacterized protein that we named "Drospondin" as an endogenous ligand, which could induce responses similar to those observed in fly neuronal cultures treated with mReelin. Here, we described that Drospondin is a secreted glycoprotein, whose N-glycosylation is necessary for its secretion to the extracellular milieu. We also report that primary cultures of fly MB neurons respond to treatment with Drospondin, and this response depend on LpRs. Further, we notice that fly mutants for this protein have a shorter lifespan and smaller brain compared with controls. Finally, we also studied changes in social behavior in Drospondin mutants. Overall, these results indicate that as Reelin, Drospondin could play an important role in neuronal development and function in flies.

Financing: This study was supported by Fondecyt grant 1200393 to MPM. FRC was supported by ANID Doctoral fellowship N°21180582

P62 Ansights into the neuronal role of a new epigenetic mark: Histone aminylation in *Drosophila melanogaster* brain and behavioral consequences of its alterations during development

Entendiendo el rol neuronal de una nueva marca epigenética: Aminilación de histonas en cerebro de *Drosophila melanogaster* y consecuencias conductuales de su alteración

Isidora Almonacid¹, Antonia Soto-González¹, María-Estela Andrés¹, Angélica M. Fierro², Jorge M Campusano¹

(1) Pontificia Universidad Católica de Chile, Departamenteo de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Marcoleta 49, Región Metropolitana, Santiago, Chile

(2) Pontificia Universidad Católica de Chile, Departamento de Química Orgánica, Facultad de Química, Macul, 7810003, Región Metropolitana, Santiago, Chile

Histone aminylation (H3Q5Aminyl) is a recently described post-translational modification (PTM) involving the covalent union between an amine (dopamine or serotonin) and glutamine 5 on histone H3. This reaction is catalyzed by the enzyme transglutaminase (TG).

Histone serotonylation (H3Q5Ser) enhances the binding of the transcriptional machinery, and *in vitro* data suggests that it might play a role in neuronal differentiation. Interestingly, this PTM is evolutionary conserved and is detected in H3 of vertebrates and invertebrates, including *Drosophila melanogaster*. On the other hand, histone dopaminylation (H3Q5Dop) has only been reported in rat and humans' brains, and has been linked to addictive behaviors.

There are several open questions regarding the regulation of H3Q5Aminyl and contribution of this epigenetic mark to brain functioning.

We characterized H3Q5Aminyl distribution in *Drosophila melanogaster* brain (with commercially available H3Q5Aminyl antibodies). Our results support differential localization of these PTMs in fly brain regions and their detection not necessarily correlate with the distribution of serotonergic or dopaminergic neurons. Genetic and pharmacological tools to alter fly brain amine content and TG expression seem to affect H3Q5Aminyl levels. Moreover, a TG mutant (*Tg^{dot144}*) exhibits alterations in complex behaviors and reduced lifespan compared to wild-type flies. Lastly, molecular modelling results suggest that H3Q5Dop reduces the interaction between DNA and the N-terminal tail of H3, suggesting a possible mechanism by which H3Q5Dop alters gene expression.

Our data support the notion that the TG-mediated H3Q5Aminyl mark plays a role in *Drosophila* neuronal development and brain function.

P63 Glucagon regulates retinal rod bipolar cell glycinergic inhibitory activity in a D1 dopamine receptor-dependent pathway that is altered in a murine myopia model

Glucagón regula la actividad inhibitoria glicinérgica de las células bipolares de bastón retinianas en forma dependiente de actividad dopaminérgica y se ve alterado en miopía

Felipe Tapia^{1,2}, Valentín Peñaloza², Oliver Schmachtenberg^{2,3}, Alex Vielma²

(1) Universidad de Valparaíso, Ciencias, Valparaíso, Chile

(2) CINV, Valparaíso, Chile
(3) Instituto de Biología, Ciencias, Valparaíso, Chile

Aims: Myopia incidence is steadily increasing worldwide, but the underlying pathophysiologic mechanisms are still only partially understood. Glucagon is a peptide thought to signal image defocus in the eye, which is considered the first step in myopia induction, and dopamine is known for its key role in myopia, being proposed as the main signaling molecule linked to its pathogenesis. The aim of this study was to corroborate glucagon signaling in the mammalian retina and find a possible link with dopaminergic signaling.

Methods: Whole-cell patch-clamp was used to study the inhibitory activity of rod bipolar cells (RBCs), as this activity is known to be regulated by dopamine and RBCs have been implicated in glucagon-related activity. Inhibitory post-synaptic currents (IPSC) were measured in RBCs from wild-type and lens-induced myopia model mice.

Results: Glucagon produced a dose-dependent and glucagon receptor-dependent increase in RBC glycinergic IPSC frequency. This effect was also dependent on dopaminergic activity as it was abolished by dopamine type 1 receptor (D1R) antagonism and in scotopic conditions. The effect was also abolished in the myopia murine model but could be recovered using D1R agonism.

Conclusions: Glucagon is a novel retinal neuromodulator in mammals, regulating the glycinergic inhibitory activity acting on RBCs in a D1R-dependent manner. Its effects are abolished in a myopia model, suggesting it is one of the pathways affected in this condition. More research will be required to determine whether this pathway could be a target for myopia prevention or treatment.

Financing: Beca ANID Doctorado Nacional, FONDECYT REGULAR No. 1210790, FONDECYT INICIACION No. 11191211.

P64 The role of LSD1 isoforms in neurochemicals and epigenetic modifications induced by Amphetamine

El papel de las isoformas de LSD1 en las modificaciones neuroquímicas y epigenéticas inducidas por la anfetamina

Fernando González¹, Montserrat Olivares¹, Gianluca Merello¹, Marcela González¹, Elena Battaglioli², Francesco Rusconi², María Estela Andrés¹

(1) Department of Cellular and Molecular Biology, Faculty of Biological Sciences, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile
(2) Department of Medical Biotechnologies and Translational Medicine, Via Luigi Vanvitelli 32, Milano, Italia

Lysine Specific Demethylase 1A (LSD1) is an epigenetic enzyme that demethylates mono and dimethylated lysine 4 in histone H3 (H3K4me1/2). LSD1 has ubiquitous (uLSD1) variants found in all cellular phenotypes and neuron-specific variants (neuroLSD1). neuroLSD1 corresponds to a dominant negative isoform that competes with uLSD1, sharing target genes but with lower catalytic activity. The uLSD1/neuroLSD1 ratio in neurons is dynamically modulated by neuronal activity and has a critical role in dopamine-related behaviors as stress response and anxiety. Amphetamine (AMPH), a psychostimulant drug and dopamine secretagogue, induces changes in gene expression that depend on epigenetic modifiers. To determine the role of LSD1 isoforms in neurochemicals and epigenetic modifications induced by AMPH, we used acute and repeated AMPH treatments in wild-type (WT) and neuroLSD1 null mice. The results show that acute treatment with AMPH in WT produced a fast and transient decrease in total LSD1 protein without changing uLSD1/neuroLSD1 ratio or LSD1 total transcript levels. On the other hand, the repeated treatment induced a long-term reduction of LSD1 mRNA and protein levels. neuroLSD1 null mice has higher levels of H3K4me2 compared with WT; however, locomotor activity and behavioral sensitization were similar between both genotypes on acute and repeated AMPH treatments. In conclusion, our data reveal that neuroLSD1 is necessary for LSD1 regulation in prolonged stimuli with psychostimulants but it is not needed for locomotor sensitization.

Financing: Funded by Fondecyt 1191152

P65 neuroLSD1 and SVIL interaction as an alternative for quantifying its expression in stress paradigms

La interacción entre neuroLSD1 y SVIL como una alternativa para cuantificar su expresión en modelos de estrés.

Roberto Sanhueza¹, María Estela Andrés¹

(1) Pontificia Universidad Católica de Chile, Biología Celular y Molecular, Facultad de Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

Lysine-specific demethylase 1 (LSD1) and its neuro specific splicing variant (neuroLSD1) play important roles in the epigenetic regulation of neuronal gene expression involved in CNS development and stress response. Reported data showed that the expression of neuroLSD1 mRNAs drops

significantly after social defeat stress. However, no studies have addressed the protein levels of LSD1 variants in stress paradigms. Here, we analyzed protein levels of LSD1, CoREST, a partner of LSD1, and the substrate H3K4me2 in the hippocampus of adult rats that were socially isolated from weaning to early adulthood. Western blot analysis showed no significant changes. Since LSD1 variants differ in only 4 amino acids, western blotting does not allow for differentiation between them. Thus, we will take advantage of the specific interaction between neuroLSD1 and supervillin (SVIL) to quantify the amount of neuroLSD1. We are installing a GST-pull down assay immobilizing SVIL on glutathione-sepharose beads as bait for neuroLSD1. If successful, this technique could allow precise measurement of neuroLSD1 in animal models.

Financing: Fondecyt 1191152

P66 Endocannabinoid peptides hemopressin and RVD-hemopressin modulate TRPV1 channel activity in HEK293 cells

Constanza Suárez¹, Sebastián González¹, **Fernando Hinostroza Balmaceda**^{2,3}

(1) Universidad Católica del Maule, Ingeniería en Biotecnología, Facultad de Ciencias Agrarias y Forestales, Avenida San Miguel 3605, Talca, Chile

(2) Universidad Católica del Maule, Centro de Investigación de Estudios Avanzados del Maule, Vicerrectoría de Investigación y Postgrado, Avenida San Miguel 3605, Talca, Chile

(3) Universidad Católica del Maule, Centro de Investigación en Neuropsicología y Neurociencias Cognitivas, Facultad de Ciencias de la Salud, Avenida San Miguel 3605, Talca, Chile

The endocannabinoid system plays an essential role in synaptic plasticity, memory formation, pain perception, food intake, as well as in anxiety disorders, and depression. In the last years, endogenous peptides were described that can modulate the activity of CB1 and CB2 receptors, called hemopressin and RVD-hemopressin. Hemopressin improves memory formation, diminishes food intake, and exhibits an anxiogenic effect, whereas RVD-hemopressin induces an anxiolytic effect. It has been shown that hemopressin administration induces an anxiogenic behavior that is blocked by SB366791 and 6-iodonordihydrocapsaicina, TRPV1 blockers, suggesting that hemopressin can modulate the activity of the TRPV1 channel. However, there is no direct evidence indicating that either hemopressin or RVD-hemopressin can activate or block the TRPV1 channel by themselves. Therefore, we performed docking and molecular dynamics simulations to determine the putative binding site to TRPV1, and calcium imaging to determine whether these peptides activate or block the TRPV1 channel in HEK293 cells expressing the human TRPV1-GFP. We found that both peptides bind extracellularly to the TRPV1 channel. Specifically, RVD-hemopressin introduces its N-termini in the pore of the channel blocking the ion conduction, whereas hemopressin does not block the channel. In the same line, calcium imaging with FuraRed revealed that hemopressin activates the channel whereas RVD-hemopressin blocks it. These results indicate that these peptide endocannabinoids can modulate the activity of the TRPV1 channel.

Financing: Proyecto Subvención para la Instalación en la Academia SA772100065 (ANID).Proyecto FONDEQUIP-ANID EQM200122.

P67 The novel TASK-1 and TASK-3 activator JG-C3-98 as a regulator of the thermal and mechanical sensitivity of primary somatosensory neurons

Elizabeth Mendoza^{1,2,3}, Sofía Romero^{1,2,3}, María Pertusa^{1,2,3}, Wendy González^{2,4}, * and Rodolfo Madrid^{1,2,3}, *

1 Departamento de Biología, Facultad de Química y Biología, Universidad de Santiago de Chile, 9160000 Santiago, Chile.

2 Millennium Nucleus of Ion Channel-Associated Diseases - MiNICAD, 9160000 Santiago, Chile.

3 Millennium Nucleus for the Study of Pain - MiNuSPain, 9160000 Santiago, Chile.

4 Center for Bioinformatics and Molecular Simulations (CBSM), Universidad de Talca, 3460000, Talca, Chile.

Equal contribution.

*e-mail: wgonzalez@utalca.cl; rodolfo.madrid@usach.cl

Abstract

Two-pore domain background potassium channels (K2P) stabilize the resting membrane potential and, as such, are key molecular determinants of neuronal excitability. Among them, TASK-1 and TASK-3 have a relevant role in inflammation, cold sensing, and pain. Activation K2P channels hyperpolarize the plasma membrane of primary sensory neurons, acting as molecular brakes of its electrical activity. Here, we studied the potential modulatory effect of JG-C3-98, a novel and rationally designed activator of TASK-1 and TASK-3 channels, on the thermal and mechanical responses of primary sensory neurons, using Ca²⁺ imaging in cultured trigeminal ganglia (TG) neurons and the extracellular recording of their nerve endings at the corneal surface. We found that 100 µM JG-C3-98 shifted the thermal threshold of cold-evoked responses of cold thermoreceptors in culture

to lower temperatures. In cultured TG neurons responding to hypoosmotic stimulation, 100 μ M JG-C3-98 also reduced their maximal mechanically-evoked responses. In cold-sensitive trigeminal neurons innervating the cornea, 100 μ M JG-C3-98 reduced the electrical response of these fibers ex vivo. These preliminary results suggest that JG-C3-98 could be used as a potentially effective pharmacological tool to modulate the thermal and mechanical sensitivity of trigeminal primary sensory neurons. Supported by Millennium Nucleus of Ion Channel-Associated Diseases (WG,RM,MP), FONDECYT 1191133 (WG), DICYT-VRIDeI 022143PP (MP,RM), and Millennium Nucleus for the Study of Pain (RM,MP).

P68 Cdk5 is a regulator of nodose ganglia activity in rats and mice

Pedro Piquer¹, Camila Duran¹, Julio Alcayaga¹, Elías Utreras¹

(1) Universidad de Chile., Biología, Ciencias, Las Palmeras 3425, Santiago, Chile

¹Millennium Nucleus for the Study of Pain (MiNuSPain), Santiago, Chile; ²Laboratory of Cellular and Molecular Mechanisms of Pain, and

³Laboratorio de Fisiología Celular, Departamento de Biología, Facultad de Ciencias, Universidad de Chile. Santiago, Chile.

pedropiquer@ug.uchile.cl

The nodose ganglia (NG) contains vagus nerve sensory neurons, which innervate viscera and other internal structures, conveying sensory information to the CNS. NG neurons transduce mechano-, chemo- and noci-ceptive stimuli through receptor-channels, that can be regulated by posttranslational modification. We previously reported the presence of the Cdk5/p35 complex, a kinase implicated in numerous processes in central and peripheral neurons, in mice and rat NGs, and its co-localization with its possible substrates P2X2, TRPV1 and TRPA1. Moreover, we detected Cdk5-specific TRPV1 phosphorylation in NG neurons of both species, indicating Cdk5 activity in this tissue. Electrophysiological recordings of vagus nerve activity in wild type (WT) and a transgenic model of Cdk5 over-activation (cTg) showed significant differences in the frequency discharge increments (Δf_{VN}) induced by ATP, with a large increase in response duration to the largest dose (1 mg/10 μ L) applied in cTg mice (n=2). Reducing Cdk5 activity with roscovitine in WT mice (n=4) produced a non-significant increase in the dose-response relation ED_{50} of mean Δf_{VN} . Evaluation of baroreflex gain in rats, before and after NG treatment with roscovitine (n=4), showed a non-significant trend towards reduced baroreflex gain after blockade of Cdk5 activity. Altogether, our results suggest that Cdk5 activity is involved in regulating the physiological function of NG.

Financing: FONDECYT 1191552 and Millennium Nucleus for the Study of Pain (MiNuSPain)

P69 Extracellular lactate as an alternative energy source for retinal bipolar cells

Victor Manuel Calbiague García^{1,2}, Yiyi Chen³, Francois Paquet-Durand³, Oliver Schmachtenberg²

(1) Universidad de Valparaíso, Programa de Doctorado en Neurociencias, Valparaíso, Chile

(2) Universidad de Valparaíso, CINV, Facultad de Ciencias, Gran Bretaña 1111, Valparaíso, Chile

(3) University of Tübingen, Institute for Ophthalmic Research, Tübingen, Germany

Metabolism is a fundamental issue for cell function. Interestingly, Warburg's studies from 1924 pointed out that tumor cells and retina are the main tissues that use aerobic glycolysis, converting almost 90% of consumed glucose into lactate. The aim of this study is a better understanding of energy metabolism in the inner retina and a possible consumption of extracellular lactate as an alternative energy source for rod bipolar cells (RBCs). The results showed that photoreceptors express MCT1 in the inner segment, and in the outer plexiform layer. MCT2 was exclusively expressed in cones and abundantly expressed in the INL. Co-immunostaining in the INL indicated that MCT2 colocalizes with RBCs markers, and with amacrine cells. Retinal explants cultures treated with SR-13800 (MCT1 inhibitor), AR-C155858 (MCT1 and MCT2 inhibitor) and shikonin (PKM2 inhibitor) showed increased cell death in the INL. Additionally, under the three different treatments, the RBC number decreased significantly. Interestingly, the exposure of retinal slices to these drugs decreased neuronal activity, and a subsequent replacement of glucose by lactate maintained the membrane potential in RBCs, and the amplitude in both outward current and calcium currents. Finally, the study of intracellular lactate dynamics expressing the genetically-encoded FRET nanosensor Laconic, suggests that inner neurons are capable of consuming extracellular lactate. Our data support the notion that RBCs can consume a portion of the extracellular lactate liberated by the retina to meet their physiological demands. This lactate can be used to produce energy through OXPHOS.

Financing: FONDECYT REGULAR No. 1210790, ANID Ph.D. scholarship No. 21180443

P70 A role for cytoskeleton remodeling in the acquisition of the senescence-associated secretory phenotype (SASP) in astrocytes

Cristopher Villablanca^{2,3}, René Vidal^{2,3}, Christian González-Billault^{1,3}

(1) Universidad de Chile, Department of Biology, Faculty of Sciences, Santiago, Chile

(2) Universidad Mayor, Center for Integrative Biology, Santiago, Chile

(3) Geroscience Center for Brain Health and Metabolism (GERO), Santiago, Chile

Cellular senescence is one of the main hallmarks of aging. In the central nervous system, the accumulation of senescent glial cells, including astrocytes, is especially damaging and may increase the susceptibility to developing neurodegenerative diseases. Senescent cells share common features such as hypertrophy, loss of cell division and aberrant lysosomes and mitochondria. Those characteristics must rely on cytoskeleton organization since its canonical role in cell morphology and intracellular trafficking. However, the senescence-associated changes that affect the cytoskeleton are far from being fully addressed. In this work, we analyzed the transcriptomic data set of senescent astrocytes. We identified several differences in cytoskeleton components, including the cytoskeleton building blocks (i.e., actin and tubulin) and their associated molecular motors. Later, using fixed-cells and live-cell imaging, we determined actin and microtubule cytoskeleton reorganization, changes in microtubule dynamic, and redistribution of cytoskeleton master regulators such as active Rac1 in senescent astrocytes. Altogether, our data suggest that astrocytic senescence promotes changes in the cytoskeleton that may promote the secretory pathways necessary to produce the senescent-associated secretory phenotype (SASP) described in cellular senescence process.

Financing: Supported by post-doctoral grant FONDECYT 3220332 to CV and ANID/FONDAP/15150012 to CG-B and RV

P71 Dinámicas temporales de la experiencia subjetiva y las respuestas fisiológicas en la empatía por dolor: un estudio neurofenomenológico

David Martínez-Pernía¹, Alejandro Troncoso¹, Kevin Blanco¹, Álvaro Rivera-Rei¹, Vicente Soto¹, Josefina Escobar¹, Claudio Araya-Veliz²

(1) Universidad Adolfo Ibáñez, Centro de Neurociencia Social y Cognitiva (CSCN), Facultad de Psicología, Diagonal las Torres 2640, Peñalolén, Santiago, Chile

(2) Universidad Adolfo Ibáñez, Facultad de Psicología, Diagonal las Torres 2640, Peñalolén, Santiago, Chile

Previous evidence shows that observing other people in pain situations causes changes in sensorimotor and somatic responses. However, the temporal structure of the sensorimotor and somatic responses and the subjective dynamics remains hidden in empathy for pain studies. Through the neurophenomenological program, this research aims to understand how sensorimotor and somatic responses change over time to a visual stimulus of empathy for pain and how it integrates into subjective experience. To answer this question, thirty-five participants viewed empathy for pain videos (sportspeople having physical accidents practicing extreme sports) and neutral videos (home furnishings) while standing still on a force platform and wearing electrodermal and heart electrodes. To explore the integration of physiological and subjective experience, we used a combination of first-person (phenomenological) and third-person (postural sway, electrodermal response, and heart rate) approaches. We found that in the seconds just before the sportspeople's fall, there is a lower postural sway, and a higher heart rate compared to the end of the empathy for pain videos. The data shows that the early reduced postural sway and late increased postural sway are different from the neutral condition and the higher electrodermal response throughout the empathy for pain videos. The subjective data shows three experiential phases: anticipatory, climax, and recovery. We discover a multi-layered experiential structure that presents three main dimensions changing over time: bodily resonance, attentional focus, and kinesthetic motivation. In conclusion, empathy is a complex social emotion composed of neurobiological and subjective attributes that change over time.

Financing: FONDECYT 11190507

P72 Vocal repertoire of four Chilean suboscine birds in relation to the neuromuscular control of the avian vocal organ

Repertorio vocal de cuatro aves suboscinas chilenas en relación al control neuromuscular del órgano vocal aviano

Tomás Salas Orchard¹, Amanda Schuck Rodríguez¹, Macarena Faunes Carvallo^{1,2}, Elisa Sentis¹, Jorge Mpodozis Marín¹, Manfred Gahr³, Máximo Fernández Villafañá¹

(1) Universidad de Chile, Departamento de Biología, Facultad de Ciencias, Las Encinas 3370, Santiago, Chile.

(2) Pontificia Universidad Católica de Chile, Medicina Veterinaria, Vicuña Mackenna 4860, Santiago, Chile

(3) Max Planck Institute for Biological Intelligence, Department Behavioural Neurobiology, Eberhard-Gwinner-Straße 82319, Seewiesen, Germany

The study of suboscine birds (sub-order of Passeriformes) has been overshadowed by its sister sub-order, the oscine songbirds, due to the latter's extended evidence for wide vocal repertoires, song learning, and a neural sensorimotor circuitry sustaining it, the song-system. Suboscines, generally considered innate vocalizers lacking a song-system, emerge as a case in point after evidence of complex vocal behaviours and songsystem-like structures in certain species. Here we present the vocal repertoire of 4 suboscine birds: the Turca, *Pterotochos megapodios*, and the Chucao, *Scelorchilus rubecula* (family *Rhinocryptidae*); and the Fío-fío, *Elaenia albiceps chilensis*, and the Diucón, *Xolmis pyrope*, (family *Tyrannidae*), in the context of the neuromuscular characteristics of their vocal organ, the syrinx. Aiming to correlate size and variability of their repertoires to the degree of motor innervation of their syrinx, in the field, we found equally ample repertoires (7-9 vocalizations) in the Chucao, Turca and Fío-Fío, despite the lesser muscular syrinx in the rhinocryptid group in comparison to the tyrannids. However, we found considerable bioacoustical differences in the structures of vocalizations between the two groups, and many similarities within them, likely caused by the different neuromuscular control of the vocal organ and social dynamics in usage of vocalization in each species. In all 4 species, syrinx innervation was characterized by cell count of XII nucleus motoneurons, and in some, axon count of the tracheosyringeal nerve, and syrinx motor terminal descriptions. Our results highlight suboscines' significant vocal and neuroanatomical diversity, and support a reconsideration of their status as songbirds, nearer oscines.

Financing: Proyecto Fondecyt 1210069, Ontogenic development of the ascending sensory pathways in birds: the visual tectofugal pathway as a case in point, Jorge Mpodozis

P73 Effects of one month of Combined Exercise over spatial memory in Older Chileans

Myriam Gutiérrez^{1,2,3,4}, Isidora Castro¹, Sergio Gajardo¹, Benjamín Saldías¹, Jamileth More^{1,2,3,4}, Carolina Delgado^{1,4}, José Luis Valdés^{1,2}

(1) Universidad de Chile, Departamento de Neurociencia, Facultad de Medicina, Av. Independencia 1027, Santiago, Chile

(2) Biomedical Neuroscience Institute (BNI), Universidad de Chile, Facultad de Medicina, Av. Independencia 1027, Santiago, Chile

(3) Hospital Clínico Universidad de Chile, Centro de Investigación Clínica Avanzada (CICA), Carlos Lorca Tobar 999, Independencia, Santiago, Chile

(4) Hospital Clínico Universidad de Chile, Unidad de Cerebro Saludable, Departamento de Neurología y Neurocirugía, Carlos Lorca Tobar 999, Independencia, Chile

Physical exercise has neuroprotective and positive effects on several cognitive abilities, such as memory. One current hypothesis about how exercise promotes memory improvement is the muscle-brain hypothesis. This idea proposes an endocrine role for the muscles, which releases humoral factors (myokines) that travel through the bloodstream to the brain, promoting neuroplasticity. However, the effects of exercise on spatial memory have never been studied in the Chilean population. Therefore, we propose that one month of moderate-intensity physical exercise increases the plasmatic levels of myokines and spatial memory in older adults.

This study aims to determine the relationship between exercise-induced myokines levels and spatial memory performance in exercised versus sedentary older Chileans. For this purpose, we used a three-stage virtual-navigation task adapted for the older population at baseline and after one month.

The preliminary analysis of the spatial memory of exercised participants showed an improvement in success rate and latency. However, this improvement was not detected in the sedentary group. In addition, the plasmatic myokine levels (irisin, cathepsin B, IL-6, VEGF) at baseline and post-exercise intervention were measured and are expected to correlate with the spatial memory task.

The results of this study will contribute to understanding the role of physical exercise in cognition, a basis for future therapeutic applications for the prevention of neurodegenerative pathologies such as dementia.

Financing: MG was funded by ANID grant (21221932). CD was funded by AAIC grant (SG-21-815077 Chile). JLV was funded by ANID (1190318) and PEW Grant (34503).

P74 Sobre la relación entre la experiencia subjetiva y la fisiología: cómo la práctica contemplativa basada en movimiento modifica la autonomía emocional.

Alejandra Vasquez Rosati^{1,2,3}, Carmen Cordero-Homad⁴, Mauricio San Martín¹, Rodrigo Montefusco-Siegmund^{1,3}

(1) Universidad Austral de Chile, Instituto de Aparato Locomotor y Rehabilitación, Medicina, Rudloff 1650, Valdivia, Valdivia, Chile

(2) Laboratorio de Fenomenología Corporal, Av Segunda Faja al Volcan Km 4.5, Villarrica, Chile

(3) Universidad Austral de Chile, Centro Interdisciplinario de Estudios del Sistema Nervioso (CISNe), Valdivia, Chile

(4) Centro de Integración Cognitivo Corporal, Luis Pasteur 5728, Santiago, Chile

Mindfulness and Somatic practices such as Yoga and Tai-Chi are non-pharmacological interventions that promote people's well-being. Somatic practices, in particular, have been shown to improve people's physical and psychological health through autonomic physiological changes and perceived stress, decreasing, for example, salivary cortisol levels. These practices are also called movement-based contemplative practices, and are characterized by understanding the individual's behavior from the embodied perspective of cognition, using specific movement sequences and modulating attention. The Cognitive-Corporeal Integration Method (CCIM) corresponds to this type of practices and has been shown to increase people's emotional adaptive capacity to environmental changes. The objective of this research is to evaluate if there is a relationship between physiological changes, experience and emotional regulation capacity of people when incorporating the practice of the CCIM. For this purpose, measurements were taken before and after a 12-week intervention in a group of patients of CESFAM Los Volcanes in Villarrica where physiological (HRV, salivary cortisol), proprioceptive (postural balance) and subjective experience (self-report questionnaires and micro-phenomenological interview) of the participants were measured. Our preliminary results show an increase in emotional autonomy, observed in the descriptions of subjective experience. Physiological measures are expected to be positively related to these changes. This study proposes a new methodology to approach mental health treatments, emphasizing the restoration of bodily cognition and its physiological and subjective experience implications.

Financing: FONDECYT Postdoctorado 3210186

P75 Study of the oscillatory dynamics of the front-lower and back-medial networks in attention deficit and hyperactivity disorder (adhd)

Piedad Maldonado¹, Rodrigo Henriquez¹, Francisco Aboitiz¹, Francisco Zamorano²

(1) Pontificia Universidad Católica de Chile, Laboratorio de Neurociencias Cognitivas, Medicina, Marcoleta 391, Santiago, Chile

(2) Universidad del desarrollo, Laboratorio de Neurociencia Social y Neuromodulación, Santiago, Chile

Attention Deficit Hyperactivity Disorder (ADHD) is the most common neuropsychiatric disorder. The behavioral Inhibition Model of ADHD proposes that the symptomatology observed in patients with ADHD is due to deficits in inhibitory control. The right inferior frontal gyrus (rIFG) and the pre-supplementary motor area (pre-SMA) are involved in control inhibition. The inhibition control would start in the rIFG and propagate towards the Pre-SMA. We hypothesize that alterations in inhibitory control in patients with ADHD are related to an alteration of the cortical oscillatory dynamics between rIFG and pre-SMA. We carry out electrophysiological recordings from male children (23 ADHD patients, and 21 with Typical developmental (TD)), between 7-13 years old, who underwent a Go/Nogo task.

ADHD exhibit a higher error rate and lower accuracy in the correct Nogo responses, as well as variability in reaction times, than TD subjects. We interpreted this result as a major impulsivity and less inhibitory control. Also, we found a P100 component for both groups, however, for ADHD subjects this ERP is earlier than the TD subject, with increased amplitude. This result suggests early information processing and low inhibitory control. Our results are in the direction that the origin of the control problem comes from earlier stages of sensory processing and not from later stages of perceptual processing. Evidencing a possible two-stage process where the first stage is reflected by the variability in the speed of the response and the second that triggers less margin of error to control behavior.

Financing: PROYECTO FONDECYT 1210659

P76 Parental burnout as a moderator between parental competencies and executive functioning of preschool children

El burnout parental como moderador entre las competencias parentales y el funcionamiento ejecutivo de los niños en edad preescolar

Josefina Escobar¹, Carolina Panesso Giraldo²

(1) Universidad Adolfo Ibañez, Centro de Neurociencia Social y Cognitiva, Escuela de Psicología, Av. Presidente Errázuriz 3328, Santiago, Chile

(2) Universidad Adolfo Ibañez, Centro de Neurociencia Social y Cognitiva (CSCN), Escuela de Psicología, Av. Presidente Errázuriz 3328, Santiago, Chile

The first years of life are crucial in the development of Executive Function (EF) -higher order thinking processes that are fundamental for reasoning and problem solving- (Best & Miller, 2010). The role of parents is crucial as their behaviors have been found to predict the development of EF in their children and this is more accentuated the younger they are (Bernier et al., 2012; Valcan et al., 2018). However, we are facing a reality in which parenthood is exposed to high levels of stress, especially among those parents of younger children (Panesso et al., 2021) which somehow impacts their quality of care. Parental Burnout (PB) occurs in parents who are exposed to excessive stress, and who do not have sufficient resources to compensate for the effects of this syndrome (Mikolajczak & Roskam, 2018). This article seeks to understand how PB impacts parental competencies and preschool EF performance. We assessed 448 parents with children aged 3-5 years. Our data have shown that parental competencies of fathers and mothers predict some components of preschoolers' executive functions, such as flexibility, working memory, and emotional control. In addition, we have observed in preliminary results that one of the symptoms of parental burnout, emotional distancing, deactivates the bonding, reflective, protective, and formative competencies with which fathers and mothers face the parenting task. These results suggest that PB could have a moderating effect between parental competencies and children's EF. These results will be discussed in light of the relevance of early care for child development.

Financing: Proyecto Fondecyt Iniciación N° 11190565

P77 Las oscilaciones diferencian entre alerta y somnolencia de acuerdo a los cambios en estimulación sensorial en una tarea de integración multisensorial

Claudio Artigas¹, Ricardo Morales², Eugenio Rodríguez¹

(1) Pontificia Universidad Católica de Chile, Psicología, Santiago, Chile

(2) Duke University, 2080 Duke University Road, Durham, NC 27708, North Caroline, United states of America

Multisensory integration is the ability to merge different sensory modalities in one perception. Research in this area has shown the involvement of frequencies such as Gamma or Alpha in the perception of different multisensory stimuli. Nevertheless, the studies are on awake subjects, and the dynamic of multisensory integration in other states of consciousness is poorly understood. We studied multisensory integration between two different states, alertness and drowsiness, to tackle this problem. We presented audiovisual stimuli to which the participants must respond if the presentation of the visual and auditory stimulation belongs to the same perceptual object (coordinated / uncoordinated). We observe a decrease in Alpha and an increase in Gamma power in coordinated alert conditions compared to drowsiness. In the uncoordinated conditions, when the visual part of the audiovisual stimulation changes faster, we observe a decrease in Alpha power in alertness but not changes in Gamma. On the other hand, when the auditory modality changes to a faster frequency, we did not observe differences in Alpha. However, we did have a higher power in the Gamma alert state. We propose that in the face of drowsiness, it will activate compensatory mechanisms to maintain behaviour. These mechanisms are related to the sensory dominance driven by the nature of the stimulation, Alpha when visual stimulation changes first or Gamma if the auditory modality changes first.

Financing: Beca ANID

P78 Implementation of an auditory two-alternative forced-choice task in rats

Implementación de una tarea auditiva de elección forzada de dos alternativas en ratas

Roberto Saavedra Rojas², Cristóbal Veloso Oyarzún², Jacqueline Rojas Retamales², Pedro Obieta Fernández², Paula Rivera Bahamondes², Diego Elgueda González¹

(1) Universidad de Chile, Departamento de Patología Animal, Facultad de Ciencias Veterinarias y Pecuarias, Av. Santa Rosa 11735, La Pintana, Santiago, Chile

(2) Universidad de Chile, Facultad de Ciencias Veterinarias y Pecuarias, Av. Santa Rosa 11735, La Pintana, Santiago, Chile

Animals perceive their surroundings by integrating incoming sensory information with internal representations, such as their behavioral goals, decisions, and memories from previous stimuli-outcome associations. Then, they display adaptive behaviors by relating perception with action. Understanding how auditory perception is influenced by cognition requires analyzing neural auditory responses while animals perform auditory tasks. In order to understand how auditory decisions are represented in the brain we trained rats in a two alternative forced-choice task auditory task. Animals were trained both in a freely-moving and a head-fixed condition. The head-fixed condition was designed to allow extracellular cortical recordings during task performance. In each trial, animals were presented with two complex “cloud of tones” stimuli, composed of short overlapping tones of varying frequencies and random onset and durations. Rats learned to compare these sounds and report whether the second stimuli had a higher or lower mean frequency by choosing a water spout at their right or left, respectively. Correct responses were rewarded with 30-60 uL of water, while incorrect responses were punished with a time out. Water pump, as well as reward spouts and behavioral apparatuses were custom-made using low-cost electronics, a modified rat stereotax and 3D-printed parts. Most rats learned the task in about a month of Monday to Friday training and were able to discriminate sounds of about 1 octave difference, with about 80% of correct responses. We found that cloud frequency difference and stimuli complexity were the main factors affecting the rats performance in the task.

Financing: FONDECYT 11190278, ANID

P79 ¿Memory consolidation without sleep? The effect of fasting on spatial memory.

¿Consolidación de memoria sin sueño? El efecto del ayuno en la memoria espacial.

Joaquín Bou^{1,2,3}, Adrián Ocampo-Garcés^{1,3}, José Luis Valdés^{1,2}

(1) Departamento de Neurociencia, Facultad de Medicina, Universidad de Chile.

(2) Biomedical Neuroscience Institute (BNI), Facultad de Medicina, Universidad de Chile.

(3) Laboratorio de Sueño y Cronobiología, Programa de Fisiología y Biofísica, Instituto de Ciencias Biomédicas, Facultad de Medicina, Universidad de Chile.

It has been widely accepted that sleep is necessary for memory consolidation. However, recent evidence indicates that fasting may potentiate memory consolidation even without a sleep period after learning. This work aims to evaluate the ability of rats to consolidate hippocampal-dependent memories after fasting in the absence of sleep. To answer this question, seven adult male Sprague Dawley rats under standard light-dark cycle conditions were evaluated for their performance on the Object in Place Recognition test under ad libitum, 24-h and 48-h fasting conditions while they were either sleep deprived or not after learning.

The memory performance of the sleep-deprived animals in the ad-libitum condition showed a significant decrease compared with those in the ad-libitum condition but allowed to sleep. Interestingly, the memory performance of 48 hours of fasting and sleep-deprived rats showed memory performance very similar to control (ad libitum/ non-sleep deprived) rats, suggesting that under fasting conditions, memory consolidation may occur in the absence of sleep. Furthermore, these results are not explained by differences in exploration time or traveling distances, discarding any movement-derived effects induced by experimental manipulations.

These results are a starting point to explore the physiological mechanisms involved in hippocampus-dependent memory consolidation during wakefulness in adverse survival conditions such as food scarcity.

Financing: Biomedical Neuroscience Institute (BNI), proyecto ACE210007

P80 Brain Oscillation and pupil variations as physiological markers of switching attention between “on task” and “off-task.”

Variaciones en oscilaciones y pupila como marcadores de cambio atencional entre “estar en tarea” y “estar fuera de tarea”

Rodrigo Henriquez^{1,2,6}, Claudio Artigas Vergara¹, Reinaldo Uribe - San Martín^{1,2,3}, Pablo Billeke⁴, Joaquin Herrero^{1,6}, Patricio Mellado², Christian Cantillano^{1,5}, Pablo Fuentealba^{1,5,6}, Francisco Aboitiz^{1,6}

(1) Centro interdisciplinario de neurociencia Universidad Católica de Chile, Medicina, Chile

(2) Universidad católica de Chile, Neurología, Santiago, Chile

(3) Centro de epilepsia Hospital Sótero del Río, Santiago, Chile

- (4) Laboratorio de neurociencia social y neuromodulación universidad del desarrollo, Facultad de gobierno, Santiago, Chile
 (5) Universidad católica de Chile, Neurocirugia, Medicina, Santiago, Chile
 (6) Universidad católica de Chile, Psiquiatría, Medicina, Santiago, Chile

The cognitive process known as attention is a mechanism that allows us to filter and focalize information. Nevertheless, which information is filtered or focused changes constantly between the outside world (on-task) and our thoughts (off-task). These changes are vital to surviving, increasing our performance or giving us insights to solve everyday problems. A vast amount of literature supports the mechanism underlying these two attentional networks, but the transition between them is poorly understood. To tackle the neuronal dynamic between these two networks, we designed a task where we presented random letters, and the purpose of the participants was to press every time an "F" appeared. For every random letter presentation, we asked the subject about his attentional state (Attended – Sleep – Unattended). We split the trials according to the participant's responses. We evaluated the pupilar diameter, spectral amplitude, and reaction times of the three trials before and two after the question to observe the attentional dynamic. With four subjects analyzed, we found a tendency of increased variability of the reaction times, higher amplitude on theta, beta and gamma, a decrease of Alpha, and higher contraction on the attentional trials before the question compared with unattended. However, in reaction times, beta and gamma, we did not find a difference in falling asleep. These physiological measures could be related to sustaining attention, lost when we are unattended but sustained in sleep, which could be related to the coupling mechanism to maintain the behaviour.

Financing: FONDECYT 1210659

P81 Mind the gap: Exploring center of mass computation in stability judgments in a real-world's intuitive physics experiment

Giuliana Bucci Mansilla¹, Jason Fischer¹

(1) Johns Hopkins University, Psychological and Brain Science, Art and Science, 3400 North Charles Street, Baltimore, United States

In daily life, the way we interact with the physical world around us is intuitive and optimal. When stacking items, we place lighter objects on top of heavier ones, or when lifting a cumbersome object, we do it close to our body. We constantly make physical inferences that seem effective, without thinking twice. What are the physical variables that we compute in our minds to make these decisions? In a real-world context, we will study which physics variables people use to keep in balance a system that is in an unstable equilibrium. We hypothesize that people use precise mental computations of a system's center of mass (CM) to maintain its stability as they interact with it. To test this idea, we will ask participants to play a game in which they maintain the balance of a platform while removing blocks from it. There will be three experimental conditions: 1- blocks with different mass placed at constant distances from the center of the platform; 2- blocks with constant mass placed at different distances from the center of the platform; 3- blocks with different mass placed at different distances of the center of the platform. In line with our hypothesis, we predict that participants will choose the lightest blocks in condition 1, the closest blocks to the center in condition 2, and the blocks that displace the CM the least (jointly considering both mass and position) in condition 3. Our findings will help differentiate between heuristic and Newtonian accounts of intuitive physics. Financing: Dynamic perception Lab. Johns Hopkins University

P82 Pupillary dynamics as a marker of the vividness of mental imagery during the deliberation process.

La dinámica pupilar como marcador de la viveza de la imágenría mental durante el proceso de deliberación

Armando Parraguez¹, Karla Padilla¹, Samuel Madariaga^{1,2}, Pedro Maldonado^{1,2,3}

(1) Universidad de Chile, Laboratorio de Neurosistemas, Departamento de Neurociencia, Facultad de Medicina, Av. Independencia 1027, Santiago, Chile

(2) Centro Nacional de Inteligencia Artificial (CENIA)

(3) Instituto de Neurociencia Biomedica (BNI)

It is well known that pupillary reflex in the absence of brightness changes can reflect brain processes such as emotional response and attention. Therefore pupil dynamics have been a target of interest for studying cognitive processes underlying perception and memory, among others. More recent studies have shown that pupil size differences could reveal successful memory recall. In this regard, eye-tracking studies indicate that the looking-at-nothing phenomenon has been used to trace information searches in memory. The looking-at-nothing phenomenon refers the gaze behavior of looking at the empty visual space where relevant information was previously located. Besides, looking-at-nothing behavior has been associated with mental imagery formation. Interestingly, our previous work found evidence of looking-at-nothing behavior during the deliberation phase in a decision-making task. Hence, we hypothesize that this gaze behavior suggests creating mental images associated with successful memory retrieval as a mechanism of deliberation during decision-making. From the above, the following question arises: Could pupil size be used for probing the vividness of this mental imagery? Does the mental imagery vividness influence better decisions? To explore those questions, we

combine the phenomenon of looking-at-nothing with a decision-making task. Participants are instructed to answer the Visual Imagery Vividness Questionnaire (VVIQ). Then subjects are asked to perform a preferential decision task, in which they have to choose which snack they prefer to eat after the experiment ends and their choice confidence level. During the task, their eye movements and pupil dynamics are recorded.

Financing: BNI PROYECTO ACE 210007FONDECYT N3210646

P83 Identification of electroencephalography and psychophysical parameters with potential diagnostic use for suicidal patients

Rosario Gajardo¹, Rodrigo Henríquez¹, Susana Morales¹, Francisco Aboitiz¹

(1) Pontificia Universidad Católica de Chile, Department of Psychiatry, Faculty of Medicine, marcoleta 391, Santiago, Chile

Suicide is a serious public health problem. Depression, common condition associated with suicide, it is described as a set of affective and cognitive symptoms associated with a dysfunction of the serotonergic system. Studies have correlated serotonergic activity with the modulation of Loudness Dependence of the Auditory Evoked Potential (LDAEP), an event-related potential (ERP) component, which is evoked by tonal auditory stimuli and correlated psychophysical performance, and emotional sensitivity.

Behavioral and electroencephalographic (EEG) data of female patients with suicidal ideation (SI, n=3) and suicidal attempts (SA, n=3) was obtained to evaluate whether the LDAEP is elicited by a novel version of the auditory oddball paradigm using stimuli with emotional valence (positive, negative, neutral) and its correlation with psychophysical indicators and Beck Hopelessness Scale (BHS). We describe LDAEP as well as in psychophysical indicators in a task of detection and recognition of emotional auditory stimuli.

Behavioral analysis indicates that false alarms, reaction times (RT), and total accuracy were no statistical difference between SI and SA groups. For EEG analysis, we describe that LDAEP is elicited with auditory stimuli with emotional valence. In addition, the amplitude of LDAEP in SI was higher than SA. Finally, Pearson correlation between LDAEP and BHS total score and affective factor show a $r < -0.975$. Also, show a trend with RT ($r \geq 0.8$). This suggests that LDAEP evoked by auditory stimuli with emotional valence is a useful tool for assessing emotional regulation and a possible neuro-marker for suicidal behavior.

Financing: PROYECTO FONDECYT 1210659

P84 Using first-person data to describe oscillatory activity: an exploratory study of the neural and experiential dynamics of being moved by artworks.

Uso del dato en primera persona para describir la actividad oscilatoria: un estudio exploratorio de la dinámica neural y experiencial de ser conmovido por arte.

Deysa Poyser¹, Eugenio Rodríguez¹, Germán Campos^{1,2}

(1) Pontificia Universidad Católica de Chile, Laboratorio de Neurodinámica Básica y Aplicada, Psicología, Vicuña Mackenna 4860, Macul, Región Metropolitana., Santiago, Chile

(2) Pontificia Universidad Católica de Chile, Laboratory for Brain-Machine Interfaces and Neuromodulation, Psicología, Vicuña Mackenna 4860, Macul, Región Metropolitana., Santiago, Chile

How does an image become a significant stimulus during an aesthetic encounter? Vision is one of the modalities most explored by neurosciences, yet we know little about how an image, like an artwork, can move us.

A growing body of evidence correlates the default network activity with aesthetic experiences mediated by artworks (Vessel et al., 2012; Cela-Conde et al., 2013; Belfi et al., 2019). Even though the functional role of this network during an aesthetic experience remains to be clarified, there seems to be a mismatch between the canonical characterization of this network and the aesthetic stance. This paradoxical activity could be a potential hallmark of aesthetic processing.

Based on the Neurophenomenological program (Varela, 1996), an experimental design that integrates subjective and objective description levels was implemented. While electroencephalographic activity is recorded, viewers perform a visual task of rating how moving (1-4) an artwork is (N=113). Each one appears for 6 s., and then they are followed by a black screen that lasts for 3 s. This session is followed by a micro-phenomenological interview based on a moving image.

Exploratory results based on the oscillatory response of 15 participants point to a difference between extreme levels of being moved ($4 > 1$) at the beta

and gamma bands and topography lateralized to the right. A generic (group) analysis of the experiential micro-dynamics indicates a structure of four phases with cognitive and emotional changes characterized by an apparent transition from a passive to an active gaze. Reciprocal constraints on these two levels of information are discussed.

Financing: Scholarship from the Vice-rectorate of Academic Research of the Pontifical Catholic University of Chile (PUC) and the Laboratory of Basic and Applied Neurodynamics PUC.

P85 Impaired cognitive function in heart failure with preserved ejection fraction is associated to cardiorespiratory alterations

Impaired cognitive function in heart failure with preserved ejection fraction is associated to cardiorespiratory alterations

Jessy Asencio¹, Camilo Toledo^{1,3}, Antonia Norambuena¹, Rodrigo Del Rio^{1,2,3}

(1) Laboratory of Cardiorespiratory Control, Department of Physiology, Pontificia Universidad Católica de Chile, Santiago, Chile.

(2) Center for Aging and Regeneration (CARE-UC), Pontificia Universidad Católica de Chile, Santiago, Chile.

(3) Centro de Excelencia de Biomedicina de Magallanes (CEBIMA), Universidad de Magallanes, Punta Arenas, Chile.

Heart Failure is a highly prevalent cardiovascular disease in the elder population, and is associated with cognitive impairment (CI). In heart failure, CI has been linked to inadequate brain oxygenation due to cerebral hypoperfusion secondary to reduced ejection fraction; however, the pathophysiological mechanisms underpinning the progressive decline in cognitive function during heart failure without brain hypoperfusion (HFpEF) are completely unknown. Since cardiorespiratory dysfunction contribute to age-related CI, we aimed to characterize the presence of CI and cardiorespiratory disorders in experimental HFpEF. Adult male mice underwent L-NAME (0.5 mg/ml) and a high-fat diet for 16 weeks to induce HFpEF and cardiorespiratory parameters were evaluated by whole-body plethysmography, echocardiography, and blood pressure recordings. Behavioral tests were used to determine learning/memory function and anxiety/depression-like behavior. Compared to control mice, HFpEF mice show signs of anxiety and depression-like behavior evidenced by a ~25% increase in total mobility time in the forced swim test and a significant decrease in total distance traveled during the open field test (35.8 ± 4.5 vs. 20.8 ± 1.3 s, Control vs. HFpEF, respectively; $p < 0.05$). In addition, we found a significant increase in escape latencies throughout the 5 trials of the Morris water maze test in HFpEF mice compared to WT mice (155.0 ± 5.5 vs. 100.0 ± 10.9 %, Control vs. HFpEF, respectively; $p < 0.05$). Finally, multiple correlation analysis evidenced a highly interdependency between the incidence of cardiorespiratory disorders and cognitive performance in HFpEF mice. Our results suggest that the development/maintenance of CI are strongly dependent of the presence of cardiorespiratory disorders in HFpEF.

Financing: Supported by FONDECYT 3190659 and 1220950.

P86 Violencia contra las mujeres y empatía: el rol de la interocepción.

Paola Solano Durán¹, Valeria Isaac García¹, Daniel Franco-Obyrne¹, Kevin Blanco Madariaga¹, David Huepe Artigas¹

(1) Adolfo Ibáñez, Neurociencias, Psicología, Santiago, Santiago, Chile

Empathy, is defined as the socioemotional ability for understanding the affective states of others, whereas, the experiences of others are represented in terms of self-experience (Decety & Sommerville, 2003). Studies have pointed out that affective empathy is negatively related to interoceptive awareness (IA) (Stoica & Depue, 2020). IA is a psychobiological process of observation, recognition, and appraisal of internal bodily sensations, emotional states, and movement (Dunne et al., 2021). In this work it is proposed that IA could be a mediating variable between affective empathy and women who are in a violent relationship (IPV). At the neurobiological level, the link between empathy, IA and women victims of violence can also be observed. Studies have shown that the Anterior Insula, Anterior Cingulate Cortex, associated with empathy, are interoceptive nodes. Additionally, Insular Cortex has been associated with affective processing of self and others (also active in subjective awareness of anger, disgust, pain). Simmons et al., 2008 showed up a group of IPV with PTSD had an increased activation in the anterior/middle insula during negative anticipation, so these women could have brain alterations because of the violence suffered. Exploring interoception in IPV can provide an insight into the phenomenon of IPV and therapeutic options to support women.

Financing: No hay financiación.

P87 Ontogenesis of the asymmetric parapineal organ in the teleost epithalamus

Marcos Cayuleo^{1,2}, Karina Palma^{1,2}, Iskra Signore^{1,2}, Margarita Meynard^{1,2,3}, Lorena Armijo-Weingart⁴, Jasmin Ibarra^{1,2}, Steffen Härtel^{1,2,5}, Miguel L. Concha^{1,2,3}

(1) Integrative Biology Program, ICBM, Faculty of Medicine, University of Chile.

(2) Biomedical Neuroscience Institute, Santiago, Chile.

(3) Center for Geroscience, Brain Health and Metabolism, Santiago, Chile.

(4) Department of Physiology, University of Concepcion, Concepcion, Chile.

(5) National Center for Health Information Systems, CENS, Santiago, Chile.

Functional and morphological asymmetries are a widespread feature of the vertebrate brain and are considered essential for efficient processing. One of the most studied areas in terms of morphology, development and evolution of brain asymmetries is the epithalamus, which consists of the habenula and pineal complex. The former is a neural complex connecting basal forebrain regions with the midbrain and hindbrain, while the latter comprises the pineal organ and, in some species, also the parapineal organ (PpO). Strikingly, the relationship between the PpO and habenular asymmetries is crucial, as in zebrafish it has been shown that the PpO is necessary and sufficient to induce habenular asymmetries during embryonic development. In teleosts, beyond zebrafish and a few other species, information about the presence/absence of PpO has been controversial and explained at least in part by a process of ontogenic regression. However, studies addressing this possibility are virtually non-existent. Here we performed a detailed ontogenic analysis of the PpO in zebrafish, and found that the PpO loses its organisation as an organ during ontogeny, although parapineal cells remain and integrate individually or in small groups in the left habenula. We demonstrate that parapineal cells retain synaptic connectivity from the larval stage to adulthood, and show immunoreactivity to serotonin, substance P and some fotoreceptor markers. Together, these findings argue against parapineal ontogenetic regression and support the idea that cellular displacement and mixing of pineal complex components in the habenula are key ontogenetic mechanisms underlying the morphological variability of this region in evolution.

Financing: This work was funded by the Chilean National Agency for Research and Development (ANID) project: Biomedical Neuroscience Institute ACE210007.

P88 The effect of histamine on spatial memory consolidation and hippocampal neuronal activity.

Efecto de la histamina en la consolidación de la memoria espacial y la actividad neuronal hipocampal

Héctor Espinoza Quiroga^{1,2}, Morín Henríquez^{1,2}, José Luis Valdés^{1,2}

(1) University of Chile, Department of Neuroscience, Faculty of Medicine, Faculty of Medicine, Independencia 1027, Independencia, Santiago, Chile

(2) Biomedical Neuroscience Institute (BNI), Faculty of Medicine, Independencia 1027, Santiago, Chile

Throughout life, we are constantly forming memories. The formation of memories depends on several phases, where consolidation is crucial to permanently preserve a newly formed memory. Histamine, a neurotransmitter synthesized by a group of neurons of the tuberomammillary nucleus in the posterior ventral part of the hypothalamus, modulates hippocampal activity. Its role in memory consolidation has been reported in object recognition and aversive memory tests, but there is little information regarding spatial memory.

Here, using *Sprague Dawley* male rats, we show that, immediately after learning, single bilateral microinjection of histamine (10 nmol/side) in the dorsal CA1 region of the hippocampus induced a facilitative effect on spatial memory consolidation, evaluated in the Oasis Maze task 24 hours and 48 hours after training.

This facilitating effect was reversed by the H_2 receptor antagonist ranitidine when spatial memory consolidation was assessed 24 hours after training and by the H_1 receptor antagonist pyrilamine when consolidation was assessed 48 hours after training.

Overall, our data indicate that histamine administration to dorsal CA1 enhances spatial memory consolidation through a mechanism that involves activation of both H_1 and H_2 receptors at different time frames.

Additionally, we are currently conducting *in vivo* electrophysiology to study the effects of histamine on hippocampal neuronal activity during spatial memory consolidation to explain this neurotransmitter's positive effects over behavior.

Financing: Instituto de Neurociencia Biomédica (BNI), proyecto ACE210007

P89 Physical exercise reverts spatial memory impairment in an animal model of perinatal asphyxia

El ejercicio físico revierte las alteraciones de memoria espacial en un modelo animal de asfixia perinatal

Javier Ignacio Silva García^{1,3}, José Luis Valdés¹, Paola Morales^{1,2}

(1) Universidad de Chile, Departamento de Neurociencias, Facultad de Medicina, Independencia 1027, Santiago, Chile

(2) Universidad de Chile, Programa de farmacología molecular y clínica, Facultad de Medicina, Independencia 1027, Santiago, Chile

(3) Universidad de Santiago de Chile (USACH), Facultad de ciencias médicas, Santiago, Chile

Perinatal asphyxia (PA) is a leading cause of death and neurological damage in the neural system of new-borns. It is a metabolic insult caused by a temporary interruption of oxygen supply to the organism, which leads to cellular death and neurological impairment. Hippocampus, basal ganglia, and cerebellum are the most vulnerable regions in PA inducing cognitive and motor impairments.

Physical exercise has a neuroprotector effect against damage in the central nervous system, and it can induce the release of different trophic factors that lead to an increase in plasticity and neurogenesis.

This study aimed to determine if voluntary physical exercise can improve the cognitive impairment in memory and hippocampal plasticity in PA rats. To test this idea, hippocampal-dependent memory was evaluated using an object location task in sedentary rats (spontaneous, cesarean, and asphyctic rats; n=6 per group); versus exercised rats (spontaneous, cesarean, and asphyctic; n=6 per group). In addition, hippocampal plasticity was assessed by Arc immunohistochemistry.

The results show that exercise (i) induced a memory increase in PA animals, achieving similar performance to the control group, and (ii) Produced an increase in Arc immunoreactivity in PA rats in the hippocampus.

This data suggest that voluntary exercise improves memory capacities in PA animal, in parallel with increased hippocampal plasticity. Nevertheless, further studies are needed to consider several exercise variables to determine which one of them is correlated with this cognitive improvement.

Financing: Instituto de neurociencia Biomédica, proyecto ACE210007

P90 Promoting neuroliteracy in early childhood

Promoviendo alfabetización neurocientífica en edades tempranas

Claudio Parra-Vasquez¹, Christian Cea-Del Rio², **Alexia Francisca Nunez-Parra**³

(1) Universidad Andrés Bello, School of Education, Faculty of Science and Social Sciences, Viña del Mar, Chile

(2) Universidad of Santiago of Chile, Neurophysiopathology Laboratory, Center for Biomedical Applied Research (CIBAP), School of Medicine, Faculty of Medical Sciences, Santiago, Chile

(3) Universidad de Chile, Physiology Laboratory, Department of Biology, Faculty of Science, Santiago, Chile

Science permeates almost every aspect of our life and it is required to confront and solve key human challenges from our present and our future. Science education is then fundamental to understand science and to cultivate habits of mind, such as scientific and critical thinking. We propose here to use neuroscience as an innovative reference frame to develop scientific thinking skills and attitudes. In the last decades the neuroscience field has pushed knowledge boundaries and has been incorporated as a core principle in many areas of our society, from decision making in Government's public policies to economics and the private industry. Therefore, neuroliteracy, the basic knowledge of neuroscience and its relevance for our society, might be highly beneficial for our citizens. Our interdisciplinary research group, formed by neuroscientists, educators and psychologists, had developed scientific resources, financed by the Ministry of Science, that promote neuroliteracy in preschool children ("Mi primer libro del cerebro" and the audiovisual series "Valentina descubre el Cerebro"). Preliminary results showed that preschool teachers have the perception that the usages of these resources enrich the conceptual schemes about the brain and some skills and attitudes of the scientific thinking in children from 4-6 years old. Specifically, they can learn concepts associated with brain structure (i.e. the words brain, neuron and synapse) and understand the role the brain plays in their daily activities. Moreover they could transfer this knowledge to other functions, understand the relevance of sleep for memory consolidation and a good nutrition for proper neurodevelopment.

P91 Olfactory cortex altered excitability might underpin olfactory discrimination deficits in the Fragile X Syndrome mouse model

Relación entre alteraciones de excitabilidad cortical y percepción olfatoria en modelo de ratón de síndrome X frágil

Marcelo Rojas-Cáceres¹, Felipe Arancibia¹, Alexia Nunez-Parra¹, Magdalena Sanhueza¹

(1) University of Chile, Department of Biology, Faculty of Science, Santiago, Chile

Fragile X syndrome (FXS) is the most common monogenetic cause of autism and second most common mental retardation cause worldwide. Due to a mutation in the FMR1 gene, FXS lacks the expression of FMRP protein which is involved in a variety of neuronal processes. A key feature of FXS symptomatology is altered sensory processing greatly affecting the FXS individual's life quality. Here, we use a combination of behavioral and in vitro electrophysiological tools to study the neurophysiological alterations underlying aberrant sensory processing in the olfactory system of the FXS mouse model (Fmr1-KO). Using a go/no-go behavioral test we found that Fmr1-KO mice had similar learning capabilities to WT mice on simple discrimination tests, but were incapable of correctly discriminate between complex mixtures. Moreover, we found that olfactory short and long-term memory were also deficient in the Fmr1-KO mice. These neuronal computations are thought to rely mainly on the piriform cortex (PC), where olfactory information is decoded by a unique ensemble of pyramidal neurons (Pyr). Electrophysiological data from Pyr in the PC of Fmr1-KO mice show an hyperexcitable phenotype accompanied with active membrane properties differences and altered network connectivity. Taken together, our data suggests a possible causal link between the observed olfactory discrimination deficiencies observed in the Fmr1-KO mouse and Pyr altered physiology

P92 Testing NREM-sleep neuromodulation hypotheses using a biophysically inspired whole brain model

Testeo de hipótesis de la neuromodulación del sueño NREM usando un modelo biofísico de cerebro completo

Fernando Lehue Bermedo^{1,2}, Enzo Tagliazucchi^{3,4,6}, Patricio Orio^{1,5}

(1) Centro Interdisciplinario de Neurociencia de Valparaíso, Harrington 287, Valparaíso, Chile

(2) Programa de Doctorado en Ciencias, mención Biofísica y Biología Computacional, Universidad de Valparaíso, Facultad de Ciencias, Valparaíso, Chile

(3) Universidad de Buenos Aires, Departamento de Física, Facultad de Ciencias Exactas y Naturales, Avenida Intendente Cantilo, Buenos Aires, Argentina

(4) Latin American Brain Health Institute (BrainLat), Universidad Adolfo Ibáñez, Santiago, Chile

(5) Instituto de Neurociencia, Universidad de Valparaíso, Facultad de Ciencias, Gran Bretaña 1091, Valparaíso, Chile

(6) Buenos Aires Physics Institute, National Scientific and Technical Research Council (CONICET), Buenos Aires, Argentina

Sleep is characterized by changes in brain neurochemistry, which translate to behavioral and electrophysiological changes in a circadian regulated way. Several neuromodulators (Acetylcholine, Norepinephrine, among others) and structures (Preoptic Area, Basal Forebrain, Thalamocortical projections, etc) are involved in this natural cerebral state transition, which together cause the aforementioned changes in brain activity during sleep. In order to better understand how local changes in cerebral neurotransmission and dynamics explain the passage between awake (W) and sleep NREM phases (N1-3), we used a Whole-Brain dynamical model to generate fMRI-BOLD-derived Functional Connectivity matrices (FC), adjusting intrinsic biophysical parameters to approximate real subjects BOLD FC data. Regional heterogeneity of neuromodulation was considered according to the empirical distribution of neuromodulator receptors, which makes the optimal parameter distribution directly relatable to specific brain chemicals and dynamics. In the model, thalamocortical input facilitated a wake-like connectivity profile, and its disconnection was key for a better fit to real FC in the descent to sleep. The role of specific dynamical properties of sleep (Transition from alpha-band desynchronized dynamics in W to local synchrony of neuronal activity in NREM) is also studied. This and other models of brain activity lay the groundwork for the construction of tools that will serve to include new untested hypotheses of brain changes in sleep, sedation, and disorders of consciousness.

Financing: Financiado por ANID a través de Fondecyt 1211750, Fondecyt 1220995, Fondo Basal FB0008 y Beca de Doctorado Nacional 2022.

P93 1/f slope is continuously dependent on frequency range in resting state intracortical recordings

Gonzalo Boncompte^{1,2}, Vicente Medel^{3,4}, Martin Irani⁵, Tomas Ossandon²

- (1) Pontificia Universidad Católica de Chile, Anestesia, Medicina, Santiago, Chile
- (2) Pontificia Universidad Católica de Chile, Psiquiatría, Medicina, Santiago, Chile
- (3) Universidad de Chile, Neurociencias, Medicina, Santiago, Chile
- (4) University of Sydney, Brain and Mind Center, Sydney, Australia
- (5) University of Illinois Urbana-Champaign, Psicology, Urbana, IL, USA

It has been proposed that the spectral power of background activity decays across frequency following a power-law behaviour ($1/f$), which is fully defined by two parameters: offset and slope. However, it has been shown that real electrophysiological data is usually better adjusted using a “knee” parameter or even two different $1/f$ equations. The frequency ranges in which $1/f$ is fitted to data are variable in the literature, and normally chosen on a case to case basis based on visual inspection. Scale invariance and the general power spectrum structure of background cortical activity have not been fully characterised. Here we systematically estimated $1/f$ slopes across different frequency ranges in resting-state intracortical recordings from 62 subjects using the FOOOF algorithm. We fitted $1/f$ across several central frequencies (CF) using a spectral span of 2 octaves, ranging from CF = 3 Hz (1.5 to 6Hz) to CF = 125 Hz (63 to 250Hz). We found in general a strong and positive dependence between $1/f$ slope and CF at low to medium CFs (from 3 to ~40 Hz), e.g. $1/f$ slope was lower when calculated between 5 and 20 Hz compared to when calculated between 15 and 60 Hz. Our results show that the range of frequencies in which $1/f$ slope is estimated systematically changes $1/f$ slope values, particularly in the frequency ranges available for scalp EEG recordings. This implies that electrophysiological field potential data does not present a strict scale invariance, and thus caution should be taken when interpreting $1/f$ results. Financing: Proyecto FONDECYT postdoctorado N 3200248

P94 Assessing the recognition of agonists, antagonists, and Ca^{2+} within the VSLD domain of TRPM8 channels by docking and molecular dynamics simulations

Evaluación del reconocimiento de agonistas, antagonistas y Ca^{2+} dentro del dominio VSLD de los canales TRPM8 mediante simulaciones de acoplamiento y dinámica molecular

Jocelyn Solorza¹, Janin Riedelsberger¹, Maria Pertusa^{2,3}, Jans Alzate-Morales¹

- (1) Universidad de Talca, Centro de Bioinformática, Simulación y Modelado (CBSM), Facultad de Ingeniería, Avenida Lircay S/N, Talca, Chile
- (2) Universidad de Santiago de Chile, Departamento de Biología, Facultad de Química y Biología, Avenida Libertador Bernardo O'Higgins 3363, Santiago, Chile
- (3) Núcleo Milenio de Enfermedades Asociadas a Canales Iónicos (MiNICAD)

The transient receptor potential melastatin 8 (TRPM8) channel, expressed in primary somatosensory neurons, is the main molecular entity involved in mammals cold thermotransduction. TRPM8 is activated by cold, cooling compounds such as menthol, and voltage. This thermo-TRP is also associated with painful pathologies and several forms of cancer, emerging as a possible therapeutic target. However, the molecular determinants behind the regulation of TRPM8 by agonists and antagonists are still not completely understood. Protein structures obtained by Cryo-EM (PDB: 6NR2 and 6O6R) revealed that both, chemical activators, and inhibitors, share the same recognition site located between the transmembrane segments S1-S4 that conform the VSLD (voltage-sensor-like domain) cavity of the channel. To identify structural determinants involved in the modulation of TRPM8 by chemical compounds, we modeled the human TRPM8 channel through comparative modeling. Agonists (menthol, icilin, and WS-12) and antagonists (BCTC, SKF96365, and AMG2850) were docked into the human TRPM8 model and molecular dynamics (MD) simulation performed in the absence and presence of Ca^{2+} cofactor. Based on docking and MD simulations we determined that the residues Tyr745, Asp802, and Arg842 are critical for the specific binding of the two types of ligands, agonists, and antagonists. In addition, we characterized how the coordination sphere from the Ca^{2+} ion act as a stabilizing agent of interactions in the region adjacent to the binding site of the ligand. This new information will contribute to the design of computational models based on Machine Learning to perform in silico high throughput screening for new TRPM8 chemical modulators.

Financing: M-P thank financial support from Millennium Nucleus of Ion Channels-Associated Diseases (MiNICAD) JS-M acknowledges a doctoral fellowship from Government of Chile through ANID.

P95 Neuroinflammation in the ventral medulla contributes to cardiorespiratory disorders in heart failure: role of astrocytes

Alexandra Las Heras¹, Esteban Diaz-Jara¹, Camilo Toledo^{1,2}, Katherine Pereyra¹, Karla Schwarz¹, Hugo Diaz¹, Rodrigo Del Rio^{1,2,3}

(1) Laboratory of Cardiorespiratory Control, Department of Physiology, Pontificia Universidad Católica de Chile, Santiago, Chile.

(2) Centro de Excelencia de Biomedicina en Magallanes (CEBIMA), Universidad de Magallanes, Punta Arenas, Chile

(3) Centro de Envejecimiento y Regeneración CARE-UC, Pontificia Universidad Católica de Chile, Santiago, Chile

Neuroinflammation is considered one main pathophysiological mechanism in heart failure (HF). Indeed, neuroinflammation modulates brainstem circuits involved in cardiorespiratory regulation, particularly the activity of C1-catecholaminergic neurons from the rostral ventrolateral medulla (RVLM) which are well-known for their role in cardiorespiratory regulation. It has been reported that astrocytic activation during inflammatory conditions regulates neuronal activity. Whether astrocyte activity is altered in HF and its implication in RVLM-C1 neuron regulation in the setting of HF is not known. Accordingly, we aimed to determine the role of astrocytes from the RVLM on cardiorespiratory disorders in HF. Adult rats underwent volume overload to induce HF. Cardiorespiratory recordings were performed eight weeks after HF induction. At the end of physiological recordings, brains were harvested and processed for immunohistochemical and molecular analysis. Astrocytic morphology was assessed by Sholl analysis. Immunoblot (GFAP, FosB) and qPCR (TNF- α , IL-1 β) were used to measure RVLM neuroinflammatory status. HF animals exhibited strong signs of astrocyte reactivity evidenced by an increased number of astrocyte processes (12.77 ± 0.78 vs. 17.92 ± 1.04), augmented number of intersections (3.15 ± 0.78 vs. 4.23 ± 1.03), and a higher total length of processes ($282.6 \pm 12.47 \mu\text{m}$ vs. $402.8 \pm 17.95 \mu\text{m}$). Indeed, we found an augmented GFAP and FosB expression within the RVLM (250% and 160% of sham, respectively). Importantly, we found that both astrocyte morphological alterations and pro-inflammatory cytokine expression were associated with a high degree of cardiorespiratory disorders in HF rats (i.e. disordered breathing). Our findings support a plausible role for RVLM astrocyte on the maintenance of cardiorespiratory alterations during the progression of HF.

Financing: Supported by Fondecyt 1220950

P96 Presynaptic Dlg and dPMCA interacts and regulates calcium kinetics in Drosophila Brain and Neuromuscular junction (NMJ)

Andres Köhler-Solis¹, Estefanía López¹, Eduardo Quiroz¹, Oliver Kobler², Ulrich Thomas², Jimena Sierralta^{1,3}

(1) Biomedical Neuroscience Institute (BNI), Neuroscience, Santiago, Chile

(2) Leibniz Institute for Neurobiology (LIN), Neurochemistry and molecular biology, Magdeburg, Germany

(3) Universidad de Chile, Neuroscience Department, Santiago, Chile.

Neurotransmitters released in the synapse occur at structures called active zones. The amount and timing of the released neurotransmitters at the active zone depends in one part on the entry of Ca²⁺ through voltage-dependent calcium channels (VDCC), and of Ca²⁺ extrusion mechanisms on the other. In *Drosophila melanogaster*, the main mechanism of bulk Ca²⁺ extrusion in presynaptic terminals is the plasma membrane calcium pump (dPMCA). Some of the dPMCA splice variants display a C-terminal PDZ interaction motif, which allows its association with PDZ containing proteins like Dlg-MAGUK scaffold proteins. We hypothesize that presynaptic Dlg controls dPMCA membrane abundance and clustering, impacting the calcium extrusion and the neurotransmitter release kinetics in *Drosophila* adult brain and NMJ. Using animals with *dlg* and *dPMCA* loss of function or presynaptic downregulation and the analysis of dPMCA by STED microscopy, we were able to show defects in synaptic dPMCA localization in pre and postsynaptic membrane of the NMJ, which changes from a distribution in clusters to a more homogenous distribution. Importantly this disruption of the dPMCA clustering correlates with an electrophysiological phenotype where in presynaptic Dlg and dPMCA knockdown. Additionally, this physical interaction was observed at *Drosophila* brain, where Dlg and dPMCA knockdown impact calcium removal and functional activity. We demonstrate that presynaptic Dlg and dPMCA interaction plays a role for the regulation of the calcium kinetics extrusion and neurotransmitter release under resting and after synaptic activity at the *Drosophila* NMJ.

Financing: Fondecyt 1210586

P97 “Local interplay of intracranial neural dynamic organization in working memory function”

Martina Redel Villarroel¹, Reinaldo Uribe-San Martin^{2, 3}, Rodrigo Henríquez-Ch^{1, 2}, Pablo Billeke⁵, Joaquín Herrero¹, Christian Cantillano⁶, Patricio Mellado², Pablo Fuentealba¹, Francisco Aboitiz^{1, 4}.

(1) Interdisciplinary Center for Neuroscience, Medical School, Pontificia Universidad Católica de Chile, Santiago, Chile.

(2) 2 Neurology Department, Medical School, Pontificia Universidad Católica de Chile, Santiago, Chile.

(3) 3 Reference Center for Epilepsy Hospital Dr. Sótero del Río, Santiago, Chile..

(4) 4 Psychiatry Department, Medical School, Pontificia Universidad Católica de Chile, Santiago, Chile.

(5) 5 Laboratorio de Neurociencia Social y Neuromodulación, Centro de investigación en Complejidad Social (neuroCICS), Facultad de Gobierno, Universidad del Desarrollo, Santiago, Chile.

(6) 6 Neurosurgery Department, Medical School, Pontificia Universidad Católica de Chile, Santiago, Chile. martina.redel90@gmail.com

It is well established that brain activity underlying various aspects of human cognition, such as attention, memory, or language, is related to cortical oscillations in different frequency bands. Specifically, in humans working memory has been correlated with low-frequency oscillatory activity (<20 Hz) mainly in EEG. However, the role of high-frequency oscillations over >50 Hz primarily has been described in non-human invasive recording, thus the distribution and organization of such activity directly recorded from the human cortex still remain unclear. We have taken advantage of subdural recordings in refractory epileptic patients implanted for clinical reasons to study the neural dynamics of working memory function and the role of local cortical activity organization between low (5 to 12 Hz) and high (55 to 90 Hz) brain rhythms. We used a modified visual Sternberg memory task in 3 patients to evaluate the functions of working memory (encoding, maintenance, recovery) related to memory loads. We found an increased power of narrow-band gamma activity (55-90Hz) during the encoding and maintenance stage, mainly in the Frontal and Left Inferior Temporal gyrus, during high memory load. Also, we show neural activity related to theta oscillation (8-12 Hz) in the early encoding stage in the left inferior frontal gyrus. Therefore, here we show the neural dynamics organization between low and high rhythms in the local brain regions in vivo human recording that could be a local neural circuit related to working

P98 Myelin damage and the respiratory rhythm: preBötC as a starting point.

Daño en la mielina y el ritmo respiratorio: preBötC como punto de partida

Raúl Pulgar^{1,2}, Jaime Eugén León¹, Fernando Ortíz C²

(1) Universidad de Santiago de Chile, Departamento de Biología, Facultad Química y Biología, Libertador Bernardo O'Higgins 3363, Santiago, Chile

(2) Universidad Autónoma de Chile, Instituto de Ciencias Biomédicas, Facultad de Ciencias de la Salud, Llano Subercaseaux 2801, Santiago, Chile

Multiple sclerosis (MS) is an autoimmune and neurodegenerative disease of the central nervous system (CNS) characterized by the loss of myelin; a specialized membrane produced by oligodendrocytes (OLs) in the CNS. An important region that undergoes myelin loss (demyelination) is the brainstem, where resides the neural network in charge of respiration, a vital rhythmic behavior. This is relevant, since patients with MS present demyelinating lesions in the brainstem, causing alterations in respiratory control and sleep apneas. However, the functional impact of myelin damage in the respiratory rhythm has not been studied. Our aim is to evaluate the respiratory impact of myelin damage restricted to the pre-Bötzinger complex (preBötC), a small nucleus that is critical for the generation of inspiration. We used two complementary MS murine models: we injected lysolecithin (LPC, a myelin-destroying toxin) into the preBötC of a 21-day postnatal CF1 mice or feed them with a mixture of cuprizone (CZP, toxin that ubiquitously and selectively eliminates OLs) and regular food. The effects on the preBötC were analyzed using immunohistochemistry, local field potential recordings, and whole animal plethysmography. Preliminary results suggest that central or local demyelination induces an irregular fictive breathing pattern as well as a decrease in the kinetic response to hypercapnia.

Financing: Supported by grants Fondecyt 1211359 (JE) and 1210940 (FO)

P99 Structural demonstration of the two-neuron hypothesis for opioid action on nigral dopaminergic neurons

Guillermo Lazcano¹, Rafael Gatica¹, Pablo Henny¹

(1) Pontificia Universidad Católica de Chile, Departamento de anatomía normal, Facultad de Medicina, Avda. Libertador Bernardo O'Higgins 340, Santiago, Chile

The endogenous opioid system modulates critical physiological responses, such as emotional behavior, nociception, learning, memory, and reward. Opioids susceptible to abuse and addiction, such as morphine, acts by binding to Mu-opioid receptors (MOR), one of the three major families of opioid receptors. The canonical hypothesis of opioid action in reward and addiction is focused on the ventral tegmental area and posits that opioids inhibit GABAergic neurons and, consequently, the activity of dopaminergic neurons increases. However, it has been suggested that another structure containing dopaminergic neurons, the substantia nigra, is also involved in opioid reward. Dopaminergic neurons appear to be strongly modulated by adjacent nigral reticulata GABAergic neurons. In this study we want to reveal the structural basis of this relationship within the substantia nigra by describing the innervation of MOR expressing nigral GABAergic neurons onto nigral dopaminergic neurons. For this purpose, spontaneous activity of single nigral cells was extracellularly recorded, followed by juxtacellular modulation to label the cell. Then, tissue containing labeled axon terminals and dopaminergic profiles has been studied in search for possible contacts between GABAergic and dopaminergic neurons. Preliminary results of

this study show appositions between labeled nigral GABAergic neurons that express MOR and dopaminergic profiles located in the substantia nigra. Further electron microscopy analysis will be carried out in order to confirm the monosynaptic connection between this nigral neurons. Opioid-induced responses of MOR GABAergic neurons will be assessed by *in vivo* intravenous morphine administration in future experiments.

Financing: Proyecto Fondecyt 1191497, Agencia Nacional de Investigación y Desarrollo Ayudante Becario VRI, Pontificia Universidad Católica de Chile

P100 Long-term ketogenic diet administration regulates presynaptic proteome by PKA and BDNF signaling pathway activation in prefrontal cortex of aging mice

Diego Acuña Catalan¹, Alejandro Acevedo², Cristina Olmos¹, Gabriel Quiroz¹, Cameron Wehrfritz³, Samah Shah³, Birgit Schilling³, Mitsunori Nomura³, John Newman³, Christian González-Billault^{1,2,3}

(1) Universidad de Chile, Center for Geroscience, Brain Health, and Metabolism (GERO), Department of Biology, Faculty of Science, Las Palmeras 3425, Ñuñoa, Santiago, Chile

(2) Universidad de Chile, Institute of Nutrition and Food Technology (INTA), El Líbano 5524, Macul, Santiago, Chile

(3) Buck Institute for Research on Aging, 8001 Redwood Blvd, Novato, California, United States

Aging is a complex process that compromises brain function progressively over time with increased risk of cognitive decline. Prefrontal cortex (PFC) is a brain region especially vulnerable to age due to significant changes in neuronal activity associated to synaptic dysfunction. Recent studies have demonstrated that nutritional interventions such as ketogenic diet (KD) preserves memory and cognition in old mice, nevertheless the molecular mechanisms specifically involved on those improvements are still unknown. Therefore, we investigated how KD administration at short- (1 week), medium- (6 weeks) and long- term (12 months) regulates the cortical synaptic proteome in aging mice. To this end, we performed mass spectrometry label-free data-independent acquisition (DIA) approaches by using pre-synaptic and post-synaptic enriched fractions derived from PFC of 26 months old mice. Bioinformatic analysis revealed that KD elicits discrete changes in the postsynaptic proteome at short-term administration, however, at medium and long-term administration KD preferentially modulates the presynaptic proteome through cAMP signaling pathway, actin cytoskeleton and synaptic vesicle cycling. Interestingly, we observed preserved working memory and cAMP signaling pathway activation by increased expression of protein kinase A (PKA) and Brain Derived Neurotrophic Factor (BDNF) in PFC's protein extracts of aged mice fed with KD by 16 weeks. Moreover, some of the results obtained using these high throughput approaches were recapitulated in cultured cells exposed to BHB, one of the main ketone bodies produced by KD. Overall, we show that KD modulates cortical proteome through key specific molecular pathways involved in synaptic activity preserving their function in aging mice.

Financing: Supported by Fondecyt Grant #1180419, ANID Scholarship #75200183 to DA and ANID/FONDAP/15150012 to CG-B

P101 Vagal nerve stimulation as a potential treatment for MS: insights from a preclinical murine model

Sebastián Vejar Contuliano¹, Andres Muñoz¹, Coram Guevara¹, Sinay Vicencio^{1,2}, Rodrigo Varas¹, Fernando Ortiz Cisternas¹

(1) Universidad Autónoma de Chile, Instituto de Ciencias Biomédicas, Facultad de Ciencias de la Salud, El Llano Subercaseux 2801, San Miguel, Chile

(2) Pontificia Universidad Católica de Valparaíso, Instituto de Química, Facultad de Ciencias, Avenida Universidad 330, Curauma, Valparaíso, Chile

Multiple Sclerosis (MS) is CNS pathology distinguished by demyelinated lesions (i.e., myelin loss), neuroinflammation and neurodegeneration. Early-stage demyelinated lesions are characterized by oligodendrocytes (OLs) loss, recruitment of OLs precursor cells (OPCs), reactive astrocytes and proinflammatory microglia (M1-like). After demyelination, there is a spontaneous process of myelin regeneration (i.e., remyelination) that unfortunately is harmed in MS, inducing several neurological symptoms, including impaired autonomous functions.

A promising treatment for peripheral and central inflammation is the stimulation of the vagus nerve (VNS). Evidence indicates that VNS reduces proinflammatory cytokines and microglia/macrophage infiltration in a neuroinflammation murine model. Moreover, VNS promotes the anti-inflammatory phenotype of microglia (M2- like) and reduces the 'M1-like' form. However, the effect of VNS in MS progression has not been systematically studied.

We have implemented a preclinical murine model of MS through focal microinjections of lyssolecithin (LPC, an OL toxin) in corpus callosum and cerebellar white matter. These animals present both cardiac and locomotor disorders. VNS was applied 7 days after the onset of demyelination (45 min/day for 3 days). Importantly, VNS-treated mice recovered their locomotor and cardiac function. These systemic responses were accompanied

by increased expression of TGF- β 1 and myelin proteins, decreased population of astrocytes and a change of microglia cytoarchitecture from an activated to a resting phenotype. Our results suggest that the locomotor and cardiac dysfunction triggered by MS can be restored by VNS through a reduction of the neuroinflammatory state in the MS model.

Financing: Funded by FONDECYT 1210940, DIUA 210-2021 VIP UA

P102 Contribution of Nrf2 antioxidant pathway in the neuroinflammation present in the cuprizone model of multiple sclerosis

Contribución de la vía antioxidante de Nrf2 en la neuroinflamación presente en el modelo de esclerosis múltiple de cuprizona

Coram Guevara¹, Sebastian Vejar¹, Francisca Villavicencio², Margrethe Olesen², Javier Reyes³, Cristian Amador³, Rodrigo Quintanilla², Fernando Ortiz¹

(1) Universidad Autónoma de Chile, Mechanisms of Myelin Formation and Repair Laboratory, Facultad de Ciencias de Salud, El Llano Subercaseoux 2801, Santiago, Chile

(2) Universidad Autónoma de Chile, Laboratory of Neurodegenerative Diseases, Facultad de Ciencias de la Salud, El Llano Subercaseoux 2801, Santiago, Chile

(3) Universidad Autónoma de Chile, Laboratory of Renal Physiopathology, Facultad de Ciencias de la Salud, El Llano Subercaseoux 2801, Santiago, Chile

Multiple sclerosis (MS) is an irreversible progressive disease characterized by the loss of myelin, the presence of glial cell-mediated neuroinflammation, and an overproduction of reactive oxygen species (ROS). These alterations have been linked to impairments of the Nrf2 signaling pathway, a critical antioxidant factor that prevents mitochondrial failure, oxidative damage, and neuroinflammation in the brain. However, it is not clear how this pathway contributes to the pathogenesis and progression of MS. We studied the participation of the Nrf2 pathway in neuroinflammation, mitochondrial function, and behavior of an animal model of MS obtained by feeding mice with 0.25% cuprizone -a demyelinating agent- during 6 weeks. Afterward, mice were fed with normal food for 6 weeks to allow for remyelination. Glial cells dynamics and Nrf2 expression were studied by immunofluorescence at 3, 6, and 13 weeks in demyelinated lesions. Nrf2 was evaluated by RT-PCR and WB. Mitochondrial function was estimated by measuring ATP production. Rotarod and NOR tests were made. At 3 weeks, animals showed a nuclear Nrf2 location in both microglia and oligodendroglia with an increase in ATP levels. At 6 weeks, morphological changes consistent with activated microglia were observed. Interestingly, a decrease in nuclear Nrf2 location and ATP levels, and fewer oligodendroglia was also observed. At 13 weeks a recovery on ATP levels and oligodendroglia number were observed. However, a decrease in locomotor and memory activity was observed, suggesting a long-term impairment (i.e. neurodegeneration). These preliminary results indicate a possible role of glial Nrf2-activation in demyelinated lesions contributing to MS.

Financing: FONDECYT 1210940 (FO); FONDECYT 1200178(RQ)

P103 ATP-receptor antagonist preserves coordinated prefrontal-hippocampal LFP activity and improves working memory performance in a mouse model of epilepsy.

Nelson Espinosa¹, Soraya Martín-Suárez², Ariel Lara-Vasquez¹, Juan Manuel Encinas², Pablo Fuentealba¹

(1) Pontificia Universidad Católica de Chile, Psiquiatría, Medicina, Marcoleta 391, Santiago, RM, Chile

(2) Achucarro Basque Center for Neuroscience, The Neural Stem Cell and Neurogenesis Laboratory, Parque científico UPV/EHU Planta 3E, Leioa, España

According to the World Health Organization, epilepsy is the most frequent primary brain disorder worldwide. This disease is characterized by recurrent seizures, most often originated in the hippocampus, a brain structure located in the medial temporal lobe. As the hippocampus is implicated in memory processes, patients with temporal lobe epilepsy (TLE) suffer from working memory impairments.

Previous results suggest that ATP plays a key role in the pathophysiology of epileptic seizures thus, we propose ATP-receptor blockade as an adjuvant pharmacological treatment for TLE. To this end, we used a murine model of epilepsy – induced by intrahippocampal injection of kainic acid – that develops hippocampal sclerosis and electrical epileptogenic discharges yet, with low seizure activity. Epileptic mice were trained in a reinforcement learning task using an operant box with a pellet dispenser and two nose-pokes (probability of reward 80% vs. 20%, 14 – 16 trials). Animals treated with ATP-receptor antagonist based on intraperitoneal administration of TNP-ATP acquired more food rewards than non-treated animals. Moreover, nose-poke response for treated animals was significantly more phase locked to the peak of the hippocampal LFP in theta band (4 – 10 Hz, $p < 0.0001$). Finally, performance improvement was correlated with LFP coherence between hippocampus and prefrontal cortex and

such coupling discriminated between rewarded and non-rewarded trials, suggesting a potential encoding in the cortico-hippocampal axis functional to the task. Altogether, these results posit the ATP pathway as a potential target for pharmacological treatment to act in conjunction with classic anticonvulsant prescriptions in TLE.

Financing: N.E. and P.F. FONDECYT 1190375A.L.V. Fondecyt postdoc 3210617J.M.E Achucarro, IKERBASQUE and UPV/EHUS.M.S. IKUR, PID2019-104766RB-C21 (MICINN); PIBA_2021_1_0018

P104 The role of vitamin D receptor (Hr96) in the mitochondrial function and neurodegeneration of a *Drosophila* Alzheimer's disease model.

El papel del receptor de vitamina D (Hr96) en la función mitocondrial y la neurodegeneración de un modelo de enfermedad de *Drosophila* Alzheimer.

Guilherme Gischkow Rucatti¹, Catalina Gomez Araos¹, Pablo Jiménez Flores¹, Francisco Muñoz Carvajal¹, Sebastián Oyarce Pezoa¹, Lesley Pow-Hing Lucero¹, Alberto J. Martín², Melissa Calegario³, Carol San Martín⁴, Mario Sanhueza⁵

- (1) Universidad Mayor, Centro de Biología Integrativa, Facultad de Ciencias, Cam. La Pirámide 5750, Huechuraba, Santiago, Chile
- (2) Universidad San Sebastián, Centro Científico y Tecnológico de Excelencia, Ciencia y Vida, Facultad de Ingeniería, Arquitectura y Diseño, Recoleta Providencia, Bellavista 7., Santiago, Chile
- (3) Universidad Mayor, Cam. La Pirámide 5750, Huechuraba, Santiago, Chile
- (4) Universidad de Chile, Centro de investigación clínica avanzada (CICA), Facultad de medicina y hospital clínico, Av. Independencia 1027, Santiago, Chile
- (5) Universidad Mayor, Centro de Resiliencia y Mitigación, Facultad de Ciencias, Av. Alemania 281, Temuco, Chile

Alzheimer's disease (AD) is the most common cause of dementia and is characterized by a progressive neurodegeneration in presence of amyloid- β (A β 42) plaques. Disruption in mitochondrial parameters appear long before AD-symptoms, contributing to the disease-mechanism. Vitamin D receptor (VDR) is a transcription factor and play a significant role in brain metabolic regulation. VD-hypovitaminosis shows a strong correlation with AD, and experimental VDR activation leads to A β 42 neuroprotection through a so far unknown molecular mechanism. *Drosophila*'s VDR ortholog, hormone receptor 96 (Hr96), regulates xenobiotic protection and energy homeostasis. Despite this prominent function, there is a lack of information about the Hr96 function in the nervous system and whether it can affect mitochondrial parameters in AD pathomechanism. Here we show that Hr96-overexpression under a pan-neuronal driver, improves lifespan, motor performance and synaptic morphology on the A β 42-based model, suggesting a Hr96-protective role against neurodegeneration. To explore the potential Hr96 role on mitochondrial genes, we constructed an *in-silico* gene regulatory network between *Hr96* and *Drosophila* mitochondrial genes. We identified 33 Hr96-regulated mitochondrial genes, many of which are associated with metabolic regulatory functions. Among these, 5 of these were down-regulated and 4 were up-regulated on AD-*Drosophila* transcriptome profile, including genes linked to cellular respiration, triglyceride metabolism, biogenesis of lipid droplets and regulation of ER stress. In vivo validation of these targets on *Drosophila* nervous system and characterization of mitochondria on Hr96 mutants will provide further clues regarding the role of VD role in AD-related neurodegeneration.

Financing: FONDECYT 11200981 y FB210008

P105 Characterization of brainstem cholinergic pathways in the demyelinated state of a murine model of multiple sclerosis

Sinay Vicencio Orellana^{1,2}, Sebastian Vejar¹, Coram Guevara¹, Javier Reyes¹, Cristián Amador¹, Rodrigo Varas¹, Fernando C. Ortiz¹

- (1) Universidad Autónoma de Chile, Instituto de Ciencias Biomédicas, Facultad de Ciencias de la Salud, El Llano Subercaseaux 2801, Santiago, Chile
- (2) Universidad Católica de Valparaíso, Instituto de Química, Facultad de Ciencias, Avenida Universidad N°330, Valparaíso, Chile

Multiple sclerosis (MS) is an autoimmune/neurodegenerative pathology characterized by the presence of demyelinated lesions (i.e., myelin loss) ubiquitously distributed in the central nervous system (CNS), involving local neuroinflammatory response and axonal damage that leads to neurological impairments associated with both central and peripheral function deficits. Studies indicate that acetylcholine (ACh) levels in the cerebrospinal fluid of MS patients decrease proportionally with the disease progression. In addition, ACh supplementation or the inhibition of its hydrolytic enzymes promotes neuroprotection and myelin repair (i.e., remyelination). Therefore, considering: (i) the therapeutic potential of modulating the cholinergic pathways in MS, and that (ii) the brainstem is the main route of communication between the CNS and the peripheral nervous system, our objective was to study the cholinergic pathways of the brainstem under the hypothesis that cholinergic signaling is decreased in the brainstem during the demyelinated state in a murine MS model.

To determine this, we induced focused demyelination lesions in corpus callosum and cerebellar white matter by the lysolecithin (LPC) injection in C57BL/6 wild type mice, to analyze after the brain tissue at 7 and 14 days-post-injection (dpi). By using immunodetection (choline acetyltransferase, ChAT and vesicular ACh transporter, VACHT), we observed that the cholinergic signaling was decreased in the brainstem at 7dpi, which was recovered at 14dpi. Interestingly, RT-qPCR assays showed more inflammatory cytokines at 7 versus 14dpi (TGF- β y TNF- α , $p < 0.05$). The results of this project have potential to shed light on new therapeutic targets and possible mechanisms involved in the pathogenesis of MS.

Financing: Funded by FONDECYT 1210940

P106 Molecular characterization of monocarboxylate and glucose transporters expressed in cells derived from progenitor cells from human olfactory epithelia

Caracterización molecular de transportadores de monocarboxilato y glucosa expresados en células derivadas de células progenitoras de neuroepitelio olfatorio humano

Liliana Espindola Salva^{1,2}, Andres Gonzalez Gutierrez¹, Estefanía Lopez Arenas¹, Macarena Smith¹, Jimena Sierralta Jara^{1,2,3}, Maria Isabel Behrens Pellegrino^{4,5,6}

- (1) Universidad de Chile, Neurochemistry and Molecular Biology, School of Medicine, Independencia 1027, Santiago, Chile
- (2) Biomedical Neuroscience Institute, School of Medicine, Independencia 1027, Santiago, Chile
- (3) Universidad de Chile, Department of Neuroscience, School of Medicine, Independencia 1027, Santiago, Chile
- (4) Universidad de Chile, Department of Neurology and Neurosurgery, School of Medicine, Santos Dumont 999, Santiago, Chile
- (5) Advanced Clinical Research Center (CICA), School of Medicine, Independencia 1027, Santiago, Chile
- (6) Clínica Alemana, Manquehue 1410, Santiago, Chile

Alzheimer's disease (AD) is characterized for a decline in memory and higher cortical functions. Among the multiple factors that have been considered in the development of the disease, is the imbalance in brain energy metabolism. The energetic coupling between glial cells and neurons is essential for proper brain functioning and requires the transport of glucose and metabolites derived from it such as lactate and pyruvate.

Evidence from patients and various models of AD indicates alterations in the expression of glucose (GLUT) and monocarboxylate (MCT) transporters in areas of the brain, determined by in vitro or post-mortem studies. In addition, research in patients indicates that some prominent markers for AD, such as mitochondrial dysfunction, may manifest in peripheral tissues.

We hypothesize that olfactory neurons differentiated from olfactory neuroepithelial stem cells (ONSC) from patients with Alzheimer's mild cognitive impairment display alterations in the expression of GLUTs and MCTs as well as mitochondrial dysfunction compared to neurons from control patients.

Using qRT-PCR and measurements of O₂ consumption and acidification, we are studying whether there are differences in the expression of GLUTs and MCTs and mitochondrial function between mild cognitive impaired patients and controls. We will present the data of technical controls as well as patients.

Financing: Funding: This project of investigation is funded by Proyecto FONDECYT 1190958

P107 Challenging histone aminylation by amines availability

Desafiando la aminilación de histonas por la disponibilidad de aminas.

Bastián I. Rivera¹, Isidora Almonacid¹, Antonia Soto Gonzalez¹, Jorge M. Campusano¹, María Estela Andrés¹

- (1) Pontificia Universidad Católica de Chile, Departamento de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Avenida Del Libertador Bernardo O'Higgins 340, Santiago, Chile

Histone aminylation is a recently discovered epigenetic phenomenon involved in genetic regulation. It consists of the addition of monoamines such as dopamine or serotonin to glutamine 5 residue of Histone 3 (H3). It has been proposed that this epigenetic mark could participate in the perpetuation of aberrant neuronal states caused by deregulation in the signaling of monoamine neurotransmitters. Histone aminylation is a permissive modification that activates transcriptional programs that could regulate behaviors. For example, cocaine and heroin seeking in the drug addiction context (Lepack et al., 2020). Given its recent description, there are many unknown aspects of this new epigenetic mark and the consequences of its dysregulation. We propose that changes in biogenic amines signaling could imply variations in histone aminylation abundance, influencing anatomical, circuits, and

behavioral alterations associated with neurological disorders. We found that flies PINK1B9 mutant with parkinsonian phenotype showed no change in H3 lysine 4 methylation levels, but exhibited an unexpected decrease in histone serotonylation and dopaminylation, compared to control. These results were not altered when flies were treated with Fluoxetine, a drug that increases the extracellular availability of serotonin. This data indicate alterations in histone aminylation abundance in Parkinson's disease flies model, and de impossibility to restore the normal levels, presumably due to the failure of mechanisms not yet identified.

Financing: Fondecyt 1191152 to MEA

108 Chronic stress impairs spatial memory flexibility and prefrontal-hippocampal coupling

Lorena Chacana-Véliz¹, Tatiana Dib¹, Danae Barria¹, Ignacio Negrón-Oyarzo¹

(1) Universidad de Valparaíso, Instituto de Fisiología y Centro de Neurobiología y Fisiopatología Integrativa, Facultad de Ciencias, Gran Bretaña 1111, Valparaíso, Chile.

Learning and remembering the location of relevant places in the environment (i.e. spatial reference-memory) is crucial for survival. This cognitive function depends on the coordination between the medial Prefrontal Cortex (mPFC) and Hippocampus (HPC) and is supported by the emergence and synchronization of patterns of brain oscillatory activity. Recent research showed, through Local-Field Potential (LFP) recordings in freely-moving mice, that spectral coherence, a measure of oscillatory activity synchronization, gradually increases in the mPFC-HPC network across the acquisition of spatial-reference memory. However, it is unknown if chronic stress affects mPFC-HPC synchronization during spatial reference memory formation and recall. To address this issue, C57BL/6 mice were chronically implanted with electrodes in the mPFC and HPC and then subjected to restraint stress for seven consecutive days. Control mice were not subjected to stress. Then, mice of both groups were subjected to LFP recording during spatial reference memory formation and recall in the Barnes maze. Our results show that chronic stress affects cognitive flexibility during long-term recall of spatial memory. Importantly, oscillatory activity synchronization in the mPFC-HPC axis was impaired in chronically stressed animals compared to non-stressed. Altogether these results will help to understand the relationship between brain oscillatory activity alterations and chronic stress-induced impairment of cognitive functions.

Financing: ANID Doctorado Nacional folio 21200451

P109 A study of top-down signals in the extra-classical receptive-field effects in a visual cortical microcircuit model

Estudio de señales de arriba hacia abajo en los efectos de campo receptivo extraclásicos en un modelo de microcircuito cortical visual

Samuel Madariaga^{1,2,3}, Pedro Maldonado^{1,2,3}, Christ Devia^{1,2,3}

(1) Laboratorio de Neurosistemas, Departamento de Neurociencia, Fac. Medicina, Universidad de Chile, Santiago, Chile

(2) Centro Nacional de Inteligencia Artificial (CENIA)

(3) Instituto de Neurociencia Biomédica (BNI)

Central questions in visual neuroscience are what are the cortical circuits that generate the neural responses of the primary visual cortex (V1) and how they interact with each other.

Several studies have shown how neurons in V1 preferentially respond to stimuli with optimal orientations and sizes within their receptive field (RF). Although mechanisms have been proposed that explain the effects on the RF, there are responses suppressed by environments far from the center of the RF, called extra-classical effects, which do not fit these ideas. Some authors have studied how top-down signaling from higher-order areas may explain the differences in extra-classical receptive field effects. Evidence that inactivation of the higher-order regions results in reduced strength of surround suppression. Although efforts have been made to generate models that account for this, top-down modulation is difficult to determine using electrophysiology, and the potential mechanisms are still unclear.

Under the paradigm of predictive processing, a recurrent model is proposed, described by microcircuits. Each microcircuit consists of 4 layers representing a functional grouping of cortical neurons. Each microcircuit interacts via lateral inhibition and excitatory connections with similar RF microcircuits, and sends bottom-up signals to higher visual areas, receiving top-down modulatory signals from these.

The objective of this study is to generate a model capable of accounting for the extra-classical receptive field effects and study top-down signaling in the response of neurons in V1

Financing: BNI PROYECTO ACE 210007

P110 The serotonergic innervation of ring neuron subpopulations modulates spatial learning in *Drosophila melanogaster*.

La innervación serotoninérgica de subpoblaciones de neuronas anulares modula el aprendizaje espacial en *Drosophila melanogaster*.

Ivana Gajardo^{1,2}, Carlos Oliva¹, Jimena Sierralta², Jorge M. Campusano¹

(1) Department of Cell and Molecular Biology, Faculty of Biological Sciences, Pontificia Universidad Católica de Chile.

(2) Department of Neuroscience, Biomedical Neuroscience Institute (BNI), Faculty of Medicine, Universidad de Chile.

The wide distribution of serotonergic projections in the CNS of vertebrates promotes changes in the structure and activity of brain areas relevant to cognitive flexibility associated with spatial learning and memory. In *Drosophila*, spatial learning and memory, which is necessary to guide navigation, require subpopulations of ring neurons of the ellipsoid body (EB). Several studies support that the EB is innervated by ExR3 neurons, which belong to the PMPD cluster and can modulate the activity of ring neurons by activating 5-HT7R. Here, we have generated a genetic tool based on the TANGO-map approach to provide new support for this idea. In particular, we show a robust immunofluorescent signal of the mCherry reporter activated by the exogenous expression of the human 5HT1AR-Tango in R3 and R4-ring neurons. Thus, our results demonstrate the release of serotonin from the PMPD cluster on R3 and R4-ring neurons, which are involved in spatial learning and memory.

Financing: Supported by ANID fellowship #21191820 and FONDECYT #1210586

P111 A glass of dopamine, please: volumetric estimates of striatal axonal, nigral somatic and dendritic domains of the mouse nigrostriatal system using Cavalieri's principle.

Catalina Muñoz Muñoz¹, Alejandro Oñate-Ponce¹, Pablo Henny¹

(1) Pontificia Universidad Católica de Chile, Departamento de anatomía normal, Facultad de Medicina, Avda. Libertador Bernardo O'Higgins 340, Santiago, Chile

Accurate descriptions of the three-dimensional structure and neuronal population size are necessary to understand the function and organization of the nervous system. Stereology is the gold standard approach for quantification of the size and number of cellular structures and has been extensively used in the central nervous system. Among stereological methods, Cavalieri's method allows unbiased estimates of volume. While widely used for total or regional brain volume, this method has not been generally applied to measure the volume of small nervous elements. We developed and applied a protocol based on Cavalieri's method to estimate the volume of the entire axonal, dendritic, perikaryal, and nuclear domains of the nigrostriatal dopaminergic system in a murine model. For that, we carried out immunofluorescence staining for tyrosine hydroxylase in brain serial sections and acquired randomly and systematically sampled confocal laser images across the substantia nigra and the caudate-putamen. We then used point-counting to estimate the area of TH-stained elements across these regions in serial sections. We found that the total volume of the nigrostriatal dopaminergic system is approximately 0.37 mm³. Of it, ~5% corresponds to perikarya and cellular nuclei, ~10% to neuropil/dendrites, and ~85% to striatal axonal varicosities and segments. By providing accurate estimations of fundamental anatomical parameters, this method may be used to follow in detail early and/or subtle changes in axonal, dendritic, somatic, and nuclear volume that accompany neurodegenerative processes.

Financing: Beca Doctorado Nacional ANIDProyecto Fondecyt 1191497

P112 Dopamine-Serotonin interaction and its participation in post-mating behavioral changes in female *Drosophila*.

Interacción serotonina-dopamina y su participación en los cambios conductuales post-apareamiento en *Drosophila* hembra.

Simón Guerra Ayala¹, Ivana Gajardo^{1,2}, Jorge M Campusano¹

(1) Pontificia Universidad Católica de Chile, Departamento de Biología Celular y Molecular, Facultad de Ciencias Biológicas, Av. Libertador Bernardo O'Higgins 340, Santiago, Chile

(2) Universidad de Chile, Department of Neuroscience, Biomedical Neuroscience Institute (BNI), Faculty of Medicine, Independencia 1027, Santiago, Chile

It has been long acknowledged that aminergic neurons are involved in the modulation of a wide range of behaviors in animals. Recently, it has become clear that aminergic neurons in specific circuits functionally interact to exert their modulatory role on behaviors. After mating, flies develop a physiological change that involves the entire organism but seems to be mediated by aminergic neurons located in the brain. Here we used some of the genetic tools developed in *Drosophila melanogaster* to assess the idea that dopaminergic and serotonergic neurons interact to modulate post-mating behaviors in female flies. We used fly mutants for dopamine and serotonin transporter (DAT and SERT mutants) and drove expression of genes to activate or repress neurotransmission in specific neuronal groups. We then assessed changes in several behaviors in female flies pre- and post-mating, including locomotion, response to external stimuli, optomotor response and memory. Our results show that virgin and mated female flies exhibit different locomotion activity and social interaction before and after exposure to an attractive odorant. Moreover, our data demonstrate that these behavioral changes are modulated by a global imbalance in serotonergic neurotransmission, as seen in SERT mutants. We hypothesize that the dopaminergic system differentially affects these behaviors, an idea we are currently testing. Our results support the use of *Drosophila* in studying how aminergic circuits functionally interact to modulate complex behaviors in animals.

P113 Neural dynamics of the medial prefrontal cortex are associated with compulsive alcohol seeking.

Benjamin Carrasco^{1,2}, María Elena Quintanilla³, Andrés Liberona¹, Yedi Israel³, José Luis Valdés^{1,2}

(1) Department of Neuroscience, Faculty of Medicine, Universidad de Chile, Santiago, Chile

(2) Biomedical Neuroscience Institute, Faculty of Medicine, Universidad de Chile, Santiago, Chile

(3) Molecular and Clinical Pharmacology Program, Institute of Biomedical Sciences, Universidad de Chile

Functional dichotomy in the medial prefrontal cortex (mPFC) could guide drug-seeking behavior through its projections from the dorsal mPFC (Prelimbic) to the Accumbens Nucleus Core (NAC), while projections from the ventral mPFC (Infralimbic) to the NAC shell could guide extinction behaviors.

Using an operant conditioning task that measured motivation (progressive ratio) or extinction, we analyzed the behavior of an alcoholic rats line (UChB) after short-term (only during operant training, n=9) and long-term alcohol consumption (45 days continuous access previous to the operant training, N=10). Long-term consumption increased motivation for alcohol since these rats reached a higher breakpoint in the progressive ratio task than in the short-term consumption. However, no differences were detected during extinction.

Additionally, we recorded 1,227 neurons from 5 rats (54 recordings sessions) throughout *in vivo* electrophysiology. We found: i) a lower firing rate of the infralimbic neurons in long-term consuming rats with respect to the short term, ii) a lower variability in the inter-spike intervals of Prelimbic and Infralimbic neurons in the long-term condition, iii) lower coactivation patterns between these cortical regions for the long-term animals and v) a higher subpopulation of neurons with anticipatory activity in the infralimbic cortex in the long-term condition compared with the short-term. These results give us new insight into mPFC neuronal dynamics associated with compulsive behavior in alcohol addiction.

Financing: Biomedical Neuroscience Institute (BNI). ICN09_015. Guillermo Puelma Foundation.



P114 Neuronal dynamics of the retrosplenial cortex in temporal lobe epilepsy

Dinámica neuronal de la corteza retroesplenial en la epilepsia del lóbulo temporal

Tamara Bustamante^{1,2}, Andrés Liberona^{1,2}, José Luis Valdés^{1,2}

(1) University of Chile, Department of Neuroscience, Faculty of Medicine, Santiago, Chile

(2) Biomedical Neuroscience Institute, University of Chile, Faculty of Medicine, Santiago, Chile

Temporal lobe epilepsy is the most common form of epilepsy with focal-onset seizures. When epileptic activity is restricted to the temporal lobe, the person will remain lucid throughout an epileptic episode. However, limbic seizures can affect cortical regions and thus progress from focal to generalized seizures with impaired awareness. It has been proposed that the cortex could abnormally reduce its activity, presumably to prevent epileptic discharges from spreading further into the brain. Alternatively, the cortex could increase its activity by coupling to epileptic discharges generated in the temporal lobe, thus propagating seizures. This mechanism remains unclear.

The retrosplenial cortex (RSC) has been proposed as a potential hub between cortical and subcortical regions in epilepsy. For this reason, we aimed to determine the changes in neuronal activity patterns of this cortex in the transition from focal seizures to spread seizures in the brain. To test this idea, focal hippocampal onset seizures were induced in the awake rat (n=4), while hippocampal and frontal activity were measured by local field potential in conjunction with single-cell recordings in the RSC in both hemispheres. Video monitoring was performed during seizures to assess their severity based on the Racine scale. This experimental set-up allowed us to determine the changes in the temporal coordination of low-frequency oscillations in all these brain regions as well as the electrophysiological events that characterized the genesis and propagation of epileptic seizures. This work will contribute to understanding how the RSC may coordinate focal-onset seizures to propose new targets for therapeutic interventions.

Financing: Project ACE210007 (Biomedical Neuroscience Institute, BNI, 2018-2022); The Pew Charitable Trusts: The Pew Innovation Fund Grant #34503 and Beca ANID de Doctorado Nacional 21200302.

