THE ROLE OF SCIENCE IN THE DEVELOPMENT OF MODERN SOCIETIES

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Academia Nacional de Ciencias, Exactas, Físicas y Naturales (ANCEFN) y Academia de Ciencias (ANC) de Argentina – Academia de Ciencias de Francia

November 19-20, 2025
FCEN, Universidad de Buenos Aires

	Wed. Nov. 19		Thursday Nov. 20
	Lectures at Pab. 0 + infinito		Lectures at Pab. 0 + infinito
9:30	Opening	9:30	CLEMENT SANCHEZ
9:40	GABRIEL RABINOVICH	10:10	EZEQUIEL LEIVA
10:20	SEBASTIAN AMIGORENA	10:50	VICTORIA PETERSON
11:00	COFFEE BREAK	11:30	COFFEE BREAK
11:20	CATHERINE CESARSKY	11:50	ANDREA GAMARNIK
12:00	MARIA TERESA DOVA	12:30	ALAIN FISCHER
12:40	LUNCH	13:00	LUNCH
14:30	ALBERTO PIOLA		
15:10	FEDERICO ARIEL		
15:50	COFFEE BREAK		
16:10	PEDRO JAUREGUIBERRY		In the framework of IYQ 2025, Pab. I:
16:50	SANDRA LAVOREL	17:00	CONF. SERGE HAROCHE

GABRIEL RABINOVICH

ANCEFN – ANC

Laboratorio de Glicomedicina, Instituto de Biología y Medicina Experimental (IBYME), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) y Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires (UBA)

THE POWER OF GLYCO-CHECKPOINTS: A SWEET FUTURE FOR IMMUNOTHERAPY?

Abstract: The responsibility for decoding the biological information embedded in the glycome—the complete repertoire of glycans in cells and tissues—rests with endogenous glycan-binding proteins, or lectins, whose expression is dynamically regulated in tumor and inflammatory microenvironments. To identify novel therapeutic targets in cancer and autoimmune diseases, our laboratory investigates the molecular interactions between glycosylated receptors and lectins in the regulation of immune and vascular programs. Over the past years, we have uncovered essential roles for galectin-1, a prototype member of the galectin family, in suppressing antitumor immunity and restraining autoimmune inflammation by differentially modulating the fate and function of effector and regulatory T cells and by promoting the generation of immunosuppressive myeloid cells. We further demonstrated that glycosylation-dependent, galectin-driven circuits contribute to mechanisms of resistance to immunotherapeutic and anti-angiogenic strategies. More recently, we revealed a role for galectin–glycan interactions in models of neurodegenerative, cardiovascular, and fibrotic diseases. Collectively, these findings position galectins as regulatory “glyco-checkpoints” that translate the sugar code into immune and vascular programs within tumor and inflammatory microenvironments, underscoring their therapeutic potential across a broad spectrum of pathological conditions.

About the speaker: Gabriel Rabinovich is Director of the Laboratory of Glycomedicine at the Institute of Biology and Experimental Medicine, Senior Investigator of sthe Argentine National Research Council (CONICET), and Plenary Professor at the Faculty of Exact and Natural Sciences, University of Buenos Aires. He is a member of the US National Academy of Sciences (NAS), the European Molecular Biology Organization (EMBO), The World Academy of Sciences (TWAS), the Argentine Academy

of Exact and Natural Sciences (ANCEFN), and the National Academy of Sciences of Argentina (ANC). His work has been recognized with more than 200 awards, including the Hakomori Award from the International Glycoconjugate Organization, the Karl Meyer Award from the Society for Glycobiology (USA), the TWAS Prize in Medical Sciences and the Konex Diamond Prize (Argentina). He has published 345 articles, many in high-profile journals, filed 11 patents, and supervised 31 PhD students and 25 postdoctoral fellows. He serves as Associate Editor and Editorial Board member for several journals and has received financial support from leading international agencies, including the Wellcome Trust, the US National Institutes of Health (NIH), the Lounsbery Foundation (USA), the Cancer Research Institute (USA), the Kenneth Rainin Foundation (USA), the Multiple Sclerosis Society (USA), the Mizutani Foundation for Glycosciences (Japan), and the Argentine Ministry of Science and Technology. His research has led to the identification of a novel paradigm centered on the regulation of glyco-checkpoints in immune and vascular programs. Most recently, he co-founded Galtec, a biotech spin-off dedicated to translating galectin-based discoveries into new therapies for cancer and autoimmune diseases.

SEBASTIAN AMIGORENA

Academia de Ciencias de Francia

Institut Curie, Paris, France

RNA SPLICING IN TUMORS GENERATES NEW PROTEIN ISOFORMS AND TUMOR-SPECIFIC ANTIGENS

Abstract: RNA splicing edits pre-RNA molecules right after transcription. The machinery of RNA splicing includes hundreds of effectors and regulators of the process and is critical in most fundamental cellular functions. Human cancers bear multiple defects in splicing, due to diverse mutations, including in the splicing machinery. Due to these defects, tumors express aberrantly spliced RNA (asRNA) species, recurrent among patients, but absent from normal tissues. These asRNAs code for new isoforms of known proteins and lncRNAs. In these transcripts new intronic sequences, that can include transposable elements become new exons, associated with new functions. We have characterized proteins encoded by these asRNAs, including transmembrane receptors and oncogenes/tumor suppressors. We have also shown that the asRNA

species in tumors code for peptides that can be presented on HLA molecules for recognition by T cells. Certain asRNA encoded peptides are highly tumor specific and can be used for cancer immunotherapies, including adoptive T cells therapies, monoclonal bispecific antibodies and cancer vaccination.

About the speaker: Sebastian Amigorena is “Directeur de Recherche Classe Exceptionnelle” at CNRS, Director of the “Center of Immunotherapy for cancers” and the “Immune responses and cancer” Team at Institut Curie (Paris, France), in the Immunology Department "Immunity and Cancer" that he created in 2003 and directed until 2021. He obtained a PhD in Biochemistry in 1990, and joined CNRS before doing a post-doctoral training at Yale School of Medecine (1992-1994), and returned to France in 1995 to start his team at Institut Curie (Paris, France).

Dr. Amigorena made significant contributions to immunology and cell biology. He discovered ITIMs, a family of short amino acid motifs present in the cytosolic tails of numerous inhibitory immunoreceptors that play critical roles in the control of autoimmunity. He also identified specialized intracellular compartments, related to endosomes, where peptides are loaded on MHC molecules. As a group leader, he pioneered the field of antigen cross presentation, establishing the fundamental functional properties of phagosomes in mouse and human dendritic cells and showing how these specializations contribute to the initiation of adaptive immune responses by dendritic cells. Amigorena’s group also showed that regulatory T cells inhibit low avidity CD8+ T cells selectively, thus preventing autoimmune reactivity and optimizing the efficacy of effector and memory immune responses against non-self-antigens. His findings modified our understanding of antigen presentation and T cell priming by dendritic cells, with applications in the fields of cancer immunotherapy and vaccination. In the last 10 years, his team analyzed the epigenetic programing of T cell differentiation and applied the findings to optimizing CA-T cell therapies. He also identified a new family of HLA-presented peptides derived from non-canonical splicing events, including transposable elements and lncRNAs. These studies served as a bases to initiate an ambitious cell therapy program at Institut Curie, including CAR-T clinical trials in solid tumors, and found a Mnemo Therapeutics, a spin-off of Institut Curie that develops technological innovation in immunoncology.

Dr. Amigorena published over 250 original articles, including, as a co-first or co-last author, over 30 papers in Nature, Science, Cell, Immunity,

Nature Immunology, Nature Cell Biology, Science Immunology and Journal of Experimental Medicine. He is a member of the French “Académie des Sciences” and an elected EMBO member since 2005. He received numerous national and international prices and awards, including the Silver Medal from CNRS (2004), the Research award from Fondation Bettencourt (2005), the Griffuel Prize from ARC (2007), the Alt Award from CRI, and twice the prestigious senior European Research Council (ERC) award (2008 and 2014), the award Claude Bernard from Paris City (2017). He became Knight of the French "Légion d'honneur" in 2018. He co-directs the Labex (Investissements d’Avenir) DC-BIOL, awarded in 2012. He serves on numerous Editorial Boards and is a regular referee for major international journals (including as a reviewing editor in Science, since 2012) and is part of SABs in several biotechs. He mentored over 30 post docs and students. His international leadership is reflected by invitations to write reviews in the most influential journals and to speak, including as a Keynote Speaker, in over 100 international conferences.

CATHERINE CESARSKY

ANCEFN, Academia de Ciencias de Francia
CEA, Université Paris-Saclay, France

GALAXY EVOLUTION WITH INFRARRED MISSIONS

Abstract: The space between stars within galaxies is filled with gas mixed with tiny dust grains. These dust grains absorb ultraviolet and optical light emitted by stars and re-emit it in the infrared. Infrared (IR) astronomy is therefore essential to uncover the obscured side of galaxy evolution. Since most IR wavelengths are absorbed by Earth’s atmosphere, space-based observations are necessary to explore the full frequency range. I will focus on the contribution of IR satellites to our understanding of galaxy evolution throughout cosmic history highlighting work carried out by my group at Université Paris-Saclay. Each mission has triggered paradigm shifts. IRAS (1983) discovered ultra-luminous infrared galaxies (ULIRGs), dominated by dust-enshrouded starbursts and/or obscured active nuclei. ISO (1995) demonstrated the ubiquity of dust-obscured star formation and revealed that even at redshift $z < 1$, a large fraction of star formation is hidden at optical wavelengths. Spitzer (2003) extended ISO’s studies to $z \approx 2$, enabling the discovery of a fundamental relation between the star formation rate of galaxies and their stellar mass. Herschel probed the far-

IR and submillimeter regime, detecting thousands of dusty star-forming galaxies at z > 2. JWST (2021) is now exploring the very early universe, delivering many surprises, in particular about galaxy properties in the few hundred million years after the Big Bang. All of these missions involved a degree of international cooperation. Telescope access—and especially data—is shared worldwide. Pushing technology to its limits in such missions has major knock-on effects for industry and for big data handling techniques.

About the speaker: Catherine Cesarsky has performed research activities in several central areas of modern astrophysics, interstellar medium, high-energy astrophysics, infrared astronomy, galaxy evolution. Born in France, she holds a Physics degree from University of Buenos Aires (1965), and a PhD in Astronomy from Harvard University (1971). She then worked at the California Institute of Technology. In 1974, she moved to France and joined the Atomic Energy and Alternative Energies Commission (CEA). Catherine Cesarsky was the principal investigator for ISOCAM, the infrared camera on board the Infrared Space Observatory satellite of the European Space Agency (ESA). From 1985 to 1993, she was Head of Astrophysics at CEA, and from 1994 to 1999 she was Director of CEA basic research in physics, chemistry and earth sciences. From 1999 to 2007, she was the Director General of the European Southern Observatory . As such, she oversaw the operation of ESO's large optical telescopes at the La Silla and Paranal observatories in northern Chile, and started the construction of the Atacama Large Millimeter Array (ALMA). She launched the European Extremely Large Telescope project. From 2017 to 2021, she chaired the Council of the SKA Organization and from 2021 to 2025 she was the first Chairperson of the Council of the Intergovernmental organization SKA Observatory. From 2006 to 2009 she was President of the International Astronomical Union. From 2009 to 2012, she was High Commissioner for Atomic Energy in France, advisor to the French government for science and energy issues. Since then, she is High level Science Advisor at CEA.
Among others, she is recipient of the 1998 COSPAR (Committee on Space Research) Space Science Award, of the Tate medal for leadership in physics from the American Institute in Physics (2020) , of the Fritz Zwicky prize of the European Astronomical Society (2024), member or foreign member of the main science Academies in France, United Kingdom (RS), Sweden (RSA), USA (NAS), Argentina (ANCEFN), and Europe, and of the Academy of Astronautics. She is Doctor Honoris Causa from the Geneva University and honorary Doctor of Science from the University of

Cambridge. Catherine Cesarsky is Grand Officier de l'Ordre de la Légion d'honneur and Grand-Croix dans l'Ordre National du Mérite.

MARIA TERESA DOVA

ANCEFN

Instituto de Física La Plata (CONICET – UNLP) - Departamento de Física, Facultad de Ciencias Exactas, Universidad Nacional de La Plata (UNLP)

THE ATLAS EXPERIMENT AT THE LHC: BIG SCIENCE, NEW TECHNOLOGIES AND THE HUNT FOR NEW PHYSICS

Abstract: The ATLAS experiment at the CERN Large Hadron Collider (LHC) is one of the world's largest and most advanced scientific instruments, representing the paradigm of modern Big Science. It exemplifies how international collaboration and the interplay between fundamental research and technological innovation converge in the pursuit of knowledge. The discovery of the Higgs boson confirmed the final missing piece of the Standard Model, yet several important questions remain unanswered. Many proposed extensions aiming to address these limitations predict new particles or interactions that could be discovered at the LHC. This talk will highlight recent ATLAS results at the energy frontier, with emphasis on searches in the Higgs sector, dark matter candidates and other possible new phenomena. We will also look ahead to the High-Luminosity LHC (HL-LHC), which will deliver a dramatic increase in collisions and drive new developments in detector electronics and real-time data processing. Local contributions to these technological challenges will be briefly outlined.

About the speaker: María Teresa Dova holds a PhD in Physics (UNLP, 1988). She is Full Professor at the National University of La Plata (UNLP) and Senior Researcher at CONICET. She is the Director of the Institute of Physics La Plata (CONICET-UNLP), and was the former Chair of the Pierre Auger Observatory Collaboration Board (2001–2006). She led Argentina's participation in the ATLAS experiment at CERN. Her recent research contributions include the search and discovery of the Higgs boson, the determination of its properties, and the exploration of New Physics—such as dark matter and supersymmetry. She has authored hundreds of

publications within the L3, ATLAS, and Auger collaborations, and has supervised more than 20 PhD and Master's theses. Deeply committed to science communication, she has spoken at TEDx events and is the author of Qué es el bosón de Higgs? (Paidós). She served on the Editorial Board of Journal of Physics G (IOP, UK, 2008–2014).

Her distinctions include the John Simon Guggenheim Fellowship (2002), the SCOPUS ELSEVIER-Secyt Prize (2007), Outstanding Woman of the Year (National Congress of Argentina, 2008), Distinguished Citizen of Buenos Aires Province (2015), The World Academy of Science (TWAS)-UNESCO Physics Prize (2022), the Konex Prize in Science and Technology (2023), and the 2025 L'Oréal-UNESCO International Award For Women in Science, for Latin America and the Caribbean.

ALBERTO PIOLA

ANCEFN

Departamento de Ciencias de la Atmósfera y los Océanos (FCEN, UBA)

OCEAN, CLIMATE AND HUMAN WELLBEING

Abstract: The ocean plays a key role in modulating the global climate system, is a significant source of food, oil, gas, bioactive compounds, and a driver of the global economy, thus playing a key role in human wellbeing. Yet, the ocean is under numerous threads posed by climate change, overexploitation, and other natural and anthropogenic stressors. Over 90% of the Earth´s warming in the past decades is stored in the ocean. Observations show that the globally averaged sea surface has warmed about 0.7 °C since the early 1980s. However, warming is not uniform, in some regions the temperature has climbed at a much faster rate, creating warming hotspots, while others have cooled. Although on average temperature in the deep ocean has also increased, though at a slower rate than at the surface, quantification of deep ocean warming is still challenging. The differential warming rate enhances the vertical stratification of the ocean, limiting its capacity to contain dissolved gases such as CO_2 and oxygen, and hindering the inflow of nutrients from the deep waters to the illuminated upper layer. Moreover, ocean warming is causing the poleward displacement of species, some of commercial significance, and creating unprecedented conditions in the tropics. Thus, the apparently simple fact that the ocean is warming has physical,

biogeochemical and biological impacts of global significance. Knowledge of the ocean temperature distribution and its variability is fundamental to understand the processes that control climate and to improve our ability to predict its evolution in upcoming decades. Arguably, this is among the most important challenges faced by mankind.

About the speaker: Alberto Piola is Professor Emeritus of Oceanography at the Department of Atmospheric and Ocean Sciences, University of Buenos Aires, Argentina. He is a sea-going physical oceanographer, and his main research interests are the large-scale ocean circulation and ocean fronts, and their climatic, geological, and biological impacts. Piola chairs the Executive Committee of the South Atlantic Meridional Overturning initiative, was vice-chair of the Scientific Steering Committee of the Integrated Marine Biosphere Research project, and past member of the Ocean Observation Panel for Climate. Piola has authored and co-authored numerous papers addressing the large-scale circulation, and water masses of the South Atlantic Ocean and the adjacent continental shelves. He is Editor-in-Chief of the Journal of Marine Systems and Associate Editor of Frontiers in Marine Science and Ocean and Coastal Research, among others. Is a member of the Argentine *Academia Nacional de Ciencias Exactas, Físicas y Naturales* and the *Academia del Mar*.

FEDERICO ARIEL

Academia Joven de Argentina

Instituto de Fisiología, Biología Molecular y Neurociencias (CONICET-UBA)

PLANT LONG NONCODING RNAs: FROM BIOLOGY TO BIOTECHNOLOGY FOR SUSTAINABLE AGRICULTURE

Abstract: Eukaryotic organisms have large genomes, but only a small fraction of their DNA encodes proteins. Remarkably, a much larger portion is actively transcribed into RNA. Among these transcripts, long noncoding RNAs (lncRNAs) have recently attracted attention. Although they do not produce proteins, lncRNAs play crucial roles in regulating gene activity through different mechanisms. In plants, they have been shown to participate in processes such as epigenetic regulation and the three-dimensional organization of DNA inside the nucleus. At the same time, RNA has gained prominence in medicine through vaccines and gene therapies, highlighting its potential as a versatile tool. In agriculture, RNA-based technologies could replace pesticides with information-carrying

molecules—similar to vaccines—and help crops cope with environmental stress without the need for genetic modification. APOLO Biotech, a startup created within CONICET, is working to bring these innovations from the lab to the field, paving the way toward more sustainable and smarter farming.

About the speaker: Federico Ariel holds a PhD in Biological Sciences and is a specialist in plant epigenetics and noncoding RNAs. He is currently an Independent Researcher at CONICET, working at IFIBYNE (CONICET-UBA) in Buenos Aires, Argentina. He currently co-leads an International Associated Lab between France and Argentina, backed by CNRS. Since January 2025, he has been holding the AXA Chair, funded by the AXA Research Fund, for a five-year term. He ranks among the top 2% of the most-cited scientists worldwide (Stanford Ranking 2025) and #1 in plant long noncoding RNA research (ScholarGPS 2020–2025). In recent years, he has received several national and international awards, including the Stimulus Award 2018 (ANCEFN); Fima Leloir 2019, Hermann Burmeister 2020 (ANC), the 2023 Bunge y Born Prize in Agrobiotechnology, and notably the UNESCO Al-Fozan Award 2023, recognizing him as one of the five most outstanding young scientists in STEM worldwide. Federico served as CONICET's representative on the Board of Directors of Y-TEC (a joint venture between YPF and CONICET) from 2021 to 2023, and on the Board of Directors of the Argentine Nanotechnology Foundation (2022–2024). He was also Co-Chair of the Young Academy of Argentina between 2022 and 2024. In 2022, he founded APOLO Biotech, a technology-based company dedicated to designing RNA-based solutions to replace synthetic pesticides in crops.

PEDRO JAUREGUIBERRY

Instituto Multidisciplinario de Biología Vegetal (IMBIV, Conicet-UNC)

ENHANCING EVIDENCE-BASED DECISION-MAKING: THE ROLE OF AI IN MODERN SCIENTIFC SYNTHESIS

Abstract: In today's globalized and interconnected world, the ability to synthesize large amounts of scientific knowledge for evidence-based decision-making is more critical than ever. However, the exponential growth of scientific publications poses an unprecedented challenge for

researchers and policymakers, particularly in socially contested fields like global environmental change. Traditional processes for systematic reviews—an essential methodology for knowledge synthesis—are highly laborious and prone to human bias, which potentially limits the scope and timeliness of generating the necessary evidence.

Here, I address this challenge by exploring the transformative role of Artificial Intelligence (AI), presenting progress on a project focused on developing and implementing AI tools designed to assist and automate key stages of systematic reviews. By applying language models and machine learning algorithms, I demonstrate how AI can optimize the identification, classification, and analysis of relevant literature. Using a previously published review as a proof of concept, and re-evaluating it with the proposed method, I show how these tools can increase efficiency, improve reproducibility, and reduce human error. By automating labor-intensive tasks, AI enables researchers to focus on critical analysis and synthesis, enhancing the transformation of scientific knowledge into reliable and actionable evidence. AI should be regarded as a valuable tool that supports, rather than replaces, scientific expertise in addressing the challenges of knowledge synthesis for evidence-based decision-making.

About the speaker: Dr. Pedro Jaureguiberry is a researcher at the Instituto Multidisciplinario de Biología Vegetal (CONICET-Universidad Nacional de Córdoba), where he specializes in fire ecology and the impacts of human activity on biodiversity. His work explores the role of fire in seasonally dry forests of Argentina, investigating the response of dominant plant species under different land-use scenarios. Additionally, he contributes to large-scale interdisciplinary initiatives like the IPBES Global Assessment Report, where his research on direct drivers of biodiversity loss has provided significant insights into the global environmental crisis. This work complements other research within his group, which integrates ecological and social dimensions to explore the multifaceted relationship between functional diversity and ecosystem services, and to inform sustainable land management practices. He was awarded the prestigious Frontiers Planet Prize International Champion 2024, one of the most important global recognitions in the field of sustainability and biodiversity conservation.

SANDRA LAVOREL

ANC, Academia de Ciencias de Francia
CNRS - Laboratoire d'Ecologie Alpine

NATURE-BASED ADAPTATION TO CLIMATE CHANGE FOR A LIVEABLE FUTURE ON EARTH

Abstract: Ecosystems in good condition and their biodiversity are the life support system for humans on Earth. Yet, they are threatened by the contemporary global polycrisis that degrades climate, soils, waters and all forms of life, and hence jeopardizes any ambitions to improve human livelihoods, including the Sustainable Development Goals.
While addressing the root causes of this global polycrisis is imperative and urgent, we must also look to how conserving, restoring and sustainably managing nature can support social adaptation to its ongoing impacts. Ecosystems help mitigating natural risks, sustain food production and other ecosystem services in the face of a rapidly changing climate, and create opportunities for novel activities and cultural values. For these to materialise, we must identify, experiment and implement at scale the necessary interventions, value chains, governance and social changes. There are already many examples of such initiatives globally, and learning from them through transdisciplinary research must guide future decisions and policy.

About the speaker: Sandra Lavorel is a functional ecologist whose career has focused on the interlinkages between human-driven changes in land and climate, and ecosystems, considered through their biodiversity, their functioning and their contributions to humans. For 20 years, her research has aimed to embed the understanding of ecological processes into the quantification of ecosystem services, the contributions of nature to human quality of life, and how these can support decision for adapting to a changing world.

She has led interdisciplinary projects and international networks, weaving knowledge and methods from ecology, geography, agronomy, sociology and anthropology among others, to address nature-based processes of transformation. This highly transdisciplinary work has involved long-term place-based knowledge co-production with diverse stakeholders and decision-makers from multiple sectors (agriculture, forestry, nature protection, tourism, land planning…).

She has also had a continuing priority in building from such place-based evidence to generic concepts, data syntheses and scaling for large-scale transformation. In this endeavour, she has had a long-standing commitment to contributing and steering excellent science for environmental policy through participation in strategic and decision processes of regional (e.g. protected areas), national (e.g. science advisory committee to the President of France, Ministries for Higher Education and Research and for Environment) and international institutions (e.g. IPBES).
With over 400 international publications, Sandra Lavorel is a member of French Academy of Sciences, and a foreign member of the U.S. National Academy of Sciences and the Academy of Sciences of Argentina. She has received multiple prestigious awards including: the CNRS Gold Medal, the Ramon Margalef Prize in ecology, the BBVA Frontiers of Knowledge award in ecology and biodiversity conservation, and the Honorary membership of the British Ecological Society.

CLEMENT SANCHEZ

Academia de Ciencias de Francia
Chaire de « Chimie des Matériaux Hybrides »
Laboratoire de Chimie de la Matière Condensée de Paris,
UMR CNRS-Université Pierre et Marie Curie-Collège de France,
USIAS (University of Strasbourg Institut of Advanced Studies)

BIOMIMETIC AND BIO-INSPIRED APPROACHES: A BETTER UNDERSTANDING OF NATURE TO CREATE NEW FUNCTIONAL MATERIALS THROUGH AND INTEGRATIVE CHEMISTRY APPROACH

Abstract: A better understanding of the construction mechanisms and structures of natural materials, and drawing inspiration from them, enables the creation of new materials and systems. Methods for developing inorganic or hybrid nanomaterials based on “gentle chemistry” involve “mineral polymerization” reactions in the broad sense and are carried out at room temperature. This type of approach makes it possible to simultaneously generate organic or biological components and mineral components in the same material, resulting in true organo-mineral hybrids or nanocomposites. Combining the properties of certain organic or biological molecules with those of mineral compounds in a single material has become an achievable goal. These cross-disciplinary approaches, in

which molecular engineering and ingenious processes are synergistically combined, encompass biomimetic or bio-inspired synthesis strategies that enable chemists to develop complex systems of various shapes with perfect control over different scales of size, composition, functionality, and morphology. The creation of hybrid hierarchical architectures involves cross-disciplinary synthesis methods and clearly illustrates the central role of chemistry in the field of advanced materials. It is in this context, at the crossroads of “chemistry in all its forms,” physics, biology, and materials science, that a new field of investigation is developing concerning bio-inspired inorganic or hybrid materials. The design of these new functional materials, adapting their manufacturing methods to climate change, should enable a more sustainable future for the Earth. These strategies will highlight the analogies between natural and synthetic materials. In terms of applications, some organo-mineral hybrids or nanocomposites are at the development or prototype stage, while others are already on the market.

About the speaker: Today Clément Sanchez is Emeritus Professor of the Collège de France, chair named « Chemistry of Hybrid Materials » and Professor at USIAS (University of Strasbourg Institut of Advanced Studies) chair named Chemistry of ultradivided matter. He was Director of the “Laboratoire de Chimie de la Matière Condensée de Paris” (UMR 7574, University of Pierre and Marie Curie-Collège de France-CNRS) (1999-2013). He did a large part of his carrer at the CNRS where he was Director of Research studying ”chimie Douce” strategies to synthesize hybrid nanomaterials. He was also Professor at l'Ecole Polytechnique during 12 years. He received an engineer degree from l'Ecole Nationale Supérieure de Chimie de Paris in 1978 and a “thèse d'état” (PhD) in physical chemistry from the University of Paris VI in 1981. He did a post-doctoral work at the University of California, Berkeley, and is currently performing research at Paris Sorbonne University, at the University of Strasbourg and at the University of Bordeaux. He is specialized in the field of nanochemistry and physical properties of nanostructured porous and non-porous transition metal oxide-based gels and porous and non-porous hybrid organic inorganic materials shaped as monoliths, microspheres and films. Most of his synthesis strategies are bioinspired and use manufacturing methods adapted at best to climate change. He was the chairman organizer of numerous international meetings associated to the field of soft-chemistry (Chimie douce), hybrid materials and related bio-aspects. He was the recipient of several national and international awards and he is member of

several Academies of Sciences. For a more complete CV and more informations about his different awards please see: https://www.usias.fr/chaires/clement-sanchez/ https://www.college-de-france.fr/site/clement-sanchez/Biographie.htm https://scholar.google.fr/citations?user=vM9snnEAAAAJ&hl=fr

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EZEQUIEL LEIVA

ANC

Departamento de Química Teórica y Computacional. Facultad de Ciencias Químicas.

Laboratorio de Energías Sustentables. Universidad Nacional de Córdoba.

Instituto de Investigaciones en Físico-Química de Córdoba (CONICET-UNC)

RECHARGEABLE BATTERIES OF THE FUTURE: HOW FAR CAN WE PUSH THE THERMODYNAMIC AND KINETIC LIMITS?

Abstract: This title refers to the two fundamental constraints currently faced by battery technology: the issue of capacity, which gives rise to so-called *range anxiety* (the fear of running out of power), and the issue of *charging rate* (the frustration of long recharging times). In this talk, we will present an overview of modern batteries from a broad, multidisciplinary perspective, and examine these two limitations while highlighting potential solutions. We will also discuss some of the work being carried out in our laboratories, emphasizing the importance of being embedded in a strong technological and scientific ecosystem.

About the speaker: Ezequiel Leiva is currently an Emeritus Professor at the National University of Córdoba (UNC) and a Superior Researcher of CONICET. He obtained a PhD. Degree in Physical Chemistry at the UNC, and completed postdoctoral studies in Germany using DAAD and Humboldt scholarships. In 2019 he became a member of the National Academy of Sciences of Argentina. Afterwards, he obtained the Konex Prize in Science and Technology in 2023 and in 2024 the Agustín Arévalo Prize of the Ibero-American Society of Electrochemistry.

Until 2012, he developed research work in nanoscience and nanotechnology using computational modeling. In 2013, he participated in the foundation of the Laboratory of Sustainable Energies of the UNC, and

since then, he has devoted his work to the study of Li-ion and post-Li-ion technologies.

VICTORIA PETERSON

Academia Joven de Argentina
Instituto de Matemática Aplicada del Litoral (CONICET)

TOWARDS BROADCASTING NEUROTECHNOLOGY FOR MOTOR RECOVERY IN ARGENTINA

Abstract: By means of a brain-computer interface (BCI) promising rehabilitation technologies can be built for restoring motor function after stroke. However, their high cost and complexity often limit their accessibility, especially in low- to middle-income countries. As a potential neurorehabilitation tool, the BCI system should allow rapid use across several sessions. Traditional brain decoding algorithms require large calibration data, which restricts therapy time, and generally do not adapt to brain changes that may encounter technology usage learning. This talk presents coAR.BCI (coadaptive rehabilitative brain-computer interface), a low-cost, open-source, co-adaptive and human-centered BCI that aims at fostering the usability of these neurotechnologies for rehabilitative purposes. The algorithmic solution as well as designed neurofeedback is envisioned to make this technology more accessible and appealing.

About the speaker: Victoria Peterson is a CONICET Assistant Researcher at IMAL, Santa Fe, Argentina and Associate Professor at Universidad Nacional del Litoral, Argentina. She obtained her degree in Biomedical Engineering in 2013 and her Ph.D. in Engineering, Signals, Systems and Computational Intelligence in 2018. In 2019, she joined IMAL, UNL-CONICET, Argentina as a CONICET postdoc fellow and later in 2021, she became a Harvard Research Fellow at the Brain Modulation lab in the Massachusetts General Hospital, Boston, USA. Victoria is currently an external collaborator of the Brain Modulation Lab and was a visiting Doctoral Student at the RELab, ETH Zurich in 2017 and 2018. With over 10 years of experience in machine learning solutions for brain signal decoding in the context of brain-computer interfaces, one of her research projects was nominated for the BCI Award 2021. In 2024, she received the Early Career Award of the ANCEFN, Argentina.

ANDREA GAMARNIK

Academia Nacional de Farmacia y Bioquímica

Instituto de Investigaciones Bioquímicas de Buenos Airres (CONICET)

GENERATING TOOLS AND KNOWLEDGE FOR DENGUE VIRUS CONTROL

Abstract: Dengue virus (DENV) continues to pose a major public health threat across Latin America and other tropical and subtropical regions of the world. Recurrent epidemics cause hundreds of millions of infections each year, imposing severe health and socioeconomic burdens. There are four DENV serotypes (1 to 4), and infection with any of them can lead to clinical outcomes ranging from mild febrile illness to severe hemorrhagic disease. Individuals experiencing a secondary infection with a different serotype are at increased risk of severe disease due to a phenomenon known as antibody-dependent enhancement. Therefore, to provide effective protection, vaccines must be tetravalent, targeting all four serotypes simultaneously. Despite decades of research, the development of an effective vaccine remains elusive, and no specific antivirals are currently available.

Our work aims to dissect the molecular mechanisms of DENV infection and replication to identify novel antiviral targets and guide the design of improved vaccines. A major challenge in vaccine development lies in the differences in infection dynamics, replication rates, and host-virus interactions among the four serotypes. By integrating proteomic studies using human infected cells with technology to genetically manipulate the four DENVs, we have uncovered serotype-specific strategies to subvert human antiviral defenses and drive pathogenesis. This mechanistic information is now being used for rational design of balanced tetravalent vaccines. In parallel, we have established a platform for development of diagnostic tools for detection of all four DENV serotypes, which are currently available for clinical use.

About the speaker: Dr. Andrea Gamarnik obtained her Ph.D. in biochemistry studying plant-pathogen interactions at the University of Buenos Aires in 1993. After a postdoc at the University of California, San Francisco, and working in the biotechnology industry in California, she returned to Argentina at the end of 2001. She is currently the Director of

the *Instituto de Investigaciones Bioquímicas de Buenos Aires* (IIBBA) of CONICET at the Fundación Instituto Leloir, where she leads the Molecular Virology Laboratory.

The goal of her lab is to study infectious diseases that are relevant to the country and the region. Given the public health impact of dengue virus in Latin America, she focused her research on this pathogen. Her laboratory has made seminal contributions on the mechanism of dengue virus replication. These achievements led to her incorporation in the American Academy of Microbiology in 2014 and the American Academy of Arts and Sciences in 2021. She has received numerous national and international awards including the L'Oréal-UNESCO International Award for Women in Science representing Latin America, the Konex Platinum Award in Science 2013–2023, the Award *Investigador de la Nacion* 2022, and she was a member of the Infectious Diseases Program of the Howard Hughes Medical Institute (HHMI).

During the COVID-19 pandemic, she created the COVIDAR group, which developed the first national kit for measuring antibodies against SARS-CoV-2. More recently, her team developed the **DetectAR Dengue** kit for dengue diagnostics through the detection of viral antigens. This kit was approved by ANMAT in 2024 and is now available for clinical use.

ALAIN FISCHER

Academia de Ciencias de Francia

Professor Emeritus , Collège de France, Chair of Experimental Medicine

DNA-BASED THERAPIES: FROM RECOMBINANT PROTEIN TO GENE THERAPY

Abstract: From the 80s, it became feasible to produce at wish recombinant proteins from cell factories engineered to do so by insertion of genes. It led to the impressive development of biotherapies in several fields of medicine, notably diabetes, cancer, immunological diseases and infectious diseases. DNA is now also being used in the design of new platforms of vaccines as illustrated by the succes of modified adenoviral vectors to protect against Ebola and Covid. Finally, cell modification by addition of a genetic sequence as mediated by viral vectors in vivo or ex vivo has led to success in the treatment of a variety of inherited diseaes

such as primary immunodeficiencies, blindness, neuromuscular diseases, hemophilias and hemoglobin disorders. Despite occurrence of adverse events, these therapies reach now for the first one 25 years of protracted efficacy, holding promise to extend application to many more inherited rare diseases. Gene therapy has also transformed immunotherapy of B cell leukemias through the design of CAR (chimeric antigen receptor) T cells. Genome editing, based on modified CRISP,-Cas technology is being tested to provide more precise genetic correction or intervention, offering further perspective of therapeutic development.

About the speaker: Prof. Alain Fischer studied medicine, with a specialization in pediatrics and immunology at the Université of Paris. After completing a postdoctoral fellowship at the University College London, he started independent research in an INSERM unit at the Necker Hospital in Paris. From 2009 to 2016, he was the director of the Institute for Genetic Diseases (Imagine) at Necker University Hospital. Dr Fischer also served as a professor of pediatric immunology at the Université Paris Descartes. From 1996 to 2012, he has served as the director of the pediatric immunology department at the Necker Hospital. Dr Fischer was Professor at College de France (chaire Claude Bernard from 2014 to 2020). Dr Fischer's main research interests are gene therapy, primary immunodeficiency diseases, and the development of the lymphoid system. Dr Fischer received the Louis Jeantet Prize for Medicine in 2001 and the Japan Prize 2015. He is a member of the French and US National Academies of Science and Medicine. He served as president of the French Academy of Science in the years 2023 and 2024.