Ciencia con M

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La sociedad actual se enfrenta a retos globales cada vez más complejos: el cambio climático, el riesgo de nuevas pandemias o la búsqueda de fuentes de energías alternativas y más ecológicas. En este contexto, la ciencia y la tecnología se han convertido en herramientas claves para dar respuesta a estos desafíos y promover el desarrollo sostenible de la población mundial. La comunidad científica, encargada de ofrecer soluciones a estas problemáticas, sólo incluye a un 30% de mujeres. Más aún, entre los galardonados por el premio Nobel menos del 6% son mujeres. Así, la escasa participación de las mujeres en la generación de conocimiento científico supone la renuncia a buena parte de su diversidad, talento y potencial. En el imaginario popular, una persona que se dedica a la ciencia es representada como un hombre blanco, con anteojos, anciano, medio despeinado y con cara de loco que vestido con delantal se encuentra en soledad, dentro de un laboratorio rodeado de tubos de ensayos y probetas. ¿Cuáles son las razones de esta pobre representación y visibilización de las mujeres en la ciencia? En esta presentación les contaremos acerca de una experiencia documental producida por el MCAA Chapter de Argentina en donde se plantean éste y otros interrogantes relacionados al trabajo de las científicas y la forma en que sus aportes se visibilizan.

https://www.youtube.com/watch?v=TBknIQu2jaA&t=161s&ab_channel=CIMECONICETUNT

Genomics "microbial dark matter" exploration for antimicrobial discovery

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The urgent need for novel bioactive compounds is driven by the dramatic global increase in antimicrobial resistance (AMR), considered one of the top ten threats to world public health (WHO, 2021). Antimicrobial discovery is complicated by the lack of data to perform structure-function correlations, thus preventing rediscovery and/or compounds with low activity or high toxicity. Novel antimicrobial chemical classes or mechanisms have not been proposed over the last three decades. While classical research roadmaps can still provide short–term solutions, sustainable strategies to reduce costs and time-to-market are needed, all the while assuring novelty and reduced resistance. Among them, genomic data mining is a field with enormous potential for rapid screening and encountering leads to modern antimicrobial discovery [1]. Some of the advantages of data mining are the ability to predict chemical structures from sequence data, the anticipation of the presence of novel metabolites, the understanding of gene evolution, and the corroboration of data from multiple omics technologies. Based on public gene sequence mining platforms and in silico studies of protein evolution, MicroIQ has predicted that several completely unexplored biosynthetic gene clusters (BGCs) could be extremely interesting as sources of potentially bioactive molecules. The search has been directed by the following criteria: potential antimicrobial activity, new chemical classes and molecules, the absence of immunity (resistance) or virulence genes in or near the biosynthetic gene cluster, a general chemical class with evidence of low antimicrobial resistance and microorganisms of non-pathogenic origin. This strategy pinpointed clusters that produced lanthipeptides, siderophores and non-ribosomal peptides. In addition, rationally designed synthetic peptides obtained through collaboration helped establish the baseline for predictions of other synthetic and semi-synthetic derivatives. These and similar molecules have never been characterized, originate from nonpathogenic bacteria of widely diverse origins, and appear to have evolved along the tree of life, indicating that they confer an evolutionary advantage [2]. These predictions were confirmed in the laboratory, indicating the discovery of novel molecules, active against multi and pan-resistant pathogens isolated from Mexico. We submit to the use of the scientific community a fully sequenced and characterized collection of recently isolated ESKAPE pathogens, which were used for the first molecular epidemiology report from México. This lays the foundation for the identification of other novel BGCs and molecules and for the rational design of compounds to have better biological activities and/or less toxicity, finally contributing to limiting AMR in a sustainable way.

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Control of intestinal Th17 cell homeostasis by the unfolded protein response sensor IRE1 in dendritic cells

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The intestinal immune system is constituted by a broad diversity of cell types performing specialized functions. Perturbations in this equilibrium are associated with the development of gastrointestinal diseases. Type 1 conventional dendritic cells (cDC1s) are fundamental for maintaining tolerance in the gastrointestinal tract and the mechanisms safeguarding intestinal cDC1 function are a matter of extensive research. In this context, the sensor IRE1 of the unfolded protein response (UPR) and its associated transcription factor XBP1s is reported to regulate the survival of intestinal cDC1s. However, little is known about the role of IRE1 in maintaining the tolerogenic roles of cDCs in the intestine. Here, by using conditional knock-out mice lacking the RNase domain of IRE1 in dendritic cells (IRE1truncDC mice), we discover that IRE1 in cDCs critically regulates the homeostasis of intestinal Th17 cells in steady state. IRE1truncDC mice display a selective accumulation of Th17 cells in the small intestine lamina propria (siLP), which is accompanied by increased neutrophil infiltration, increased goblet cell numbers, and epithelial enlargement. Notably, siLP Th17 accumulation is dependent on IRE1 RNase outputs in cDCs independent of XBP1s transcriptional activity. On a mechanistic level, we found that siLP cDCs from IRE1truncDC mice produce higher levels of IL-6 and express lower amounts of retinoic acid biosynthetic enzymes compared to control counterparts, which may contribute to promoting Th17 polarization. In conclusion, we uncovered a novel regulatory mechanism regulating Th17 homeostasis in the intestine, which depends on the IRE1 sensor of the UPR in cDCs.

El origen y la evolución de la familia Asteraceae sobre la base del análisis de su registro fósil

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Las asteráceas (girasoles, margaritas) representan casi una décima parte de todas las plantas con flores (angiospermas) vivientes (Palazzesi et al., 2022a). A pesar de su rol dominante en los ecosistemas terrestres, la historia evolutiva y el ritmo de diversificación de esta familia son apenas conocidos. Esto se debe, en parte, a la escasez de fósiles y de programas estadísticos robustos capaces de estimar su diversificación a través del tiempo. En esta presentación repaso los principales registros fósiles de la familia y exploro los cambios en las tasas de diversificación de Asteraceae utilizando un nuevo modelo implementado en el programa 'RevBayes'. Los registros fósiles más antiguos asignados a esta familia se vinculan a granos de polen recuperados de sedimentos del período Cretácico de Antártida (Barreda et al., 2015). Luego, otros registros provienen de Patagonia, de sedimentos del Eoceno, hace unos 45 millones de años (Barreda et al., 2010). Un reciente análisis demuestra que el aumento más importante en la diversificación de esta familia se produjo en el Oligoceno (~28 Ma), en coincidencia con un abrupto descenso global en la concentración de CO_2 (Palazzesi et al., 2022b). Otra importante familia de angiospermas que también se diversifica para esos momentos es la de Poaceae (gramíneas). Éstas estimaciones de bajas tasas de diversificación antes del Oligoceno es coherente con la escasez de fósiles asignados a margaritas conocidas de este periodo. Del mismo modo, nuestras estimaciones de una elevada tasa de diversificación a finales del Oligoceno y principios del Mioceno concuerdan con la elevada diversidad de fósiles de este grupo de plantas, tanto de Asteraceae como de Poaceae. Estos análisis demuestran la importancia del estudio de los fósiles como herramienta principal para reconstruir la historia evolutiva de un grupo de plantas y su vínculo con los cambios climáticos pasados.

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Crafting Synthetic Microbial Communities for Enhanced Drought Resiliency in Legumes

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Changing landscape, rapid urbanization, loss of the available agriculture land, challenged fresh-water reservoirs, biotic and abiotic stresses, and mounting costs of chemical fertilizers significantly impact global legumes productivity. Yield losses because of widespread fungal and bacterial pathogens, toxins, droughts, and insect damage are most common. One of the economically feasible and ecofriendly approaches to counter these damages is to get benefit from plethora of plant-growth promoting bacteria (PGPB). However, traditional culture-dependent techniques overlook the role of uncultivable bacterial genre in plant growth promotion. Moreover, a single strain biofertilizer often fail to perform under filed conditions leading to the reliance on chemical fertilizers and fungicides. Therefore, the development of new approaches to decipher microbial ecology data, their assemblage and abundance, organ-diversity of microbes is inevitable and can unravel the novel mechanisms of successful plant-microbe interactions. The proposed research project aims to identify - organ distribution, abundance, specific assemblages, coping mechanisms to fight stress and diseases, of microbial communities associated with legumes. Microbial community profiling based upon their abundance and localization in leguminous plants will be performed using culture-dependent and culture-independent approaches. Closely localized microbial cultures forming communities will be assessed for the production of phytohormones, atmospheric nitrogen-fixation, solubilization of insoluble minerals, and the ability to mitigate abiotic stresses. The community-based culture collection (CBC) will be used to design a synthetic community comprised of naturally occurring highly abundant bacterial groups from roots and shoots. Leguminous plants will be used as the model to probe the abundance-based synthetic inoculants. This will help to recover unexplored and silent microbiota from leguminous plants to mitigate the hazards of abiotic stress and increase the atmospheric-nitrogen fixation without disturbing the ecological balance of nitrogen cycle.

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Hyperglycosylated human chorionic gonadotropin (hCG-H) increases the adhesive potential of Ishikawa cells to trophoblastic spheroids in-vitro

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Embryo implantation begins with the apposition of the blastocyst on the maternal endometrium, followed by attachment to the endometrial surface epithelium. hCG–H is a hyperglycosylated isoform of hCG that can only be detected in the medium of embryos cultured in vitro after hatching and is the most abundant isoform during the first trimester, suggesting that this hormone could have a modulatory role on the endometrium during blastocyst implantation. However, its possible paracrine effect on the receptivity of the endometrial epithelium has not been studied. The objective of this work was to determine the role of hCG-H on the adhesion of the endometrial epithelium using an in vitro implantation model. For this, the Ishikawa cell line was used as a model of endometrial epithelium and the trophoblastic line HTR8/SVneo spheroids was used as a blastocyst model. The spheroids were prepared via the hanging drop method. Ishikawa cells cultured in monolayer were incubated with vehicle or 10 IU/mL of hCG enriched in 21% or 89% with hCG-H for 24 hours. Subsequently, the culture medium was replaced and 10 spheroids per condition were added in duplicate and after 2 hours the proportion of spheroids adhered to the Ishikawa cells was evaluated through an inverted microscope. The proportion of adhered spheroids in the vehicle condition was 45%. Treatments with 21% and 89% hCG-H increased adhesion by 22% and 67% respectively in relation to the vehicle ($p<0.05$ for 89% hCG-H). These results suggest that hCG-H triggers signaling mechanisms in endometrial cells that facilitate embryo adhesion, which could occur through a modulation in the repertoire of surface molecules involved in cell adhesion.

MSCA Iberus Experience: 11 outstanding postdoctoral researchers at Campus Iberus

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Iberus Experience is an H2020 Marie Slodowska-Curie Action Cofund programme for Experienced Researchers, managed by Campus Iberus, the Campus of International Excellence (CEI) of the Ebro Valley promoted in strategic aggregation by the public universities of the Autonomous Communities of Aragon and La Rioja, of the Foral Community of Navarra, as well as that of the province of Lleida in Catalonia. Iberus Experience is an International Fellowship Programme for talent attraction, consolidation and retention at the Campus of International Excellence of the Ebro Valley offering 11 postdoctoral 3-years contracts to excellent researchers to develop individual and freely selected research projects in one of the five areas of specialization of Campus Iberus (Agrofood and Nutrition, Health Technologies, Energy and Sustainability, Social and Territorial Development and Circular Bio-economy) in order to produce a positive effect in terms of excellent science with impact at the regional level. The programme is run in collaboration with the 4 Universities of Campus Iberus as recruiting institutions, the University of Lleida (engaging 4 researchers), the Public University of Navarre (3 researchers), University of Zaragoza and University of La Rioja (2 researchers each). 5 female researchers out of 11 participate in the program, with the recruited researchers being of 9 different nationalities from 4 continents (Argentina, Brasil, India, Italy, Nigeria, Pakistan, Philippines, Spain -3-, Vietnam). The postdoctoral researchers engaged at the Iberus Experience programme are Cristina Vieites Blanco (Spain), Joan Oñate Narciso (Philippines), Lauren Yabuki (Brasil) and Saqib Gulzar (India) joining the University of Lleida, Izzah Shahid (Pakistan), Lucas Castellani (Argentina) and Trung Anh Trieu (Vietnam) being incorporated at the Public University of Navarre, Ana Rua (Spain) and María Batuecas (Spain) as part of the University of Zaragoza, and Mattia Ghirardello (Italy) and Rine Reuben (Nigeria) being selected for the University of La Rioja. These outstanding researchers at the Iberus Experience programme receive attractive conditions based on the principles of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, as well as the EU Principles for Innovative Doctorate Training. Campus Iberus Universities hold the Human Resources Strategy for Researchers – HRS4R seal, which openly demonstrate their commitment to act in a responsible and respectable way and to provide fair framework conditions to the researchers. Among the benefits, the researchers have available both administrative and financial support for international research costs, training and network participations, or tailored training and personalized mentoring: they define and follow a Personal Career Development Plan at the beginning of their contract, having access to a variety of training options and workshops on relevant scientific and transferable skills along their recruitment period. Moreover, several activities are planned to promote their integration in the local Campus Iberus life and cultural activities. Additionally, numerous international Universities and non-academic participating organizations (companies, research centers and hospitals) are committed with the Iberus Experience programme to offer secondments, visits, collaborations and networks, as well as other opportunities to enhance the researcher's career and guarantee an attractive ecosystem for the incoming researchers.

https://www.iberusexperience.com/
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Cohabiting with molecules

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Augmented and virtual reality (AR/VR) in the chemistry classroom opens the option of visualizing three dimensional structures with multiple layers of information, that can be toggled on and off with a simple button. We present the current efforts for incorporating these technologies at UNAM via the project "Cohabiting with Molecules". These include generating translations from ab initio models into digital files amenable for AR/VR, using common day objects to create games, as well as outreach events with geolocalized molecular systems.

Talley, Zachary. (2019). Technology Transfer Challenges Between Academia and the Biotechnology Industry. Master's thesis, Harvard Extension School.

Birnbaum, M. (2016). Pharma and Academia: What We Have Here Is a Failure to Communicate. Cell Metabolism, 24(3), 365-367.

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Interdisciplinary scientific cooperation in Latin America: Experiences, Challenges and Perspectives

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Global wicked problems of today such as global warming and social inequality require interdisciplinary collaboration to be properly understood and tackled (Lönngren & Van Poeck, 2021). However it is well-known that there are multiple obstacles to build effective and sustained collaboration due to the complexity that interdisciplinary collaboration entails (Laursen, Motzer & Anderson, 2022). In Latin America, the manifestation of the wicked problems of today is amplified. The increasing social uprising in the region show that it is urgent to find ways to put ethical and sustainable interdisciplinary collaboration in practice. However, the geographic distance and cultural differences, as well as the uneven wealth conditions both as social and professional levels at both sides, establish a landscape that in most cases hinders the development of truly collaborative and sustainable initiatives between Latin America and the global north. In this poster, I will delineate some of the major reasons and examples of why it is hard to establish sustainable collaboration at the scientific level between Latam and the global north. Next, inspired by the autopoiesis theory of Maturana & Varela (1991), I will propose a conceptual model to develop interdisciplinary collaborative research groups that is able to self-maintain with minimal support and that are increasingly capable for making positive impact in their surroundings. As a proof of concept, I will share some successful experiences in developing collaborative and impactful initiatives between European and Latin American scholars.

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Learning design for open data competencies in elementary school

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Current literature has explored the lack of skills for users to engage in Open Data (OD) systems as one of the main barriers to expand the benefits of OD in society. Therefore, OD Education is gaining relevance for citizens to take part in open data ecosystems as users and providers. Even though schools have been identified as key actors for achieving literacy goals in the OD field, educational approaches have not been clearly defined. In this paper we investigate how educational designs for teaching open data competencies in elementary school can be developed. Previous research on OD skills has shown that data literacy and real-world problem solving are central in OD Education, meanwhile active learning approaches have been successfully used specially in undergraduate education. In this study a theoretical framework has been outlined to define the main design elements for OD learning design in elementary school. A human-centred/co-design approach has been considered to apply the theoretical framework in a case study. A learning design for OD competencies in elementary school is finally presented and discussed.

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Explorando la relación entre Olvidar y Perdonar

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Frecuentemente, se espera que las personas que han sido víctimas de transgresiones "perdonen y olviden". Olvidar los detalles de experiencias pasadas que provocan emociones dolorosas como resentimiento, rabia y odio, parece necesario para reemplazar las emociones negativas por otras positivas. Sin embargo, recordar los detalles de las transgresiones pasadas también parece ser fundamental para el perdón – si el recuerdo de una ofensa se eliminase de la mente de una víctima, no diríamos que esa persona perdonó a su victimario. Parece entonces que el perdón requiere de una contradicción: uno tiene que recordar y que olvidar para perdonar. ¿Cómo deberíamos entender de manera precisa la relación entre perdonar y olvidar para resolver esta paradoja?

Forgetting and Forgiving: Exploring the Connections between Memory and Forgiveness: https://www.memoryandforgiveness.org/

Indigenous Cosmologies in the Peruvian Andes

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This is a comparative approach to indigenous cosmologies in Northern and Central Peruvian Andes based on anthropological fieldwork among two Quechua-speaking peasant groups.

Main challenges for technology transfer from academia to industry: a common language for innovation

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The great challenges that industries face today make innovation essential, not only to improve competitiveness but even for their survival. Often, they face the problem of obtaining poor results in their innovation processes compared to all the money they invest in it, and if we add to this an increasingly competitive market due to globalization, many companies have realized that they needed to look beyond their own walls to innovate. The idea that the next new focus might not come from in-house research has led many companies to shift their R&D spending abroad through collaborations with startups and "academia". This research aims to present a critical look at the characteristics of the university-industry relationship, when it comes to innovating in what is known as "open innovation", and raises certain aspects that are important to improve, such as, the establishment of common concepts in innovation, technology transfer, research projects and the personnel two-way mobility between industry and academia.

Talley, Zachary. 2019. Technology Transfer Challenges Between Academia and the Biotechnology Industry. Master's thesis, Harvard Extension School

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¿Qué rol para las interfaces cerebro-computadora en esquizofrenia? Un estudio de factibilidad

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Objetivo: explorar la capacidad de pacientes con esquizofrenia (EQZ) crónica, para utilizar un deletreador visual (1) mediante Interfaces cerebro-computadora (ICC) basadas en electroencefalografía (EEG) (2).

Métodos: participaron 7 pacientes (4 hombres, X= 43,85 años); 3 del Centro de Salud Mental de Adultos (CSMA) y 4 de la Unidad de Rehabilitación del HU-IPM en Reus.

Paradigmas: Primero se usó un test oddball auditivo evocando la Mismatch Negativity (MMN) y la onda P300. Se registró el EEG (BrainVision, Barcelona), 16 electrodos: Fp1, FP2, Fz, Cz, Pz, F3, F4, C3, C4, P3, P4. En una segunda fase, dos pacientes del CSMA participaron en la tarea del deletreador visual de OpenVIBE (Mensia Technologies, France)(3) en electrodos Fz, Cz, Pz, P3, P4, O1 y O2.

Resultados: en los tests auditivos, se identificaron ambas ondas en 1 paciente del CSMA; sólo la MMN en 2 del CSMA y 1 de Rehabilitación. El resto de los pacientes no mostró ondas identificables. Con el deletreador visual, los pacientes obtuvieron durante el entrenamiento porcentajes de acierto de 65,3% y 67,7% respectivamente pero 0% aciertos en el test online. A remarcar que completaron toda la prueba, completamente novedosa para ellos.

Conclusiones: A nuestro conocer, este es el primer intento que se hace de usar un deletreador visual en pacientes con esquizofrenia. Los resultados sugieren que pruebas basadas en ICC pueden realizarse en pacientes esquizofrénicos estables con propósitos tanto diagnósticos como de rehabilitación, sin embargo, adaptaciones son requeridas para ello.

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Assessing the Impact of University-Firm Collaboration on Firm Performance and Regional Development

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The PhD thesis showcased in this poster aims at assessing the impact of collaboration with university on firms and regions. The study focuses on the creation of economic value given by collaboration with university, and examines how it can aid the survival of firms in a global and competitive market, therefore translating into regional development. Firstly, collaboration with university should facilitate the development of new and/or improved products and practices at corporate level, which would in turn lead to higher innovation-related financial performance. Additionally, university-firm collaboration should facilitate the economic growth and social development of the regions where the interaction takes place. The poster results showcase evidence supporting the hypotheses previously mentioned.

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Attraction Campaigns to Reduce the Gender Gap in the School of Engineering of Universidad Tecnológica de Bolívar

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Reducing the gender gap in Engineering Programs at UTB has been a challenge since the foundation of the engineering school. In the first academic period in 2020, the 29% of the engineering students were female with much deep disparity in some disciplines like electrical, computer and mechanical engineering. In this poster, we describe the main programs implemented at UTB in order to reduce this gap in the years to come.

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