ENCUENTROS

THIRD CONFERENCE OF YOUNG CHILEAN SCIENTISTS IN EUROPE

GÖTTINGEN 11–13 FEBRUARY 2009

Conference Volume

ENCUENTROS

Third conference of young Chilean scientists in Europe

Held at the Max-Planck-Institute for Experimental Medicine

Göttingen 11 - 13 February 2009, Germany

www.encuentros2009.org

Encuentros 2009

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Welcome by the Organizers

Welcome to Encuentros 2009!

"Encuentros" began, as its name suggests, as a gathering of Chileans that were studying science in Europe. Its aim was to not only to catch up with old friends, but also to get to know the scientific works of fellow Chilean colleagues. The first meeting happened in Dresden in 2006, with about 8 participants. The following year, that number grew to 15 in Milan. Although the group had expanded, the participants left the meeting with the hope that following meetings could reach more scientists and thus have a greater impact.

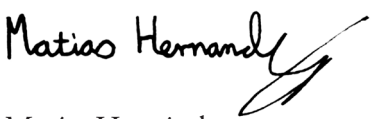
"Encuentros 2009" builds from those earlier meetings. In this edition of "Encuentros", there are not only more participants, but also the quality of speakers has dramatically increased. In addition, the nature of scientific research has become evermore interdisciplinary; consequently, the diversity of topics being represented has also expanded.

To promote better networking and communication between Chilean scientists in Chile and abroad, the program includes presentations of senior scientists working in Chile and in Europe. The program is further complemented with short talks of 13 young Chilean researchers, at doctoral and post-doctoral level, coming from six countries of Europe and even from the United States. And if that is not enough, we have distinguished speakers who are working in important research organizations throughout Europe and Chile, all of which in some way or another will discuss topics such as research funding, cooperation, mobility and networking.

Although science is the common denominator of this meeting, we are also pressed by recent scientific developments in Chile. In this regard, we have proposed three lines of discussion that we would like to generate in the round table and panel discussion:

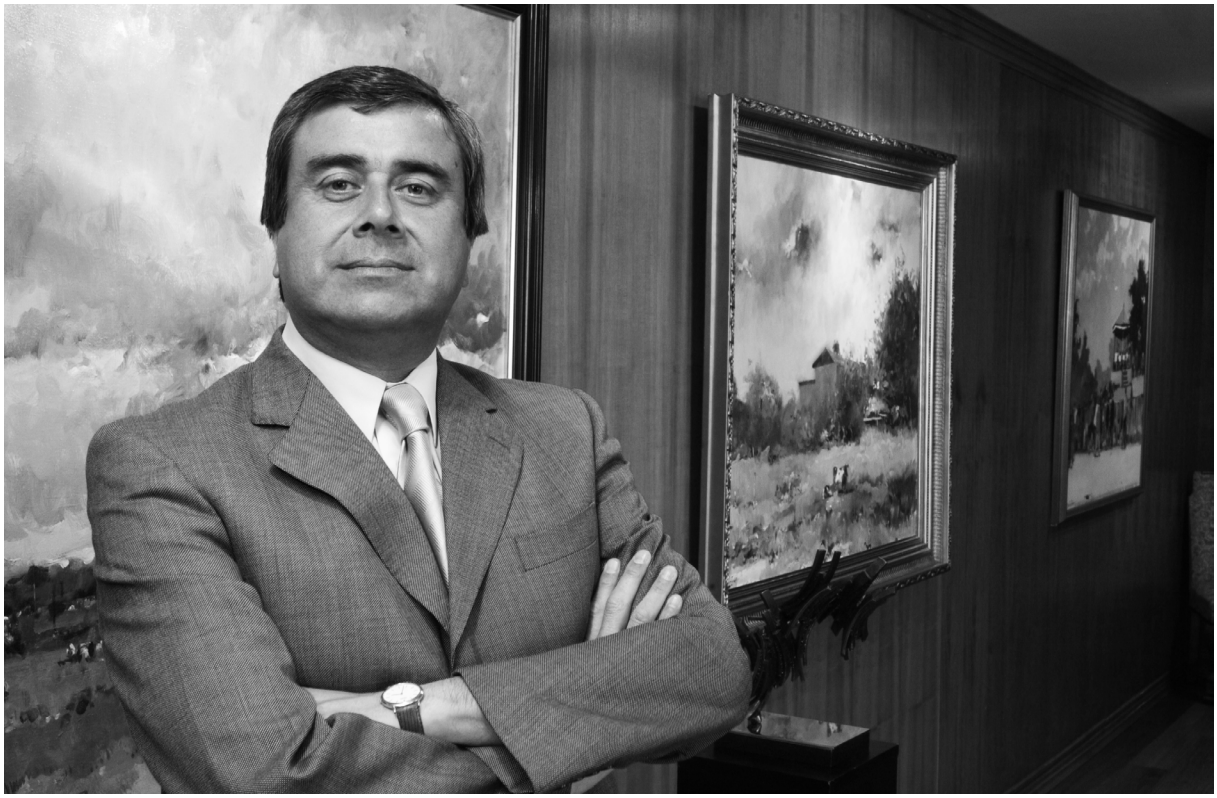
- Acceleration of scientific research in Chile through better cooperation and communication between Chilean scientists working abroad and in Chile
- The brain-drain effect, ways to re-integrate Chilean scientists
- More scientific cooperation between Chile and Europe

It is with this in mind that we would like to welcome you to "Encuentros 2009". The organizers hope that you learn a lot from the scientific talks, but also that you find meeting fellow Chilean scientists working in Europe a rewarding experience.



Matías Hernández
on behalf of all the organizers of Encuentros 2009

Mensaje del Embajador



Prof. Dr. Álvaro Rojas Marín
Embajador de Chile en Alemania

Redes científicas para una mejor ciencia

M. Castelles hacia fines del siglo pasado, llamó a la "sociedad del conocimiento y de la información", como la "la sociedad relacional", un modelo en el que el progreso tecnológico establece nuevas demandas por "trabajadores del conocimiento", los que sustituyen creciente y masivamente, puestos de trabajo ocupados hasta ayer por trabajadores, que fundaban sus competencias en habilidades manuales.

En el mundo de las ciencias este cambio se inició antes que en el resto de la sociedad, toda vez que junto con el desempeño científico autónomo, la capacidad de integrar equipos de trabajo multidisciplinario, que operaban en ambientes multiculturales era ya la tónica desde hace muchas décadas. El trabajo cooperativo de antaño tiene hoy un excelente sustento tecnológico para su operación y además, el reconocimiento de las políticas públicas para su desarrollo. No obstante la simplificación y generalización que existe para el trabajo en redes, la velocidad y profundidad del nuevo conocimiento que se va generando lo hace cada vez más complejo y sofisticado.

Las redes científicas de cooperación en las que cada miembro debía tener dominio del **know why**, del **know what** y del **know who**, lo escuchamos ahora de manera mucho más generalizada, particularmente en el proceso de formación de competencias del nivel profesionales; es este por cierto un gran aporte al proceso formativo. Gracias a ello, los nuevos "trabajadores del conocimiento" ingresan al mundo de las ciencias con este background y su trabajo en ellas les resulta culturalmente mucho más cercano.

La red que se ha formado de estudiantes chilenos que están realizando sus estudios en Alemania y Europa se inserta en el contexto descrito. Nos parece una excelente iniciativa, que ayudará mucho a socializar los avances individuales, así como también entender el proceso formativo científico como un tema que compromete a una generación, que ve en estas redes también una forma de comunicación efectiva y eficiente. Felicitamos a los organizadores por su concreción, el esfuerzo desplegado ya ha rendido sus frutos.

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Science made in Chile that is going Global

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16:30 Claudia Duran, Pablo Ferrada, Elias Urrejola (Germany)
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Panel discussion

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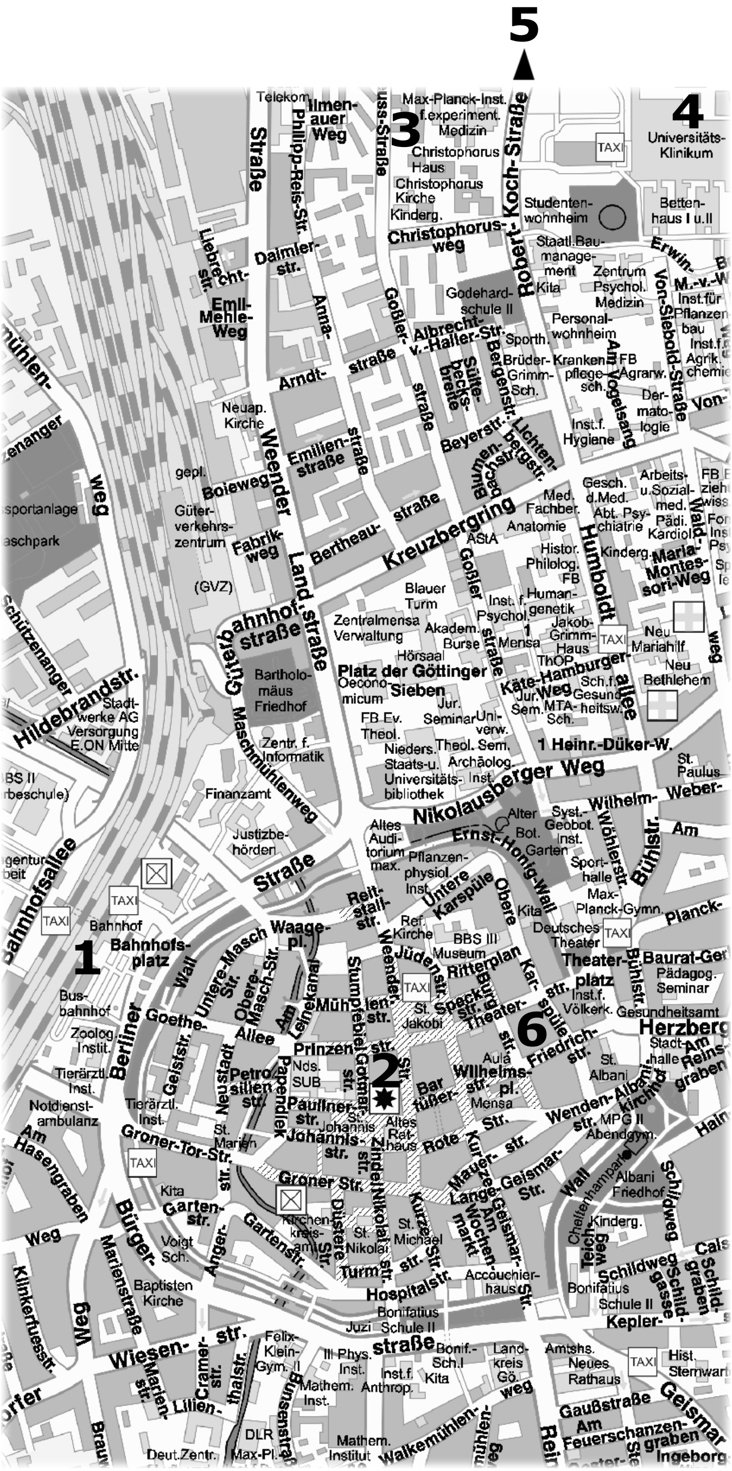
** Live broadcast via SecondLife.com (courtesy of Nature Publishing Group)

Venue

Göttingen

The origins of Göttingen, which is situated in the center of Germany as we know it today, go back to the 10th century. During the middle ages, the village of Gutingi became a wealthy town, due to its membership in the Hanseatic League. Today Göttingen is mainly renowned for its old University Georgia Augusta, founded in 1737, and its subsequent tradition in scientific research. The list of famous people that were connected in one way or another to Göttingen and its university is long (including 44 Nobel prize laureates). The most important example might be Carl Friedrich Gauss, who spent almost his entire life in this city as a student, Professor for Astronomy and Director of the Observatory. Further scientists affiliated with the university include Max Planck, Wilhelm Weber, Werner Heisenberg, Max Born, David Hilbert and Bernhard Riemann. In addition, the famous Brothers Grimm held Professor positions and Otto von Bismarck was a student at this university. Not all of them were as loyal as Gauss, for which some people blame the weather to be responsible. During the times of the Third Reich, many of the greatest minds emigrated or were forced to leave, which almost destroyed the scientific community of the university. Perhaps Göttingen's most lucky break was it being spared from the bombing during World War II, the unwritten understanding being that Germany would not bomb Cambridge and Oxford and the Allies would not bomb Heidelberg and Göttingen. Since the 1950s, the university has been rebuilt and Göttingen saw the foundation of the Max Planck Society within its walls, while it became home to four Max Planck Institutes. Today Göttingen is one of Germany's lively student cities, with a variety of inviting bars and cafes, a cosy Christmas Market and beautiful timbered houses. Being situated close to the Harz mountains in the center of Germany, it is both a popular destination for tourists and a good starting point for journeys for the Göttingen students.

City Map



1 Main station

2 Gänseliesel statue

3 Max Planck Institute Exp. Medicine

4 University Hospital ("Klinikum")

5 Hotel „Am Papenberg"

6 Bar / Restaurant Inti

from http://stadtplan.goettingen.de

General Information

City Transit

(References are to the Transit Map on the next page)

The most convenient way to the Göttingen city center from MPI Experimental Medicine is taking one of three possible bus lines. From the "Robert-Koch-Staße" bus-stop (1), line 8 buses arrive at quarterly intervals at peak hours and every 30 minutes in the evening. Line 5 and 10 buses arrive at the "Theodor-Heuss-Straße" (2) bus-stop at similar combined intervals. These stops are marked with black circles on the Göttingen transit map (next page).

While these buses all follow slightly different routes, they converge on the city center. Getting off at the "Markt" bus-stop brings you just behind the Altes Rathaus (the old Town Hall) and the central square of the city. Lines 8 and 10 also continue on to the train station "Bahnhof" which is the third stop after "Markt".

The ride takes less than 15 minutes and the fare price is €1.70 for single tickets, while you can buy 4 tickets together for €5.40. These tickets are purchased directly from the bus driver and should be time-stamped on board. They can be used independently and are good for one hour within which round-trips are possible. Bus-stops are announced in the bus while detailed timetable information can be found at the bus stops.

To return to MPI Experimental Medicine, the same bus lines should be taken from the "Kornmarkt" bus stop at the corner of Weender and Groner Staße and NOT from "Markt" bus stop. Getting off at "Robert-Koch-Staße" (1) for line 8 and "Theodor-Heuss-Straße" (2) for line 5 and 10 leaves you at a five minute walking distance from the institute. The last bus leaves "Kornmarkt" for the institute at 23:28.

Taxi services

You can request a taxi at any time from the reception desk in the institute. Fares to the city center or train station will be around €6. You may pick up a cab in front of the train station or behind the Altes Rathaus where they line up.

Phone: +49-0551-69300 / +49-0551-66066

Lunches and social event at Inti bar

With your registration, you will be provided with lunch vouchers that you can use for Thursday and Friday lunches in the mensa of the University hospital (Klinikum mensa) across the street from MPI Experimental Medicine (3). Entering the hospital building, you will find the mensa to your left.

Additionally, you will be provided with drink vouchers for the closing event of the conference, which will take place at the Inti bar which is located at the corner of Burgstraße and Friedrichstraße (Burgstraße 17, see map on previous page).

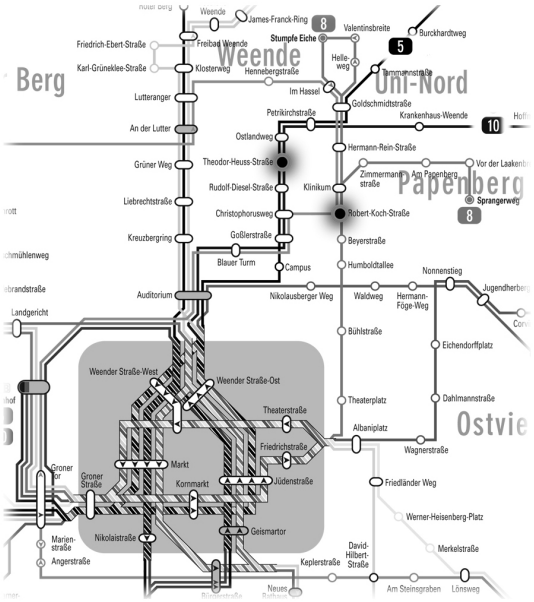
For extra meals outside the conference, the "Best Western Hotel Am Papenberg" situated adjacent to the MPI Experimental Medicine campus (4) houses an Italian cuisine restaurant. An asian cuisine restaurant and a Döner fast-food booth are a five-minute walk from the institute turning left at Gosler Straße (5). Other alternatives would involve going towards the city center.

Internet

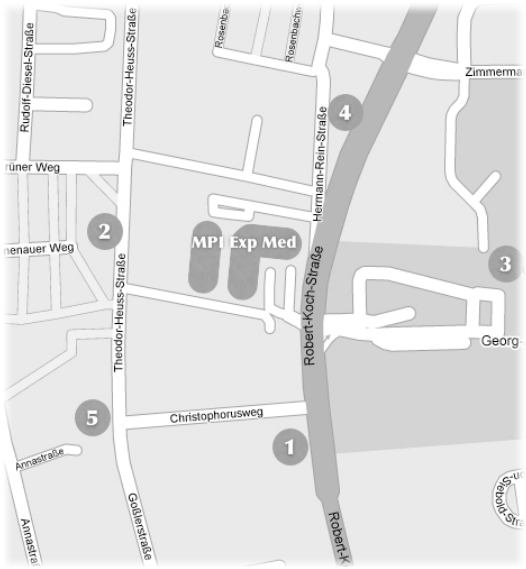
Computers for basic internet access are available in the library next to the lecture hall and in the cantine. For these computer use the username "student" and the password "logon". Free wireless internet access is also available at the venue site which does not require a username and password.

Transit Map

Göttinger Verkehrsbetriebe GmbH



Venues



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Bionexa
Red de Colaboración Científica

www.bionexa.org

Sponsors and Collaborators

The organizers would like to thank the sponsors and collaborators for their generous support and assistance

GEFÖRDERT VOM

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MINISTERIO DE RELACIONES EXTERIORES
DIRECCIÓN DE ENERGIA, CIENCIA Y TECNOLOGÍA E INNOVACIÓN

Embajada de Chile en Alemania

Acknowledgments

The organizers would like to thank the speakers for accepting our invitations and all those who were "behind the scenes" and generously provided assistance and advice during the organization of Encuentros 2009. We would also like to thank friends and family for their patience and understanding. We apologize to those who could not be in this list and who helped us after the printing of this booklet.

Alejandra Real
Alejandro Ormeño
Allan Najum
Andrés Benavides-Yates
Andrés Molina - CONICYT
Barbara Schillings
Ben Frank
Carmen Rotte
Danny Lobos
Eric Goles
Felipe Camposano
Foteini Orfaniotou
Gottfried Mieskes
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Ioanna Bethani
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Lorena Guzmán
Macarena Jordan Puelma
María Isabel Méndez
Nicolás Luco
Pablo Valenzuela
Sina Barysch
Stephan Junek
Svea Dettmer
Ulrich Nauber
Ute Rust
Victoria Viteri – British Council

Keynote Lectures

Cristián Hernández

Business Development
Fundación Ciencia para la Vida
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Science made in Chile that is going global & Career perspectives in Chile

Molecular Biotechnology Engineer from Universidad de Chile with a Master in Bioscience Enterprise from the University of Cambridge (2003). Throughout his career, Cristian has acquired invaluable experience in bio-businesses and technology transfer, both in Chile and in England. He has been a successful bio-entrepreneur, business consultant and Business Development Manager at Summit plc UK. He joined Fundacion Ciencia para la Vida as Director of Business Development in 2007

Political and public awareness of the importance of scientific and technological innovation for Chile's economic development has increased significantly in recent years. In this context, Fundacion Ciencia para la Vida, is playing a key role. To accomplish this goal, Fundacion acts as an interface between the productive and academic sectors, and collaborates with scientists all over the world, both in the public and private sectors. Only recently Fundacion has established high-value collaborations with several international partners that are positioning Chilean science at top international levels. Interesting examples of Science made in Chile that is going global will be presented during the talk.

Ramón Latorre

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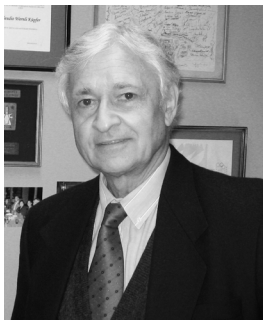
Ion Channels and the Montemar Cantata: A Case Study of Successful Science in Chile

Professor Latorre obtained his degree in Biochemistry and his Ph.D. at the University of Chile in 1969. He did his postdoctoral training in the Laboratory of Biophysics at the National Institutes of Health, MD., USA. After a brief stay as Assistant Professor in the Faculty of Sciences, University of Chile he returned to the USA where he held positions at Duke University, the University of Chicago (1975-1977) and Harvard Medical School (1977-1983). In 1983 he took a professorship at the University of Chile and in 1984 he co-founded the Centro de Estudios Cientificos de Santiago (CECS) and he was named Chair of the Biophysics Section. He is at present Professor at the Neuroscience Center of the University of Valparaíso, Professor of Cellular Physiology at the Faculty of Sciences, University of Chile, and Adjunct Professor of Anesthesiology, Department of Anesthesiology, University of California, LA, USA.

The main scientific interest of Professor Latorre is the molecular workings of ion channels, proteins that are located in cellular membranes and act as doors of perception. These proteins put us in contact with the external world by translating and amplifying all the stimuli incoming from the external milieu into an electrical language understandable to the cell. He has published more than 140 original articles and has edited or co-edited 7 books. He is the most cited Chilean scientist in the field of Biology.

His work in this field has been recognized through several national and international awards, among them Presidential Cathedras awarded by the Government of Chile in 1996 and 1999, the National Prize in Natural Sciences bestowed by the Government of Chile in 2002, the Rectorial Medal from the University of Chile in the same year, and named Robert F. Kennedy Professor of Latin American Studies by Harvard University in 2003.



Claudio Wernli

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The Chilean National System of Science, Technology and Innovation & The Millennium Science Initiative

Dr. Wernli is an Agronomy Engineer from the University of Chile and obtained his PhD in 1972 at the University of Reading, England. He thereafter worked for the Institute for Agricultural Research (INIA) as Head Researcher and then as its General Director. Since 1999, he has been executive director of the Millennium Science Initiative. Dr. Wernli has had a distinguished career not only as a manager, but also as an academic and consultant. He is, for instance, a full Professor at the Faculty of Agricultural Sciences, University of Chile, and invited Professor at CATIE (Costa Rica) and INTA (Argentina), and has been a consultant on a range of Agricultural and Agro-industrial development projects for the IICA /BID/ PROCISUR and the FAO.

The Millennium Science Initiative Program (MSI) is a governmental institution inserted in the Ministry of Planning of Chile. This program, pioneer in the underdeveloped or developing world, counted initially with the support of the World Bank through a special credit (Learning and Innovation Loan) for its implementation, and with relevant organizations of the world-wide scientific community. The MSI finances projects in scientific research through Centers of Scientific Excellence -Institutes and Nuclei- that are awarded on the basis of their scientific merits through a public contest. The awarded centers are expected to develop cutting edge research and actively participate in the formation of young researchers, to carry out collaboration and interaction networks with other centers of excellence of the region and the world, and to project in concrete ways their advances through outreach activities, particularly to the educational sector, industry, services and society, contributing to increase the development of the country in various fields. The Institutes and Nuclei carry out scientific research at similar levels as those of advanced laboratories of developed countries. The areas of research devoted by the MSI centers are, among others, the following:

- Biotechnologies
- Genetics
- Biophysics & Molecular Physiology
- Medical Sciences
- Plant Biology
- Microbiology
- Ecology & Biodiversity
- Theoretical & Condensed Matter Physics
- Mathematics
- Quantum Optics
- Chemistry
- Seismotectonics
- Information & Communication Technologies
- Glaciology
- Energy Processing and Transportation
- Industrial Optimization

Plenary Lectures

Sergio Rica

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Supersolidity: Dissipationless Flow and Lattice Ordering in Helium

Dr. Rica completed his Bachelor and Masters in Physics from the University of Chile. He then went on to obtain a PhD in Physics in 1993 at the Universite de Nice Sophia-Antipolis, France. He has thereafter worked for several years as a researcher at the Centre National de la Recherche Scientifique (CNRS) in a number of laboratories in France as a CR II (grade II) researcher and then as a CR I researcher (which included a brief stay in 2001 at the Center for Mathematical Modeling of the University of Chile, of which CNRS is a scientific partner). From 2002 to 2005, Dr. Rica was an Associate Professor at the Department of Physics at the University of Chile. He has since then returned to France as a CNRS researcher at the Laboratoire de Physique Statistique de l'Ecole Normale Superieure. Dr. Rica received the CNRS Bronze Medal in 1996, which generally recognizes a researcher's outstanding achievements while still in his/her early stages of his/her career.

Dr. Rica has contributed to a large variety of problems in nonlinear physics: from the interaction of defects, pattern formation, models of superfluidity to the kinetics and thermodynamics of Bose-Einstein condensation, granular material, suspensions, foams, elasticity, and nonlinear waves. His most significant contributions are on Superflow models (namely the non-linear Schrödinger equation). His team has shown a very striking phenomenon: that flow around an obstacle creates a drag force beyond a well-defined threshold velocity, linked to the emission of vortices from the perimeter of the obstacle. Dr. Rica has studied the phenomenon of vortex nucleation in detail over the years, and was also observed experimentally in 1999 by W. Ketterle and collaborators at MIT.

More recently, Dr. Rica has worked on the kinetics and thermodynamics of BEC and nonlinear PDE's. In Santiago he started a small experimental laboratory dedicated to the study of behaviors of matter out of equilibrium such as foam, sand, suspensions, and elastic waves.

Juan Reyes Martínez

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Giving up sex for money? A "de-prostitution" case of a physiologist/biochemist in the changing universe of science funding in Chile

Professor Reyes obtained his degree in Biochemistry at the University of Chile in 1974. Between 1973 and 1978, he worked as Assistant Teacher in the field of Biophysics, at the Medical Faculty, of that same university. As associate researcher, he obtained the degree of PhD in physiology at Harvard Medical School. He then continued his scientific carrier with a post-doctoral position in the Laboratory of Human Reproduction and Biology of Reproduction, in the same institution. With the support of the Rockefeller Foundation, Professor Reyes returned to Chile to the Faculty of Medicine, University of Chile. Nevertheless, in 1986 he took the decision to change the big cities for the province, and he started to work in the Faculty of Chemistry, Catholic University of Valparaíso, where he currently is a Professor. He is also an Assistant Professor in the Faculty of Medicine and Dentistry, University of Alabama at Birmingham, USA.

Professor Reyes has taken part in the editorial committee of the American Journal of Physiology, and currently in the editorial committee of the Journal of Biological Chemistry, the Direction of the Biological Society of Chile, and in the Chilean Society of Physiology. From 2006 to 2008, he directed the Unit of Advanced Studies of the Catholic University of Valparaíso, Chile.

The topic of the research carried out by Professor Reyes is cellular physiology and the phenomena of membrane transport, work that has been supported by the Rockefeller Foundation, CONICYT and the Andes Foundation. In his talk, he will outline the developmental stages of his career as a researcher, university teacher and administrative director, pointing out the sources of funding and the associated institutional environment. He will also present the research environment of the Universidad Catolica de Valparaíso in the Chemistry Institute and its association with other academic units within the University, with some focus on the Biochemistry-Biotechnology area, and specifically on the cell physiology and biochemistry of cell differentiation and death/senescence in osteoblasts, spermatogenic cells and skin fibroblasts.

Christian Griesinger

NMR based structural Biology
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Neurodegeneration: an NMR spectroscopic view from both sides of the atlantic

Professor Griesinger obtained his PhD at Frankfurt University in 1986. After a few years as post-doctoral fellow at ETH Zurich, he was appointed professor of Organic Chemistry at the University of Frankfurt in 1990. In 1999, he became director and scientific member at the Max Planck Institute for Biophysical Chemistry. Professor Griesinger's research interests are in multidimensional NMR spectroscopy and its application to the structure elucidation of biomolecules. Among the many prizes he has been awarded for his work are the Sommerfeld Prize of the Bavarian Academy of Sciences in 1997 and the Leibniz Prize in 1998.

Parkinson's disease feature aggregates of α-Synuclein, so called Lewy bodies, which are connected to neuronal death. With NMR in liquid and solid state, we have characterized the polymorphic forms of α-Synuclein: a) Monomers, that are considered to be the healthy form, are so called intrinsically unfolded proteins lacking secondary structure but have partial tertiary structure which autoinhibits aggregation. In line with this we observe that mutants that destabilize the partially folded form aggregate faster and exhibit higher toxicity in animal models. b) Oligomers of defined size could be linked to toxicity. Their structural characterization is very difficult but on its way. c) Fibrils are formed which could be characterized structurally by solid state NMR and are non-toxic. To test this assumption, we predicted mutants that inhibited fibril formation and found increased toxicity in animal models.

In addition to modulating the "aggregation landscape" by mutants we also set out to interfere with aggregation by small molecules. With screening and targeted libraries we identified compounds that are active in various animal models of Parkinson's but also Creutzfeld Jacob and Alzheimer's disease. Biophysical characterization of the compounds indicates that they prevent the formation of the above described toxic α-synuclein oligomers and form non-toxic off-pathway oligomers.

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Recalcine - from a Chilean drugstore to an emerging Pharma with global presence

Ms. Araya studied Environmental Chemistry at the Universidad de Chile, and obtained her Master in Science and PhD in Biotechnology from the University of Cambridge. During her PhD she generated several publications and patents, being awarded the "Young Investigator Award" by Hoffman LaRoche in 2005. In Cambridge, she started Paramata, a nanotechology company, where she worked actively for 2 years. At present she is R&D Director at Recalcine, the largest pharmaceutical company in Chile.

At the beginning of the nineties, Corporacion Farmaceutica Recalcine started a strong international expansion process. The first countries to market its products were Peru, Colombia, Bolivia and Paraguay. Currently present in 16 countries of Latin America, in 2006 the Company entered the Asian continent through a strategic agreement with a Vietnamese company. In 2003 began the construction process of the first plant of the new Pharmaceutical Complex, fully operating in December 2005. The technology and the high quality standards used at the pharmaceutical complex of Laboratorios Recalcine have made it the most modern in Latin America. Today, 85 years after its foundation, Corporacion Farmaceutica Recalcine is the leading company in the pharmaceutical market in Chile. It is constantly developing biotechnology projects and clinical studies, supported by the main forming entities in Chile and abroad.

The concretion of these proyects have made Corporacion Farmaceutica Recalcine the first Latinoamerican laboratory with research of its own.

Miguel Allende

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Finding a dual utility for the zebrafish model: an attempt to combine basic and applied interests

Professor Allende obtain his degree in Biology from the Catholic University of Chile in 1987 and his PhD in Molecular Biology at the University of Pennsylvania in 1994. He prolonged his stay in the USA as a postdoctoral fellow in Developmental Genetics at MIT until 1997, after which he returned to the University of Chile as Assistant Professor. He was director of the Millennium Nucleus in Developmental Biology between 1999-2006. He is currently an Associate Professor at the University of Chile and director of the Centre for Genomics of the Cell, a Centre funded by the Millennium Science Initiative.

Our lab is interested in understanding the molecular mechanisms governing development and regeneration in vertebrate sensory systems. We study the zebrafish mechanosensory lateral line system, an organ that develops after an intricate and complex process of cell migration, morphogenesis and neural differentiation. Importantly, the mechanosensory hair cells in this system have the capacity to fully regenerate after damage, providing an excellent model for studies aimed at achieving regeneration of mammalian hair cells, which, after loss, are not spontaneously replaced. Our work with zebrafish has allowed us to develop numerous tools such as transgenic animals, the use of genomic analytical techniques and in vivo cellular analysis. In parallel, we have found that these same tools can be successfully applied to address problems of interest to the pharmaceutical, toxicological and environmental sciences. We have diversified our work to explore applications in cancer research, immunology, environmental monitoring and food safety. I will discuss how we have combined academic interest with utility in our research and how a single technological platform can be applied to these diverse fields.

Walter Stühmer

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A potassium channel as a tumour marker

Professor Stühmer obtained his PhD at the Technical University of Munich in 1980. After a brief stay in the USA as a visiting scientist in 1983, he settled at the Max-Planck-Institute for Biophysical Chemistry in Göttingen in the department of Professor Erwin Neher. In 1992 he was appointed director of the Department of Molecular Biology of Neuronal Signals at the Max-Planck-Institute for Experimental Medicine. His research interests are in the molecular biology of ion channels, cellular signal processing, functional electrophysiology, and in structure-function relationships in ion channels. Professor Stühmer has been honoured with the Humboldt-Mutis-Prize in 1991 and the International Amedeo and Frances Herlitzka Prize for Physiology in 1998 for his work.

Ion channels are increasingly being linked to cancer and tumour progression. Here we describe a voltage-gated, potassium selective channel (Eag1, Kv10.1) with novel electrophysiological properties, whose normal physiological function is yet unknown but which shows oncogenic transforming potential if expressed ectopically. Strikingly, the expression of the human Eag1 is restricted to brain, but it is also present in several tumour-derived cell lines. More importantly, the protein can be detected in more than 75% of human tumour samples, while the corresponding normal tissues are devoid of the channel. Experiments under in vitro conditions have demonstrated decreased proliferation of Eag1-expressing cells by inhibition of expression and/or function of this channel. This inhibition of Eag1 is accomplished using RNA interference, functional anti-Eag1 antibodies, or (unspecific) EAG1 channel blockers. We have also used in vivo models to visualise the distribution of Eag1 in tumour-bearing mice using specifically designed recombinant antibodies. We conclude that Eag1 is a widely distributed tumour marker with diagnostic and therapeutic potential.

Erwin Neher

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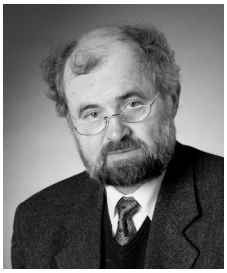

Ca^{2+} signals and short-term synaptic plasticity in the central nervous system

Professor Neher studied physics at the Technical University of Munich, and later obtained an MSc in Physics at the University of Wisconsin, USA. He then returned to Munich to complete his PhD in 1970. He then became a research associate at the Max Planck Institute for Biophysical Chemistry in Göttingen until 1982 (in 1975 he was also a guest scientist at the department of Physiology, Yale University). Professor Neher was subsequently appointed director of the Membrane Biophysics Department at the Max Planck Institute for Biophysical Chemistry. His major research interests are molecular mechanisms of exocytosis, neurotransmitter release, and short term synaptic plasticity.

Professor Neher has received numerous awards for his work, including the Leibniz prize in 1987 and the Nobel Prize in Medicine or Physiology in 1991 (shared with Professor Bert Sakmann) for the development of the patch-clamp technique.

In order to understand how the brain handles its information flow and adjusts synaptic connections on the second and subsecond timescale, one has to understand all aspects of synaptic transmission ranging from availability of vesicles for exocytosis, presynaptic electrophysiology, Ca^{2+} signalling, the process of exocytosis, and postsynaptic neurotransmitter action. Our work concentrates on presynaptic aspects. We study the basic mechanisms of exocytosis, using adrenal chromaffin cells as a model system and the patch-clamp method. This work, in which intracellular Ca^{2+} is manipulated (caged Ca^{2+}) and measured on the single cell level aims at understanding the role of specific synaptic proteins in the maturation and exocytosis of secretory vesicles. We use neuronal cell cultures and brain slices for studying mechanisms of short-term plasticity, such as depression and paired pulse facilitation. The Calyx of Held, a specialized synapse in the auditory pathway, offers unique possibilities for simultaneous pre- and postsynaptic voltage clamping. This allows a quantitative analysis of the relationship between $[Ca^{2+}]$ and transmitter release.

Reinhard Jahn

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In vitro-reconstitution of membrane fusion in the secretory pathway – still a long way to go

Professor Jahn earned his PhD in Biology in 1981 at the University of Göttingen. After working at the University of Yale and Rockefeller University, he returned to Germany to head a junior research group at the Max Planck Institute of Psychiatry in Munich in 1986. He then returned to Yale University, where he became Professor of Pharmacology and Cell Biology in 1995. He returned to Germany again in 1997, this time as Director and Scientific Member at the Max Planck Institute for Biophysical Chemistry. Throughtout his career Professor Jahn has made seminal contributions to the field of cell trafficking, in particular in the areas of exocytosis, membrane recycling in nerve terminals, and on the structure and function of synaptic vesicles. For his work, he has received numerous awards, including the Leibniz-Prize in 2000 and the Ernst Jung-Prize for Medicine in 2006.

Membrane fusion in the secretory pathway is mediated by SNARE proteins. According to current ideas, assembly of SNAREs residing in the membranes destined to fuse operate as nanomachines that pull membranes tightly together and thus cause fusion. Key to the present understanding of these nanomachines has been the reconstitution of fusion from purified components, however, the properties of the reconstituted system are still very different from the underlying biological reaction, and they are also different from the properties of in-vitro fusion reactions carried out with native membranes in cell-free extracts. In our work, we concentrate on understanding the molecular details of the SNARE fusion machine, with particular emphasis on the factors controlling fusion kinetics and on the intermediate steps that are involved in the fusion pathway. Our recent data provide new insights into the kinetic control and the underlying molecular mechanisms and conformational changes that govern SNARE-mediated membrane fusion.

Cristina Navarrete

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Should we be establishing Cord Blood Banks in Latin America?

Dr. Navarrete studied Medical Technology at the Faculty of Medicine of the University of Chile from 1970 to 1974. She continued with her scientific and clinical career in 1978 in the Department of Transplantation Immunology at the London Hospital Medical College (LHMC) where she obtained her PhD. After spending 18 months in the Department of Molecular Biology in the Hospital for Joint Diseases in New York, she returned to the LHM in 1987 and became a Lecturer in Immunology.

In 1993, Dr. Navarrete moved to the North London Blood Transfusion Centre in London to direct the clinical services provided by the laboratory of Histocompatibility & Immunogenetics (H&I). She was also appointed Senior Lecturer in Immunology at the Royal Free Hospital Medical School, University London. She then became a Principal Investigator (PI) at the National Blood Service to set up an associated research program in the areas of Immunology and Immunogenetics of Transfusion and Transplantation with particular emphasis on Cord Blood Transplantation. In 1996, Dr. Navarrete was appointed Zonal Head of the H&I Services in the London and South East Region and Scientific Director of the Cord Blood Bank. She was then appointed National Head of Histocompatibility & Immunogenetics Services for the National Blood Service and Director of The British Bone Marrow Registry in 2000, and was later appointed reader in Immunology at the combined Departments of Immunology of the Royal Free and University College Medical Schools.

Throughout her career, Dr. Navarrete has been actively involved in the development and direction of research and its clinical application in the above-mentioned areas. Simultaneously, she directs a research group and is also actively involved in training and education.

Jani Brouwer

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CONICYT and its efforts to reshape Chilean Science through cooperation, mobility & networks

Ms. Brouwer studied Educational Science in the Netherlands, and has been living in Chile since 1993. She has an extensive record in coordinating and managing educational and development-related programs in Latin America, and has worked, among other organizations, for CONICYT, the Fundacion Andes and UNICEF. She is currently director of the Basal Financing Program for Centers of Scientific and Technological Excellence, one of the programs implemented by CONICYT.

The Basal Financing Program for Scientific and Technological Centers of Excellence was created in the year 2006 as an initiative of the National Council on Innovation for Competitiveness (CNIC). This program allows funding to be granted to distinguished national groups of researchers at universities and/or independent scientific centers, in order to ensure that the basic and technological research performed is focused on increasing the competitiveness of the Chilean economy, whose motors are the quality of advanced human capital, knowledge and innovation.

The first eight centers financed through the first round of competitions in 2007 among thirty-three centers represent world-class efforts to strengthen science and technology in Chile in ways that enhance scientific research, build human capacity, promote outreach and international collaboration, and contribute to the economic development of Chile in sustainable ways.

Inge Lamberz de Bayas

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Germany‘s R&D System and International Cooperation & Instruments for Supporting Scientific and Technological

The International Bureau was created by the German Federal Ministry of Education and Research (BMBF) to strengthen the international ties of German universities, research institutes and enterprises with the ultimate goal of building competencies and fostering competitive advantages for industry and the research community in Germany in the areas of research and innovation. In doing so, the International Bureau is making an important contribution to cultivating an international dimension within the research programmes of the BMBF.

Ms. Lamberz‘s talk will focus on the Bureau‘s current work, with particular reference to Chile and with regards to its four main objectives:

1) Supporting the Federal Ministry of Education and Research (BMBF) in the planning and implementation of international cooperation in research and education

2) Supporting German research institutions in planning and implementation of their international cooperation with priority-countries

3) Developing cooperation opportunities with funding agencies all over the world within the framework of national, bilateral and multilateral programs

4) Building up and fostering networks with other stakeholders in International Cooperation

Marc Bovenschulte

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Networks and Clusters - the Benefits of Cooperation

For more than ten years Dr. Bovenschulte has worked on technology trend scouting and foresight, the analysis of innovation processes and the transfer of knowledge within changing stakeholder constellations. Dr. Bovenschulte covers socioeconomic settings and effects of emerging technologies and is head of the programme managements "ITA - Innovation and Technology Analyses" and "Foresight" on behalf of the Federal Ministry of Education and Research. He is also member of the managing team of the German meta-initiative for technology-oriented networks of excellence "Kompetenznetze Deutschland" and responsible for co-operations with Latin America.

The improvement of networking is a key issue of modern innovation policy in order to stimulate scientific and technological performance and economic competitiveness - not only in biotechnology. But what kind of profiles and hallmarks do successful networks show beyond fashionable buzzwords? How do networks collaborate and what potentials can be used to assure their further and long-lasting development? The presentation will outline an exemplary overview on German clusters and networks based on the initiative "Kompetenznetze Deutschland" (www.kompetenznetze.de).

European Research Area

EU commission (Research)

Talk I

Participation in the FP7 program

Talk II

Better Careers and More Mobility for Researchers and the EURAXESS Initiative

In 2000, the EU decided to create the European Research Area (ERA). The significance of this decision is the unification of an area all across Europe which has the following aims:

- Enable researchers to move and interact seamlessly, benefit from world-class infrastructures and work with excellent networks of research institutions;
- Share, teach, value and use knowledge effectively for social, business and policy purposes;
- Optimise and open European, national and regional research programmes in order to support the best research throughout Europe and coordinate these programmes to address major challenges together;
- Develop strong links with partners around the world so that Europe benefits from the worldwide progress of knowledge, contributes to global development and takes a leading role in international initiatives to solve global issues.

The representatives of the EU Commission (Research) will provide specific information that may be helpful to Chilean scientists working in Europe, such as programs that can enhance research capabilities and programs that promote scientific cooperation between Europe and Chile.

DAAD

DAAD

Title - to be announced

Using funds largely provided by the Federal Ministry for Economic Cooperation and Development, the DAAD promotes the creation of high-quality and permanently self-sufficient higher education structures in developing and transformation countries. Core areas include support for the initial and continuing education and training of young university teachers and other experts and specialists in the form of grants and scholarships for stays in Germany and sur-place scholarships for studies in the respective home countries, plus the development of partnerships with German higher education institutions. Here, too, the creation of sustainable networks involving DAAD funding recipients constitutes an integral part of the programme. Funding for stays at German higher education institutions by these students, academics and researchers additionally serves to advance an understanding for the developing countries and the need for development-policy cooperation.

Fernando Guzmán

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Creation of an advisory council for innovation of Chileans living abroad

The Direction of Chilean Communities Living Abroad (DICOEX) is the institutional linkage for the State of Chile for the development and inclusion in the national affairs of all Chileans, who for one or another reason, are living outside the country. One of the primary objectives of the Direction for this year is the creation of a "National Advisory Council" in science and innovation, composed of prominent Chileans residing abroad. With the creation of this new network it is intended to generate a space for open and fruitful discussion in order to promote Chile to make the necessary jump to achieve sustainable development in the twenty-first century.

Closing Lectures

Omar Larach

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The Sweet Spot of Science + Business

Mr. Larach is a biologist by training from the University of Chile and Business Engineer from the University Gabriela Mistral. Throughout his career, Omar has acquired invaluable experience in Bio-Business in Chile, and has become a successful Bio-Entrepreneur and Business Consultant. He joined Merck as a QC analyst and has moved internally to a more commercial role. He currently works in business development in Pigments and Life Science.

Science and business often do not go together. In general, researchers do not have adequate incentives to create a business with their knowledge, and rather, are directed to investigate, teach and write papers. To do anything out of that box -like starting up a company- would be seen as a risky move that may lead towards losing reputation. On the other hand, business people are too busy to focus on fundamental questions that may only be answered through research.

Therefore, it seems natural to think that the researcher-businessman interests are too far apart or unlinked to find common ground. However, there is growing evidence that countries need this science and business synergy to accelerate their development. If they actually interact, which one would ultimately win or lose? What makes them so different? What data do we have that show there really is productive interaction between these two worlds? Are there are any concrete examples of this happening in Chile? These and other questions will be answered.

Cristián Hernández

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Career perspectives in Chile

Motivated by the idea of contributing to Chile's development through his experience and contacts overseas, Cristian decided to work on a project that would connect Chilean researchers that live abroad, with the investigators and research-oriented companies that exist in Chile. This idea materialized into BIONEXA (www.bionexa.org), a web-based network for scientific collaborations that has enabled a number of alternative career paths for scientists back in Chile. This lecture will offer a comprehensive guide for graduate students and postdoctorates who are considering careers outside the lab. The day-to-day activities in alternative science-related jobs will be described, discussing both the rewards and the difficulties in several different employment settings. Perhaps more than anything else, this talk aims to demonstrate that scientists can find challenges and fulfilment outside the lab.

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Developing Scientific Collaborations: The Bionexa & Nature Publishing Group affair

Bionexa is a virtual platform that promotes knowledge and technology transfer between Chilean and Latin-American researchers and investigators and research-based companies in the region.

In less than two years Bionexa's website has been visited more than 75.000 times from people from 618 cities and 49 different countries in the world. Currently there are more than 800 registered members who find in Bionexa a space in which they can share what they do, meet colleagues in other countries, and support the development of Science in Latin America.

Nature Publishing Group (NPG) is one of the largest Scientific Publishers in the world. Nature Network and the Elucian Islands are two important members of the NGP family through which the creation of innovation and discovery networks and online platforms are helping to bridge the gap between scientific communities. Nature Network and the Elucian Islands are two recent examples of how NPG is enabling scientists to share knowledge and exchange information in order to gain new perspectives on research.

In 2008, Bionexa and NPG signed a collaboration agreement that seeks to promote the scientific contribution and the transfer of know-how and technologies between Latin American countries and the rest of the world. This collaboration has been a success so far and there are many more projects to come that will help to encourage cooperation between investigators in order to increase the quantity and excellence of research made in Chile and Latin America.

Participants′ Abstracts

Classification of Enzymes According to Similarities in Reaction Mechanism

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Enzymes are proteins whose role is to catalyze chemical reactions. They are the most abundant proteins and the most studied of the biological molecules. Up to now enzymes have been commonly classified by using measures of similarity in their sequence and structure, and by the reactions that they catalyze. Current methods for classification of enzymes are generally not capable of showing a clear relationship between structure and function that could be used for prediction of function of newly sequenced enzymes or used for engineering enzymes with new functions.

Recently, we developed a method that measures similarity of enzymes based upon the explicit mechanism of the reactions they catalyze [1]. This opened a new avenue for classification. We are currently using measurements of mechanism similarity to study the reactions catalyzed by homologous enzymes (products of evolutionarily related genes) present in our Structure Function Linkage Database (SFLD) [2], and on functionally analogous enzymes (products of unrelated genes but that perform similar functions) from the MACiE database [3]. We are particularly interested in contrasting the results of clustering of enzymes obtained by the traditional approaches of sequence, structure and function with our method based on mechanism similarity.

Our results quantitatively show that homologous enzymes can catalyze very diverse reactions, but the similarity among their mechanisms of catalysis is always high. Our results also indicate that divergence of sequence does not necessarily imply divergence of reaction mechanism. Conversely, not all members of the same homologous group use the same mechanism to perform catalysis. This implies that the relationship between sequence/structure and function is yet more complicated than previously envisaged for homologous enzymes. On the other hand, we have found that as much as one third of functionally analogous enzymes, despite being the product of non-related genes, share high similarity of chemical mechanism.

To provide access to the tools we have developed to classify enzymes according to similarities of mechanisms, we are currently creating a web server to search for mechanism similarities among enzymes. We envisage that the web server will be helpful for validating and predicting reactions and mechanisms of enzymes and to help guide engineering of enzyme functions by identifying enzyme templates capable of catalyzing the key mechanistic aspects of a function.

1. O Boyle NM J Mol Biol 368 1484-1499 (2007)
2. Pegg SC-H Biochemistry 45 2545-2555 (2006)
3. Holliday GL Nucleic Acids Res 35 515-520 (2007)

Plant ecology and distribution of ephemeral wetlands in Chile: state of the art

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Ephemeral wetlands (also called seasonal wetlands) are ecosystems, where dry periods alternate with flooding ones. This fluctuation between two extreme unfavourable conditions promotes the evolution of specialized plant species. Since ephemeral wetlands (EW) are scarcely researched in Chile and little is known about its ecology, distribution and degree of endangering, this ecosystem type is still not protected by national conservation laws. The aim of this presentation is to show the state of the art in the study about Chilean EW based on published and own works.

In total there are only 9 publications about EW in Chile. All of them are restricted to the study of the flora and vegetation, other organisms than vascular plants are not studied. EW have presumably a broad distribution in Chile, principally in the Mediterranean climate range and its transition to the temperate range, however detailed researches are concentrated around the 40° S. The vegetation of Chilean EW presents some floristic affinities with Californian vernal pools determined through geographical vicariance (e. g. in the genera Navarretia and Lasthenia). Areal disjunctions are also presented between Chile and the region around the Parana-mouth (Juncus pallescens, Hydrocotyle cryptocarpa). EW specialists include both high endemics (Blennosperma chilense, Lasthenia kunthii) as well as cosmopolites (Juncus bufonius, Anagallis minima).

The lack of knowledge about EW both in the scientific community as well as in the public opinion makes it difficult to protect these ecosystems that are naturally fragmented and rare. Future researches should be concentrated on the determination of the whole distribution of EW in Chile and their protection status at the species and community level, and on a better understanding about the ecology and phylogeny of EW organisms.

Bicarbonate-transporter gen regulation by the combination of bile acids and glucocorticoids in human liver cells

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Background and aims. High daily doses of ursodeoxycholic acid (UDCA) is the treatment of choice in primary biliary cirrhosis (PBC), a chronic cholestatic disease associated with autoimmunity and with alterations in both the biliary bicarbonate excretion and liver expression of the bicarbonate carrier in the hepatobiliary tract AE2. There is, however, a subset of PBC patients with a poor response to UDCA monotherapy, and combination of UDCA with glucocorticoids seems beneficial in those cases. Here we investigate whether UDCA, alone or in combination with glucocorticoids, could have an effect on AE2 gene expression in human liver and analyze the possible mechanisms involved.

Methods. We used human liver cells from hepatocyte and cholangiocyte lineages and treated them with dexamethasone and/or UDCA (as well as with other bile acids). We analyzed the effects of these compounds on: i) the transcriptional expression of AE2 isoforms by measuring the mRNA levels through qPCR; ii) the AE2 activity by microfluorimetry; iii) the AE2 alternate promoter activity by luciferase-reporter gene assays; and iv) transcriptional factor interactions on AE2 promoter sequences using chromatin immunoprecipitation (ChIP) assays.

Results. The combination of UDCA and dexamethasone, but not UDCA or dexamethasone alone, increased the expression of liver-enriched alternative mRNA isoforms AE2b1 and AE2b2, with no changes in the expression of the complete AE2a isoform. Increased alternative expression correlated with enhanced AE2 activity. The observed combination effects remained after replacing UDCA with its taurine and glycine conjugates -but not with cholic or chenodeoxycholic acids. In vitro and in vivo luciferase-reporter gene assays showed that UDCA+dexamethasone combination upregulates human AE2 alternate overlapping promoter sequences. ChIP assays indicated the role of HNF1 and GREcore elements in this upregulation, which involves UDCA/dexamethasone combination-dependent interactions between GR and HNF1 isoforms, most probably through p300.

Conclusions. These findings indicate that the combination of UDCA and dexamethasone improves the AE2-mediated chloride/bicarbonate exchange through upregulation of AE2 alternate promoter. The observed effects are specific for hydrophilic bile acids. Thus, our data provide a potential molecular explanation for the beneficial effects of the combination of UDCA and glucocorticoids in PBC patients with inadequate response to UDCA monotherapy.

1. Arenas, F. J. Clin. Invest. 118 695-709 (2008)

Neuregulin signalling promotes microglial proliferation and survival contributing to the development of neuropathic pain

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Following peripheral nerve injury, microglia in the spinal cord increase in number and become activated releasing a variety of chemical mediators which enhance pain transmission leading to a hypersensitive state (Watkins et al 2001). In situations where the blood brain barrier is intact the principal means by which microglial numbers increase is via the proliferation of resident microglia (Ajami et al 2007) however there is limited knowledge regarding the proliferative and survival factors mediating this response. In this study we show that NRG signalling via its ErbB2 receptor promotes proliferation and microglia survival in vitro (without causing direct activation). The spinal nerve ligation (SNL) model results in a robust microgliosis within the dorsal horn of the spinal cord contributing to the generation of neuropathic pain. Such microgliosis was associated with an increased expression of phospho-erbB2 specifically within microglia. Blockade of the erbB2 receptor in this model inhibited the proliferation, activation and expression of phospho-P38 by microglia. Furthermore consequent on such changes the mechanical pain related hypersensitivity was reduced. NRG1-erbB signalling therefore represents a novel pathway regulating microglial function which is likely to have wide relevance in the response to injury and which may also be subject to therapeutic intervention.

Neural networks for visual motion perception

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My Ph.D. subject is about the understanding and modeling of how the human brain performs specific tasks, such as the motion perception and the recognition of motion patterns (to walk, to jump, to run, etc.). We remain as close as possible to biology taking our inspiration from it, but considering simulations and robots as testing platforms. We take into account also FPGA board's constraints (2). The kind of models we use are recursive neural networks.

The work of my thesis is part of the Computational Neuroscience group "Cortex" at the INRIA-Loria laboratory (France). As first results we have already showed how relatively simple networks can perform motion detection and to solve problems such as the aperture (1). We are currently studying foveated vision and the integration of other features such as color and orientations, in order to achieve more robust and precise pattern recognition, as the overall goal of my thesis.

1. Mauricio Cerda ESANN proceedings 505 (2008)

2. Hugo Barron-Zambrano RECONFIG proceedings 100 (2008)

Los Paradigmas Cientificos. Un Acceso Cualitativo a los Procesos de Construccion y De-construccion de la Realidad.

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Desde una perspectiva etica toda ciencia se encuentra involucrada en el devenir del ser humano, por lo tanto, un objetivo implicito de esta, es aportar al bienestar de la humanidad. Esto no siempre se cumple, en tanto que la produccion cientifica se encuentra tensionada, por nociones de verdad que operan en determinados momentos historicos y/o por grupos que se imponen desde el poder, construyendo una determinada forma de observar la realidad.

En las ciencias sociales, donde el laboratorio es lo social, se manifiestan tambien estas tensiones, generando como resultado diferentes visiones o miradas, determinadas por paradigmas historicos-temporales que afectan al conjunto de los actores sociales. En el presente trabajo vamos a analizar el tema indigena a la luz de los diferentes paradigmas, bajo los cuales occidente ha observado a estas sociedades.

Functional characterization of thymic epithelial progenitor cells

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The thymus is one of the primary lymphoid organs and plays a central role in the immune system. It provides the essential microenvironment for proper T cell development. In the thymus, the maturation of T cells depends on several physical and functional interactions between the T cells and different stromal cell types. The stroma is mainly composed of epithelial cells (TECs) and it has been described that one single bi-potent precursor cell is necessary to give rise to the cortex and medullary areas of the thymus after birth. This single precursor is capable of creating a functional thymic environment that supports normal thymopoiesis. The Foxn1 is a helix/forkhead transcription factor which is crucially required for proper epithelial cell differentiation and organization inside the thymus.
Conditional targeted cell ablation is a powerful method to elucidate the physiological function of cell populations and their regenerative capabilities. We are using three different methods of conditional targeted cell ablation in order to elucidate the functional characteristics of this epithelial bi-potent progenitor cell.

Nucleophilicity and Electrophilicity of Silylenes from a MEP and Dual Descriptor Perspective

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Nucleophilicity and elecrophilicity of mono and disubstituted silylenes are analyzed using the molecular electrostatic potential and the dual descriptor $\Delta f(r)$, defined within the so-called conceptual DFT. A set of 32 compounds has been chosen which can be classified into 4 groups or families based on a linear relationship between the molecular electrostatic potential measured in the electrophilic (empty 3pz orbital) VA and nucleophilic (lone pair) Vmin regions around of the silicon atom. The electrophilic and nucleophilic character of silylenes given by VA-Vmin is connected to the orbital resolved Dual descriptor $\Delta f3pz$ through the π-electron donating property of the substituent.

Empirical evidence of bias in the design of experimental stroke studies: a metaepidemiologic approach

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Background and Purpose- At least part of the failure in the transition from experimental to clinical studies in stroke has been attributed to the imprecision introduced by problems in the design of experimental stroke studies. Using a metaepidemiologic approach, we addressed the effect of randomization, blinding, and use of comorbid animals on the estimate of how effectively therapeutic interventions reduce infarct size.

Methods: Electronic and manual searches were performed to identify meta-analyses that described interventions in experimental stroke. For each meta-analysis thus identified, a reanalysis was conducted to estimate the impact of various quality items on the estimate of efficacy, and these estimates were combined in a meta-meta-analysis to obtain a summary measure of the impact of the various design characteristics.

Results: Thirteen meta-analyses that described outcomes in 15 635 animals were included. Studies that included unblinded induction of ischemia reported effect sizes 13.1% (95% CI, 26.4% to 0.2%) greater than studies that included blinding, and studies that included healthy animals instead of animals with comorbidities overstated the effect size by 11.5% (95% CI, 21.2% to 1.8%). No significant effect was found for randomization, blinded outcome assessment, or high aggregate CAMARADES quality score.

Conclusions: We provide empirical evidence of bias in the design of studies, with studies that included unblinded induction of ischemia or healthy animals overestimating the effectiveness of the intervention. This bias could account for the failure in the transition from bench to bedside of stroke therapies.

Characterization of immune responses in SJL/J mice experimentally infected with Theiler´s murine encephalomyelitis virus

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Theiler's murine encephalomyelitis (TME) is a chronic inflammatory demyelinating disease, induced in SJL/J mice via intracerebral injection of the BeAn strain of Theiler's encephalomyelitis virus (TMEV). TME shares many clinical and pathological features, as well as immunological aspects, with multiple sclerosis and canine distemper and therefore serves as a viral model for animal and human demyelinating diseases. The aim of the present study is to detect molecules, as well as genes and pathways, involved in peripheral lymphoid organs and central nervous system immune responses and immunoregulation, associated with the induction and progression of this disease. Several techniques have been used in this research, such as RNA isolation and DNA microarrays for gene expression profiling. Also, immunophenotyping analyses have been performed to detect multiple molecules involved in the immune response and apoptosis. As well, histology assessments of diverse tissues have been performed. Organs investigated in the central nervous system are brain and spinal cord; at the peripheral lymphoid organs level are cervical lymph nodes and spleen. This study seeks to demonstrate for the first time several significantly changed genes following TMEV infection by gene expression profiling. Analyses including immunohistochemical examinations will provide a more comprehensive understanding of the prevailing processes in this viral model for demyelinating diseases.

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Integrated Microfluidic Real-Time NASBA Systems for Molecular Diagnostics

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Enzymatic in-vitro amplification of nucleic acids has revolutionised life science research and spurred numerous advances in biotechnology and many other disciplines. Nucleic-acid amplification methods and DNA sequence technology have permitted the exact identification of pathogens that otherwise were not possibly to identify with traditional laboratory techniques such as culture enrichment and plating. Other advantages include the exact quantification of target pathogens and the real-time detection of amplified products. Despite this, conventional detection assays based on nucleic-acid amplification provide at best only an order of magnitude more sensitivity than other conventional methods. In addition, manual handling and frequent transfer of liquids can add additional sources of contamination to the analysis.

Microfluidic lab-on-a-chip promises to integrate entire analytical clinical process steps on a monolithic platform. Compared to conventional laboratory methods, integrated microfluidic platforms offer potential advantages of lower cost, higher speed, smaller sample and reagent volumes, and automation of all processes from sample preparation to analytical result: the "sample to answer" concept. For some experiments, however, the most important consequences of successfully implementing microfluidic lab-on-a-chip will be enhanced assay reproducibility and more quantitative results relative to classical analytical procedures.

We review the microfluidic integration of RNA purification and real-time Nucleic Acid Sequence-Based Amplification (NASBA) and discuss its challenges and advantages. Compared to conventional laboratory analysis, these integrated systems will enable molecular diagnostics for bacteria, viruses, cancer markers, or point of care clinical applications with lower cost, less contamination, and smaller sample volume.

Solar Energy, Bifacial Solar Cells

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One of the missions of science is to assist people in solving their problems and to help making their life more comfortable.

In general answers emerge when problems develop. The foreseeable end of the fossil fuel era and its implication of all its environmental problems is a particularly relevant example. One of the problems afflicting modern society is the supply of abundant, clean cheap energy. This is also a current problem in Chile. We have reached a point where there are no more viable solutions, other than renewable energies.

Chile has a tremendous natural potential for windpower, geothermal, biomass, hydroelectric power and solar energy. Unfortunately it lacks the technology and the necessary infrastructure, in particular as far as harvesting solar energy is concerned.

In basic terms, solar radiation is converted into electrical power using semiconductor devices, called solar cells (or photovoltaic cells). These cells are clustered in panels or solar modules, which perform the function of collecting sunlight and transforming it into a potential difference, which in turn generates electric currents in an electrical load. Where alternating current is needed, it must be converted from DC into AC via an inverter. This electrical power can be directly used in homes or factories or can be fed into the electrical grid or stored.

Specifically, in my PhD work, I am working on the improvement of the efficiency of bifacial solar cells. They allow light to be converted into electricity on both sides of a solar cell. This is a particularly useful cell in regions with a high diffuse part of solar light or a strong reflection, e.g. from the ground of deserts or reflecting facade of walls. This can increase the efficiency of solar cells by a few %. It is therefore an ideal solution in the north of our country (Atacama Desert) due to its climatic and optical conditions.

My scientific work is predominantly of experimental nature, demanding however, crucial knowledge of basic physics, in particular semiconductor physics. But there are also theoretical and social problems involved. The latter implies to make society understand the importance and benefits of long-term projects and investments of their tax-payer money. There is no doubt that it will become an important component of the alternative energy matrix in our country.

Improvement of Melanoma Cell transfection efficiency using Plasmid DNA encoding for IL-12 coupled to Goldnanoparticles

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Gray horses spontaneously develop melanomas which frequently become metastatic. To date no feasible therapies exist for equine melanoma. Different therapies have been tried but with limited success. Immunotherapeutic approaches present alternative strategies for the treatment of metastatic melanoma. Plasmid DNA encoding for interleukin 12 (IL-12) has shown to be effective in various tumor models.

Heinzerling et al. (2001) showed that the injection of human IL-12 encoding plasmid DNA into existing melanoma tumor nodules of gray horses induced significant tumor reduction in all treated melanoma metastases and complete disappearance of the tumor in one of the 12 patients after a single cycle of IL-12DNA treatment.

Synthetic DNA delivery systems provide a logical vehicle for gene therapy and have overcome the limitations of viral DNA vectors, but suffer from less efficiency. Goldnanoparticles (GNP) are attractive candidates for gene delivery. They allow tuning of the charge and hydrophobicity to maximize transfection efficiency while minimizing toxicity, bind plasmid DNA through electrostatic interactions and protect DNA from enzymatic digestion (Gosh et al., 2008).

In order to improve the transfection efficiency and develop a useful therapy against equine melanoma, this study aims to create a new DNA delivery system, able to carry GNP and DNA encoding for equine IL12.

1. Heinzerling J Mol Med 78 692-702 (2001)

2. Gosh Advanced Drug Delivery Reviews 60 1307-1315 (2008)

Tissue Engineering and Regeneration

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Clinical success in tissue regeneration requires improvements in vascularization capacity of scaffolds. Several efforts have been made in this field including cellular and acellular technologies. In order to enhance regeneration of tissues, in our lab, we combine different cell populations and scaffolds to enhance angiogenesis and vasculogenesis. Our research is mainly about the use of stem cells technologies, development of new biomaterials, and the role of aging in wound healing and tissue regeneration. We are focused in the development of new skin substitutes to treat severe injured patients and non healing wounds. Basic, preclinical and clinical studies are currently being performed in our lab.

Silicon Solar Cells with Selective Emitter

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In the field of silicon solar cells, structures are commonly formed by a p-n junction, which means that silicon, from group IV of the periodic table, is doped with impurities from the group V of the periodic table to obtain an n-type layer, starting from a p-doped wafer containing impurities that belong to the group III. In order to improve the performance of solar cells, it is needed to reduce losses. These are optical and electrical. If electrical losses are to be reduced, then there are two aspects to be considered: Recombination and Ohmic effects. The difficulty is, while reducing the Ohmic effect by high doping, the losses from recombination increase and vice versa.

The problem can be solved by the development of a new structure for the emitter, called "Selective Emitter", which is to perform a higher doping level under metal contact to reduce resistance between metal and semiconductor and thus ohm effect, and a lower doping level to reduce recombination losses. This structure finds an optimum and constitutes compromise between the two mentioned aspects. At the end, it allows achieving a higher generated current, a higher open circuit voltage, lower ohm effect and a higher efficiency.

The project is been developed at the ISC-Konstanz, an independent non-profit organisation, in part publicly funded to perform research focused on Crystalline Silicon Photovoltaics. The supervision of this PHD work and research is done by Mr. Prof. Emeritus Ernst Bucher from University of Konstanz, who also gives scientific support to the ISC.

Noise and sound quality in electrical machines

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In this work the noise and vibration behavior produced by electrical drives is studied.

First the results of a series of measurement of the structure vibration of an electrical drive (in this case a switched reluctance machine) is presented. Thereafter some new methods for measuring the vibration and noise radiation characterization are developed and presented. The measurements are done in a static (motor is on, but not turning) and dynamic (motor is driven normally) condition. The vibration on the machine surface is measured with a laser scanning vibrometer and with a 19-microphones array to measure the 3D noise radiation, which is called directivity. Also some numerical simulation techniques, such as finite element method (FEM) and boundary element method (BEM), are presented. This helps to characterise the vibrations generated by machine before it is constructed.

The second part deals with sound quality and psychoacoustics. Measurements of machine noise as well as synthesized sounds are used to test some psychoacoustic parameters such as tonalness, loudness, annoyance, consonance/dissonance. Afterwards, tests are done where listeners have to evaluate several sound samples presented via headphones. The results of the tests can help design engineers to recognize which aspects of the sound of some product (e.g. vacuum cleaner, motor of a car, etc.) are important for some specific product or applications.

Keywords: acoustics, psychoacoustics, noise, vibration, electrical drives, switched reluctance machine.

(Preliminar abstract of PhD thesis. No oral presentation).

Conotoxin production in the plant chloroplast

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Conotoxins are produced by the Cone Snails to hunt their prey (fishes or other mollusks). They are produced in the venom of these cones and are very potent neurotoxins also bioactive in the human system. These toxins are small proteins, around 10-30 amino acids, and have a particular structure with multiples disulfide bonds. The function of these toxins is related with the modulation of ion channels, so far they had been organized in five different subclasses according with the target and the activity of them (inhibition of ion channels).

The high specificity of them has been the basis for their use as drugs candidates in pharmacology. In the last few years, several conotoxins has been chemically made buy different companies and they are been tested in clinical trials as pain relief compounds. One example is PrialtR, produced by Elan, and this product is already accepted to by commercialize in the US. The multiples disulfides bond, and some post-translational modifications had made the production (chemical synthesis) very expensive. They are some data of successful production of conotoxins in E.Coli, and knowing the similar characteristic of bacteria and chloroplast, we decide to use tobacco plants as a platform to produce conotoxin. The idea is to clone these toxins into transformation vectors able to recombine with the chloroplast genome, and under the control of a strong promoter to have a high production of conotoxin in tobacco leaves. After this step is also necessary to test the efficiency of purification, the final produced protein in the plant and the specificity of it under the ion channel target.

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Pattern-based Service Architecture Design for Enterprise Application Integration

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Context:

Software applications are built or acquired to provide specialised functionality required to support business processes. If new activities and applications are created and integrated into existing processes and infrastructures, new requirements need to be satisfied. Enterprise Application Integration (EAI) aims to link separate applications into an integrated system driven by business processes.

Service-Oriented Architecture (SOA) has been recognised as an approach to solve the EAI problem. Software services are the building blocks of SOA. Services are reusable software that can be described, advertised in a public repository, used by different consumers, and composed to provide more complex functionality and to automate business processes. Architecture and process patterns are model abstractions that capture previously proven design solutions. Instantiation of patterns allows the reuse of successfully applied designs, thus improving the quality of software.

Problem:

During recent years, techniques and tool support for service architecture design have increasingly matured. However, service identification and architecture change management are still mainly manual and costly activities. Recent efforts to support automation are in their beginnings. Some of the main issues requiring efforts are related with the definition of the scope and granularity of software services, and mechanisms to manage and analyse the impact of changes from process models and application architectures generates on service architecture solutions.

Contribution:

- An architectural framework consistent of four main layers involving relevant models for EAI. A traceability model maintains the relations between elements from different layers. A mechanism to monitor and propagate changes on models support the identification of changes on patterns. Patterns are related with non functional properties of architectures and subsequently to quality attributes.

- Process patterns are used to define the granularity and scope of software services over process models. Process patterns and process models are defined as directed, typed, labelled graphs. A family of graph pattern matching and discovery pattern algorithms is provided. Graph pattern matching algorithms incorporates inexact and partial pattern matching; hierarchical pattern matching; and matching of generalized patterns by means of ontology support - a simple implementation involves a taxonomy of domain specific terms.

Numerical Simulation of Drying Wood Populus Tremuloides

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A simulation macroscopic of drying wood Populus Tremuloides is submitted. The numerical simulation is two-dimensional type diffusive in where is considered the water potential as the force that induces the migration of moisture inside the porous media during the drying process. For the integration the mathematical model partial differential nonlinear second order is used CVFEM (Control Volume Finite Element Method). The numerical results obtained are validated indiscriminately by comparison with analytical results and experimental. Analyzes of consistency and convergence are shown for various meshes types, steps toward integration and methods of solution in linear systems. Finally, displayed in detail, results of application to the drying process of wood expressed in various configurations of transitional moisture content and curves of drying.

Epithelial plasticity of primary cultured hepatocytes: implications for in vitro studies of liver damage.

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Cultured primary hepatocytes represent a well accepted in vitro system for studies of drug metabolism and enzyme inducing properties of pharmaceuticals and testing cytokines and small molecules to support liver regeneration and block formation of liver fibrosis. However, signal transduction in cultured hepatocytes differs from signaling in the liver in vivo. The mechanisms responsible for differences in vivo and in vitro are not fully understood, hampering progress in developing assays to understand molecular details of diseases, and the proper pharmaceutical treatment. My research addressed the state of signaling pathways and gene expression networks in hepatocytes cultured by two culture systems, namely on dishes coated with dried collagen or between two layers of collagen gel ("collagen sandwich"). My investigations have shown that both culture systems represent completely different cell states concerning the activity of the signaling networks, translating into different responses to cytokines like TGF-β, a master cytokine in proliferation control and in chronic diseases such as liver fibrosis. In dried collagen systems, hepatocytes dedifferentiate into a fibroblastoid phenotype, loosing metabolic functions and polarity, and showing proliferative and regenerative gene expression profiles. These changes were activated by signaling complexes, in particular FAK/Src, Akt and ERK1/2. Akt caused resistance to TGF-β-induced apoptosis, and ERK1/2 led to dedifferentiation, know as epithelial to mesenchymal transition (EMT). In contrast, collagen gel did not activate FAK, keeping hepatocytes in a differentiated stated and sensitive to TGF-β-induced apoptosis. In this system, inhibition of p38 and expression of active Akt caused apoptosis resistance, whereas active Ras mediated EMT. Most remarkably, matrix-induced EMT was reverted by re-plating the cells from stiff dried collagen to collagen sandwich, demonstrating that hepatocyte dedifferentiation in vitro is a reversible active process, leading to similar morphological and functional alterations as observed for regenerating hepatocytes in vivo. My ongoing research is aimed to compare the regenerative and malignant responses in vivo to the changes observed in vitro using these two culture systems. The implications of my research will allow a better understanding of primary cell culture behavior and aid to the development of improved in vitro systems to study complex pathological conditions.

Exploratory analysis of the rainfalls in Valdivia zone south of Chile.

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The present work describes the different cycles and trends of the rainfall in the Valdivia zone over the last century (39° 49' 27" S, XIV region of Chile). The instrumental information was gathered and compiled in the Geosciences Institute of the Universidad Austral de Chile. To understand the stochastic nature of diverse climate phenomena like rainfall, we used a homogenization test (SNHT) and diverse spectral analysis (FFT, Wavelet). The annual time series display cycles of 2-7 and 8-14 years and these cycles are repeated every 80 years. Besides, the autumn season present a cycle of ≈22 years. The year seasons and the annual period have a strong decreasing trend, mostly in summer and autumn. These described cycles and trends have been linked with several phase or out-of-phase periods in a long-time scale (hundreds or thousands of years) and related with global interaction processes (ENSO, AAO) present in this geographic zone. Keywords: Valdivia, SNHT, FFT, Wavelet, ENSO, AAO.

Characterization of *Pseudomonas nitroreducens* MHP41, simazine-degrading bacterium from Chilean agricultural soil

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Herbicides are used in agriculture and forestry in many regions of the world. Chlorinated s-triazine herbicides, such as simazine and atrazine are released in cultivation fields for weed control. The pollution of the environment with s-triazines is of enhanced concern due to their toxicity and wide distribution in soil as well as in aquatic systems. In bacteria, the biodegradation of s-triazine herbicides involves a series of hydrolytic reactions catalyzed by amidohydrolases. The atzA, atzB, atzC, atzD, atzE and atzF genes encode the enzymes for the mineralization of s-triazines. These atz genes are plasmid borne in Pseudomonas sp. strain ADP and several other bacteria and are highly conserved in Gram-negative and Gram-positive s-triazine degraders. For the removal of s-triazines from the environment, efficient bioremediation processes have been established. Our research has been focus in the biological characterization of Pseudomonas nitroreducens MHP41, a native strain isolated from Chilean agricultural soil. This novel s-triazine-degrading bacterium efficiently degrades simazine, is capable of growing fast using simazine as the sole nitrogen source and reaches high biomass. Pseudomonas sp. MHP41 possesses all atz genes of the upper and lower catabolic pathways for simazine degradation, and are located in their plasmid as well as in their chromosome, being this bacterium an interesting microorganisms for studies on the bioremediation of s-triazine contaminated soils. Acknowledgements: Millennium Nucleus EMBA-P04/007-F, USM-130522 and CONICYT fellowships.

Mechanistic investigation of SNARE-mediated fusion of large liposomes

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Soluble N-ethylmaleimide-sensitive factor attachment receptor proteins (SNAREs) belong to a protein family that are essential for membrane bilayer fusion in a wide range of physiological processes, including neuronal exocytosis. The characterization and development of the reconstitution of SNAREs onto large artificial liposomes constitutes the first step in the mechanistic investigation of SNARE-mediated membrane fusion in vitro. The generation of large unilamellar and monodisperse SNARE-liposomes with high incorporation efficiency and right-side out orientation are very desirable properties for fusion studies, mainly due to their lower curvature stress and their significantly greater loading capacity. We used a method established by Rigaud and co-workers as a starting point for the reconstitution. First, protein-free liposomes of defined size are generated by standard techniques involving reverse phase evaporation followed by extrusion through filters of defined pore size. Second, the liposomes are then incubated with detergent (above the CMC), and a micellar solution of protein is added, followed by prolonged dialysis to remove the detergent. At a certain detergent-to-lipid ratio, spontaneous insertion of SNAREs into the membranes is observed. We have characterized incorporation efficiency and orientation of two different types of neuronal SNAREs using standard biochemical techniques, as well as the final SNARE-liposome size distributions using field-flow-fractionation coupled to multi-angle laser light scattering (FFF-MALLS). A systematic approach was undertaken to evaluate how these parameters were affected by detergent-to-lipid ratio, protein-to-lipid ratio, lipid composition, type of detergent, type of SNARE, size distribution of template (protein-free) liposomes, and the size of the dialysis molecular weight cut-off used during the last detergent removal step. The characterization allowed us to find conditions that gave relatively monodisperse SNARE-liposomes (80-100 nm) with good incorporation efficiency and orientation with minimal lipid loss (< 5%).

The next phase involved the functional characterization of the large SNARE-liposomes by measuring physical parameters that are indicators of SNARE-induced fusion. So far lipid mixing properties and changes in size distributions have been studied, and the general finding is that the SNARE-liposomes undergo SNARE-specific lipid mixing with a corresponding increase in size. Furthermore, the higher the SNARE density on the liposomes, the greater the extent of both lipid mixing and the size increase. This correlation provides further support that these two fusion-related indicators are indeed SNARE-dependent. Finally, we have gathered biochemical data suggesting the existence of a metasable pre-fusion state where the SNARE machinery is believed to undergo changes that drive liposomes from a docked state to full fusion. The presence of this state is further supported by electron miscroscopy.

The ECAISA Pilot Project. Towards the establishment of an Animal Census in the Eastern Cape, South Africa

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The Eastern Cape Province of South Africa is in an urgent need for an animal census. This to improve farmers support programs, vaccination campaigns and state veterinary services. To do so the Eastern Cape Animal Information System (ECAISA) was created.

This project has as its main objective to define the strategies needed to determine the animal population in this region, aggregated mainly in five animal groups. These animal groups are commercial, communal, villages, game and wildlife. For each animal population, field strategies, questionnaires and pilot exercises are being designed and implemented to test all the aspects related to an animal census exercise. Additionally costs, resources, personnel, equipment and time requirements are being recorded as a test for the main census exercise.

This project is expected to be complete by mid 2010 and will provide useful experience to the State Veterinary Services of the Eastern Cape for the implementation of their animal census to be done in the following years.

Dynamic Materials for Tissue Regeneration

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In the field of tissue engineering and regeneration therapies, traditional cell culture strategies have been conceived with the purpose to reproduce *in vitro* the *in vivo* cell micro-architecture, considering the generation and maintaining of a stable surrounding along the culture time. Nevertheless, this approach seems to be not the most adequate to generate *in vitro* platforms for tissue engineering, due to the lack of *dynamism*, which is a characteristic of the *in vivo* regeneration processes.

With the improvement of the nanotechnology and development of new methods for surfaces micro-fabrication, the generation of non-stable surroundings for cell culture becomes every day more importance. These environments are characterized not only for presenting similar composition and organization to the extracellular matrix, but also to change their properties with time, cell activity or due to the modulation of the microenvironmental conditions by the researchers, improving the communication between the entrapped cells and the biomaterial. These types of supports, denominated as *Dynamic Materials*, represents the new generation of plattform for tissue engineering.

Material research in emerging non-volatile memory concepts

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I am a senior researcher in the Memory Division of the Process Technology Department, Interuniversitary Microelectronic Center (IMEC) since October 2000. IMEC is Europe's largest independent research center in nano-electronics and nano-technology. My main research topic is the material research related to device integration in the current semiconductor technology (CMOS) of emerging non-volatile memory concepts. The memory concepts under investigations are those based on ferroelectric (FeRAM), phase change (PCRAM) and resistive switching (ReRAM) behaviors. These phenomena are potential candidates to be used in non-volatile memories devices in scale lengths where Flash memory can not compete. I also investigate the thermo-mechanical stability of metals involved in CMOS device fabrication.

1. D. J. Wouters J. Appl. Phys. 100 051603 (2006)
2. J. G. Lisoni J. Appl. Phys. 101 14908-1-7 (2007)
3. J. G. Lisoni MRS Symp Proc 997 0997-12-06 (2007)
4. L. Courtade Thin Solid Films 516 4083 (2008)
5. L. Goux Electrochemical and Solid-State Letters 11 245 (2008)

Intradermal electroporation with a survivin DNA vaccine breaks tolerance and protects against a mouse melanoma model

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Cancer immunotherapy aims to stimulate the immune system to specifically eliminate tumor cells and represents a promising alternative or complement to conventional cancer treatments. Cytotoxic CD8+ T lymphocytes (CTL) are key effector cells of the immune system and play a major role in the recognition and killing of tumor cells. DNA vaccination is an attractive antigen-specific immunotherapeutic strategy able to induce in vivo anti cancer CTL responses. Despite high efficacy in preclinical models, naked DNA vaccines need to be improved in order to overcome the low efficacy which so far has been achieved in the clinic. DNA vaccination through the skin is an attractive approach for clinical applications as skin is easily accessible and has a high number of antigen presenting cells, e.g. Langerhans cells. In vivo electroporation allows efficient DNA uptake rendering long-term and high-level antigen expression as well as the induction of several cytokines and chemokines therefore increasing the efficacy of DNA vaccines. Survivin, the smallest member of inhibitor of apoptosis protein family, is an intracellular tumor-associated antigen (TAA) broadly expressed in a large variety of tumors but generally absent in adult cells of the same tissue. Therefore, survivin represents a broadly expressed, tumor-specific target for cancer immunotherapy. The aim of this study was to evaluate the efficacy of intradermal electroporation using a human survivin encoding DNA vaccine in inducing CTL responses and long-term tumor protection. Here, we defined a CD8+ T cell epitope based on in silico epitope prediction and the ability to bind MHC class I molecules. We show that intradermal DNA electroporation of mice with a human survivin encoding plasmid generates strong cellular responses measured by ex vivo intracellular IFN-gamma staining in peripheral CD8+ T lymphocytes. This response was directed against human as well as mouse derived CD8+ T cell epitopes indicating that self-tolerance has been broken. Survivin-specific CTLs showed lytic activity as determined by CD107 up-regulation and in vivo cytotoxicity assay. This response was able to protect C57BL/6 mice against highly aggressive syngeneic B16 melanoma cells in a prophylactic as well as therapeutic tumor challenges. The results presented here demonstrate that intradermal electroporation with a survivin DNA vaccine efficiently generates CTL responses and is a promising strategy to protect from and treat tumors.

Massing Study Support. A new tool for Early Stages of Architectural Design

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Since Hugh Ferris in 1922 started with a series of massing studies the visualization of zoning planning began to be a topic for architects. Land area, built area,plot rate, average building height, and other important attributes must be handled by the architect to fulfill the law, the needs of the clients and his own inspiration. This paper presents the problem of design of envelops for high-rise isolated housing buildings. It presents a new Decision Support Systems tool based on the platform of a BIM software, that allows to simulate several options for building envelopes according to the parameters required by the city Zoning Planning. These options deliver reliable data and geometry, to be analyzed in real time for the architects, engineers, builders, government and the client in the early stages of the building's design.

Previous to the design of high-rise housing buildings, the architects must design a theoretical volume as a visual reference of the "default" Zoning Planning and Building Code applied on the plot, and then they can design a different volume that fulfills the more "specific" Building Codes, but also satisfies their own practice and the needs of the clients. To find the optimum volume, that satisfies all these variables in a reasonable time, is a complex task.

The phenomenon observed is the "variety of possible shapes and sizes for the building envelops v/s one theoretical volume in a plot". Several variables have been detected, related to the client needs (space program); the zoning planning regulations (urban codes) and the architectural practices. In this paper we present a solution for Space Program and Urban Codes.

The current research contributes with a new approach because it analyzes the building from a normative point of view (Lobos, 2006), but also including the variables of the client and the architect. Whose have an influence on the final shape and size of the building envelop.

This process of the early and schematic definition of the shape and size of the building is included in the Urban Regulations different of countries and it is well-known as "massing study", "maximum building bulk" or "theoretical volume" that is a tridimensional volume, similar to a paralepipedo (polyhedron of six faces) with additions or subtractions according to the application of different urban codes. This operation has to be done as a part of the folder for the Government Building Permission.

Is Drosophila CenH3 sufficient for kinetochore formation?

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The centromere specific histone H3 like protein CenH3 (CID in Drosophila) serves as a structural and functional foundation for kinetochore formation and centromere function. It constitutes the most upstream component of the kinetochore and it is able to recruit other inner and outer kinetochore proteins. We have previously shown that CID overexpression results in its incorporation into normally non-centromeric regions in both Drosophila tissue culture cells and the animal, leading to a variety of mitotic defects and cell and organismal lethality. Notably, outer kinetochore proteins and microtubule attachments are mislocalized only to a small subset of sites of ectopic CID incorporation, raising the question whether CID presence is sufficient for the establishment of a functional kinetochore. To adress this question we are establishing a system to target CID to specific non-centromeric sequences and follow the eventual formation of a functional ectopic kinetochore. CID has been fused to the Lac-repressor protein (LacI) and introduced into a stable S2 cell line harboring Lac operator (LacOp) sequences integrated in tandem in the genome. Preliminary data suggests that CID-LacI fusions can bind LacOp sequences and that cells experience segregation defects in mitosis.

One day after the induction of a CID-GFP-LacI fusion protein an ectopic kinetochore in the LacOp site of integration is already detectable, which can recruit outer and inner kinetochore components. Furthermore, endogenous CID can also be recruited to LacOp sites, and seems to be able to spread from the LacOp sequence into adjacent chromatin, suggesting a self-propagation of the epigenetic mark.

New Insights into the Mechanisms of Accelerated Wound Healing Following Connexin43 Downregulation

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While targeting the expression of the gap junction protein Cx43 accelerates skin wound repair, the mechanisms triggering accelerated healing remain elusive. Here we demonstrate that silencing Cx43 contributes to the healing process by significantly accelerating the velocity of fibroblasts migration. Diabetic animals, where delayed wound healing is known to occur, exhibited abnormally high levels of Cx43 in the dermal wound margin. This Cx43 up-regulation correlated with increased communication and slower rates of migration of fibroblasts cultured in high-glucose, which mimics the diabetic condition. Of clinical relevance is the fact that Cx43 silencing in these cells reverted migration rates to normal levels. The accelerated migration induced after targeting Cx43 in fibroblasts was accompanied of profound changes in the morphology and cytoskeletal organization of front-row wounded cells, which displayed a phenotype characterized by extensive lamellipodial protrusions and altered actin dyamics. Reduced cell-cell adhesion and impaired expression and/or distribution of adhesion proteins were a further consequence of silencing Cx43 both in vitro and in vivo. These findings reveal that targeting Cx43 accelerates wound healing by inducing cytoskeletal changes, regulating the remodeling of cell contacts and accelerating the velocity of fibroblasts migration, which may have therapeutic implications for diabetic or hard-to-heal wounds, in which Cx43 down regulation does not occur and migration is impeded.

Condition monitoring of planetary gearboxes

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The objective of our research project is to find a reliable solution for the condition assessment of a planetary gearbox by means of vibration analysis. A planetary gearbox consists of a central sun gear, a ring gear and several planet gears which are held by an arm shaft called a carrier. Either the sun gear shaft, carrier shaft or ring itself can serve as the input or output of the gearbox, depending on which the element is kept fixed. For its most extended form, the ring gear is kept fixed, the sun gear shaft acts as the input/output, whereas the carrier shaft acts as the output/input. As the input shaft rotates the simultaneous gearing process of the planets with the sun and the ring gear make them rotate with respect to their own shaft but also revolve around the sun gear. This revolving motion of the planets makes the carrier rotate with respect to its shaft, which constitutes the output of the gearbox.

The compactness of planetary gearboxes does not provide an accessible way to the elements inside the planetary gearbox. Measurements are, therefore, taken with sensors mounted on the outside part of the steady ring gear.

Vibration analysis takes advantage of the fact that the different processes, which take place when the machine is running, cause vibrations with different characteristics. For example, the gearing process under constant rotational speed generates a periodic vibration, whereas a localized bearing failure will produce high frequency transient vibrations as the rolling elements roll over it.

The main problem of the vibration analysis of planetary gearboxes arises from the fact that the planet gears revolve around the sun gear. Hence, the distance between the vibration's source and the sensor varies continuously. This condition is aggravated because all planets generate similar vibrations and are phase-shifted from the point-of-view of the sensor, which leads to a possible suppression of some vibration components. The suppression is an artefact of the measurement scheme only and depends on the geometry of the gearbox so that different vibration patterns for different planetary gearboxes can be found.

When failures arise, the problem become more difficult, as usual subtle changes in the vibration characteristics on the already complex vibrations environment have to be found. Therefore, signal processing techniques are to be developed, implemented and tested on a test bench and on actual machines so as to study their effectiveness.

Computational Aerodynamics of Civil Structures: Turbulence Analysis in a Telescope Building

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Civil Aerodynamics is defined as a part of the Aerodynamics responsible for the study of the motion of the fluid and mechanical loads exerted on bodies without aerodynamic shape, so that boundary layer separations occurs easily. Examples of civil structures covered in this work are subway stations and telescope buildings. In the first one we are interested in calculating the thermal comfort inside the station and in the second one in the study of the turbulence that occurs both within the building and around it. In the specific case of the telescope we are interested in knowing on one hand the spectra of energy and pressure inside the building and the characteristic parameters of the turbulence to predict the mechanical loads that are subject to the telescope mirrors, and on the other hand in calculating the optical parameters of the turbulence generated outside the building to determine the quality of visibility. We will detail how to calculate the statistic parameters of turbulence, the spectra of energy and integral scales. We also focus on the different ways to calculate them. We used the incompressible Navier-Stokes equations to simulate the fluid dynamics, which are approximated using a finite element method with a nodal implementation. In order to simulate the numerical turbulence we proposed the use of a stabilization method, in particular the OSS (orthogonal subgrid scale stabilization) in conjunction with the Smagorinsky LES model. We show an application of the model to the called E-ELT (European Extremely Large Telescope) which has been analyzed in the contest of a FP6 project funded by the European Commission.

Modern Sustainable Integrative Aquaculture

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RESEARCH AREAS

- Biochemical-Analytical-Ecotoxicology.
- Toxic secondary metabolites from cyanobacteria (monitoring & elimination).
- Alternative Protein Sources for Aquafeeds.

RESEARCH INTERESTS

My expertise includes both marine & freshwater ecosystems since I'm marine biologist with a PhD in biology - ecology. My research expertise can be divided in three main categories: biochemical analytical ecotoxicology, toxic secondary metabolites from cyanobacteria (monitoring, metabolisation & elimination) and alternative protein sources for aquafeeds. I've participated in several national and international research projects and cooperation's, such as projects FONDECYT (Chile), FONTEC (Chile) DAAD (Germany) and BMBF (Germany). During my scientific career at the Leibniz Institute of Freshwater Ecology and Inland Fisheries (ForschungsVerbund Berlin e.V.), I've been trained on diverse biochemical, molecular & analytical methods, ranging from the assessment and screening of intra cellular stress responses & physiological mechanisms to analytical quantification and screening of secondary metabolites (i.e. toxins & metabolites) & pharmaceuticals by LC-MSMS. Considering the actual situation of intensive aquaculture in Chile such as environmental eutrophication (risk of harmful algal blooms), increasing costs for ingredients in aquafeed production and infectious diseases there is a need for the scientific development of the above mentioned research lines in Chile.

SELECTED REFERENCES (ISI) 1. Nimptsch, J. Chemosphere 61 147-157 (2005) 2. Nimptsch, J. Chemosphere 66 708-714 (2007) 3. Nimptsch, J. Ecotoxicology and Environmental Safety 69 541-545 (2008) 4. Nimptsch, J. Environmental Science and Technology 42 8552-8557 (2008)

Dynamic optimization of metabolic networks

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The search for general control principles that underlie a range of biological functions is an important part of systems analysis in biology. Cellular functions exhibit a striking degree of robustness achieved by complex regulatory mechanisms that preserve the normal operation under varying environmental conditions [1]. On the other hand, Systems & Control Theory is a mature field within the Engineering Sciences that is concerned with the analysis, synthesis and design of regulation mechanisms for technological applications [2]. There has been a growing interest in using mathematical tools from Systems & Control Theory for the analysis of the mechanisms behind cellular functions [3].

The hope is that this system-level approach can help to rationalize the intricate interactions behind cellular processes. Biochemical reactions constitute the backbone of cellular metabolism. From a systemic viewpoint, metabolic functions are implemented via interconnections of different biochemical reactions, leading to the notion of metabolic networks. A particular topic of interest is the understanding of control and regulation of these networks, which has motivated the development of powerful mathematical formalisms for their analysis [4,5]. The elucidation of optimization principles in metabolic regulation has recently drawn considerable attention. The key assumption is that metabolic regulation has evolved to optimize a quantity that measures the performance of a particular metabolic function.

Our research aims at precise mathematical descriptions of the optimal operation of metabolic networks under dynamic enzyme concentrations. We consider a dynamical model for the regulatory feedback loop that couples the metabolic network with the gene expression mechanism. In this view, the metabolic network is seen as a dynamical system that is optimally regulated via feedback from gene expression. Examples of relevant optimality criteria include rapid product synthesis and optimal adaptation strategies for changing extracellular conditions. The mathematical models come in the form of nonlinear ordinary differential equations, thus analyzing their optimal behavior usually yields nonlinear mathematical optimization problems that can be tackled with tools from dynamic optimization. This approach could allow the testing of optimality hypotheses, together with the comparison of alternative feedback regulatory topologies in terms of their optimal responses.

1. J. Stelling et al. Cell 6 675-685 (2004) 2. G. Franklin et al. Prentice Hall-NJ . (2002) 3. H. Kitano Science 5560 1662-1664 (2002) 4. M. Savageau Addison-Wesley, Reading, MA . (1976) 5. R. Heinrich et al. The regulation of cellular systems,Chapman-Hall . (1996)

Hunting the biology of complex traits with Genome-wide Association Scans

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The technological progress made in the last years has allowed the first steps of a high throughput analysis of human genetic variation.

In recent years there has been great interest in what Genome-wide Association Studies (GWAS) can tell us about the genetics of human diseases. One lesson learnt is that genes coming from GWAS quite frequently do not fall in the list of our usual suspects or candidates genes. Good examples of this are the links between the complement system/type I diabetes and autophagy/Crohn's disease revealed by GWAS. A second non-trivial lesson is that the effect size of common risk variants is much lower than anticipated, necessitating meta-analyses by meta-consortia approaches. Combining very large GWAS sample data poses additional problems due to factors such as environment risk factors, heterogeneity between centres and the difficulties presented by symptom based diagnostic systems.

Overall, it is clear that GWAS are finding what they ought to, but this is still not enough to prepare to road for biomedical and clinical advances.

At this moment the community is engaged in a race for new methods to mine gems from these data. One of the most challenging aspects is to transform this huge amount of data into biologically meaningful results.

The way in which we study human genetics is rapidly evolving and is moving towards a more system based approach. At the moment, analyses of genetic variation are focused on SNPs, but this is likely to change in next few years. The incorporation of cellular and organism level phenotypes, such as mRNA and protein levels and brain activity, opens new avenues to uncover the complex relationship between genotype, phenotype and environment. It is becoming clear that it will be difficult to succeed if we do not integrate the many different aspects of these different levels of complexity.

My project aims to explore how to apply information from network biology and functional variation to whole genome studies of variation, particularly GWAS. For example, I am applying pathway and network analysis methods to GWAS aiming to shed light on the biological underpinnings of human diseases. I aim to integrate genome annotation and variation data with biological network analysis to exploit these layers of information and generate new bioinformatic methods to analyze GWAS.

Voltage stability analysis of longitudinal power systems with high penetration of wind power: chilean case

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In last years, the trend in wind generation has been the installation of large and concentrated wind farms into electrical power networks. As a consequence, wind power has reached in some regions significant penetration levels imposing new challenges to the Transmission System Operators. This is the case for instance in Denmark, some regions of Spain and Northern Germany, where wind power injections are already exceeding local demand. This situation has demanded the establishment of new grid requirements for wind generators in many countries. Disconnection of wind turbines in case of disturbance is not admitted anymore, and voltage and transient stability support -during and after grid fault events- are required.

The dynamic behaviour of wind turbines and their impact on the transmission network depends on the wind generator technology and its control strategy. The wind power integration is also limited through the particular characteristics of the transmission network where the wind turbines are connected.

Longitudinal power systems have particular characteristics and behaviour that makes them essentially weak, and in some cases prone to experience stability problems in situations where typical power structures would not. Generation zones located far away from consumption, long transmission lines, unmeshed networks and concentrated load centres are some of these characteristics. Considering that the impact of wind power on stability and control differs in the case of longitudinal power systems from the conventional meshed networks, independent studies of high penetration of wind power in these types of networks are needed.

This work focuses on the study of power systems with longitudinal structures like Chile, England, Greece, Australia, Mexico and Taiwan. It is investigated how the problems of voltage control and stability limit the integration of wind power in these systems and how the present reliability level of the network can be ensured. The investigation also analyzes the effective Fault Ride-Through capability of different wind generators in longitudinal transmission networks and its effects on system stability. Different control strategies, allowing the wind generators to support the grid voltage by injecting reactive power during and after grid faults, are developed. Simulations are performed using a simplified model of the Chilean transmission network.v

The Mesenchymal Stem Cells-Derived Oligodendrogenic Potential: A New Therapeutic Approach for Demyelinated Diseases?

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Bone marrow derived mesenchymal stem cells (MSCs) have not only stem/progenitor cell properties, but they also can regulate proliferation, survival and differentiation of other cells. We have previously shown that soluble factors derived from MSCs induce oligodendrogenic fate and differentiation in adult rat hippocampal neural progenitors (NPCs) in vitro (1). Using a candidate approach we have discarded several cytokines and growth factors as the MSCs-derived oligodendrogenic activity (1, 2). In addition, we found that the MSCs-derived activity target the complete oligodendrogenic program including cell fate decision, differentiation and maturation(2). In contrast, we found that the gliogenic factor CNTF, only plays a role on oligodendrocyte maturation (2). Therefore, the identification of the MSCs-derived oligodendrogenic activity become more important. We have also investigated if this pro-oligodendrogenic effect is maintained after cells have been transplanted into hippocampal slice cultures, which resembles an CNS-organotypic environment. When NPCs in combination with MSCs were transplanted in situ into rat hippocampal slice cultures, the grafted NPCs survived and the majority of them differentiated into oligodendrocytes. In contrast, NPCs differentiated predominatly into astrocytes when transplanted alone. Therefore, MSCs provide an oligodendrogenic niche for transplanted NPCs, and thus, co-transplantation of MSCs with NPCs might provide an attractive approach to re-myelinate the diseased CNS.

1. Rivera FJ Stem Cells 24 2209-19 (2008)

2. Rivera FJ Journal of Neurochemistry 3 832-43 (2006)

Super-resolution Study of Synaptic Vesicles

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Synaptic vesicles are located in neuronal specializations termed presynaptic nerve terminals. Synaptic transmission is achieved by the fusion of synaptic vesicles with the nerve terminal plasma membrane, with the neurotransmitter contents of the vesicles being released into the outside space (exocytosis). The vesicle components are then retrieved from the plasma membrane, in a process generally thought to be clathrin and dynamin-dependent (endocytosis). The vesicle is then refilled with neurotransmitter, and is thus ready to undergo a new round of fusion.

The small size of the vesicles (40-50 nm in diameter), and the small size of the nerve terminals housing them (1 micron in diameter) make it difficult to image the vesicles by conventional microscopy. Recently, a number of super-resolution techniques have been introduced, such as the diffraction-unlimited stimulated emission depletion (STED) technique. STED microscopy breaks the diffraction barrier of light (which normally blurs fluorescent spots to diffuse disks of 200-300 nm), allowing the experimenter to see much finer details; therefore, imaging of single synaptic vesicles becomes possible. Some of our interests aim to understand if synaptic vesicle membrane and the plasma membrane completely mix, or do the vesicle components remain segregated as patches within the plasma membrane? How does synaptic domains change upon expression of a modified synaptic protein in neurons? In addition and differently as other super-resolution techniques we can use STED microscopy to investigate synaptic vesicle mobility in living hippocampal neurons.

Ube2F a high specific E2 protein for the nedd8

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Ubiquitin-like proteins (Ubls) like Nedd8, Itg8, Fat10 ISG15 and Sumo are involved in very important processes, for example in the regulation of the endocytosis, cell cycle, DNA repair, signal transduction and gene expression. Nedd8 has the highest homology to ubiquitin. The neddylation has been shown to control the activity of E3 ubiquitin ligase complex, called SCF, which is involved in the cell cycle regulation, and also the activity of the tumour suppressor p53 via Hdm2. The neddylation involves activation of Nedd8 by a unique E1 protein, conjugation by a E2 protein and attachment to the substrate by E3. So far, Ubc12 is the only described E2. Here, we characterize a second high specific E2 protein for the neddylation cascade.

Hydractinia echinata: a new model organism in genomics

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An increasing amount of sequencing data mainly available for the cnidarians Acropora, Hydra and Nematoslella reveals that cnidarians possess a high genomic complexity, despite being one of the morphologically simplest multicellular animals. To contribute towards a broader coverage of the phylum, we performed an EST project on the hydroid Hydractinia echinata directly linked to functional analysis. Hydractinia's ESTs showed a higher sequence similarity to vertebrates than to invertebrate counterparts. Furthermore, the project detected a significant number of sequences hitherto unknown in metazoans. The identification of unique Hydractinia sequences is consistent with the suggested high diversity and complexity of genes within the phylum. To store all acquired information we created a database aimed at making the data widely available.

For further sequence characterization, we constructed a cDNA-microarray. We focused our functional analysis towards the understanding of stem cells and innate immune system in Hydractinia. Previous experiments elegantly demonstrated that Hydractinia interstitial stem cells (i-cells) exhibit a totipotency capacity. However, little is known about the genes and molecular pathways involved in the maintenance and differentiation of i-cells. We identified Hydractinia's stem-cells genes comparing the gene expression profile of colonies depleted from i-cells and in its recovery phenotype against a reference untreated colony. Microarray data ended up with 162 significant differentially expressed genes, including homologues of already known vertebrate's stem- and germ- cell genes.

Cnidarians have also been used as a model system to study innate immunity and allorecognition. To contribute in the identification of cnidarian's immune gene repertoire we analyzed the transcriptional profiling of colonies induced to an LPS and allo-recognition response. From the 245 candidate's genes, only few genes seemed to be associated with a bacterial infection but many are involved in an allorecognition challenge.

This project is the first high-throughput effort done in the colonial marine hydroid Hydractinia echinata. A relational EST database in combination with a microarray resource provides a facility platform to promote not only further research in cnidarians but also might lead to a better understanding of the ancient functionality of genes and their evolution.

Simulation model for assessing sustainability dairy cattle

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A simulation model will be used to assess the overall sustainability of dairy cattle in regions IX and X of Chile, in order to classify the level of sustainability of production systems that exist. On the other hand, will assess various modifications to existing systems to choose that combination of factors of production with the best overall sustainability parameters.

Notch regulates the expression of MCAM/CD146 in human mesenchymal stem cells

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The Notch signaling pathway has been implicated in the formation of the bone marrow niche by regulating the differentiation of mesenchymal progenitor cells and their support for hematopoiesis. Similarly, it was suggested that expression of MCAM (Melanoma Cell Adhesion Molecule) in Mesenchymal Stem Cells (MSC) from the bone marrow defines osteoprogenitors with enhanced self renewal capacity and higher potential to support hematopoiesis. Therefore we aimed to analyze a potential interaction between MCAM expression and activation of Notch signaling on MSC. We observed that activation of notch signaling in MSC, by lentiviral overexpression of Notch Intracellular Domain (NICD), enhance the surface expression of MCAM up to 5-fold. Real-time PCR showed over 20 fold increase in transcription levels of MCAM 72 hours after transduction with NICD. Activation of Notch signaling was confirmed in parallel by increased expression of Hey1 and Hes1, known Notch target genes. Moreover, the effect of NICD was partially blocked by co-expression of a dominant negative form of Mastermind1 (dnMAML1). Finally we observed a significant positive correlation (P=0.0024) between MCAM and Hey1 endogenous expression levels in samples obtained from 20 healthy donors. In summary our observations suggest Notch signaling as novel regulator of MCAM expression in MSC.

Silicon Solar Cells With Rear Contacts

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The energy from the sun is not a privilege but a right for all of us. In one hour comes more energy to the earth than what we need in one year. We are interested in the development of solar cells to encourage a wide-spread use of this technology, to convert solar radiation into electrical energy for all uses.

Silicon is mostly used to produce solar cells. The production begins with the doping of the semiconductor material (silicon wafer) with certain impurities to allow an internal movement of electrons (the material is very sensitive to light), that is to change electrical properties. The doping is performed by diffusion of Silicon wafers with special gases which contain the impurity dopant. Then, a layer on the top called emitter is achieved. After that, a barrier of silicon nitrite is deposited on the front side of the wafer, to avoid that free electrons find again local holes. The contacts for the solar cell are done by screen printing. On the front and rear side, Silber (fingers and buses) and Aluminium paste (for the whole area) are respectively used. The wafer is fired under high temperatures to produce an adherence between the contacts and the semiconductor material. Later on, the edges of the wafer are isolated (by etching or laser techniques) and the finished solar cell can be characterized (fill factor, efficiency, etc.). According to the characterization of a solar cell, we obtain the correct parameters to fire the cell.

At the ISC-Konstanz Institute Elias Urrejola is the responsible for the laser process (edge isolation, inscription on the wafers, etc.) and is member of the team in charge of the screen printing. His work is focused on different screen printing processes to increase the efficiency of the solar cell optimizing the use of different pastes (including for etching). He is also working on local rear contacts to make a bifacial solar cell. The doctoral thesis supervisor is Mr. Dr. Ernst Bucher professor at the University of Konstanz, Germany and Sponsor of the ISCKonstanz Institute.

Automatic generation of simulation code using product location information

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This communication proposes an original method for simulation code generation in discrete event systems. This method uses the product location information in the running system. The information flux (product id, location, time) is the starting point for the algorithm to generate a queuing network simulation model.

Some years ago, a new perspective for product design and manufacturing incorporated into the product, communication and sensitive capabilities within the framework of the intelligent product paradigm. The informational part of each product is feeded by the direct material environment of the physical product or by its own instrumentation (MEMS,GPS,...)

The exchanges of information between the product and its environment can be made:

(1) At certain synchronization points using RFID technologies, bar code,...

(2) In a quasi-continuous way (wireless networks like Wifi, Zigbee, Bluetooth)

These communication technologies can also contribute to the product location activity in addition to the embedded instrumentation. There are many applications of these technologies in the field of production and logistics, some examples are products traceability, stock inventory and the positioning of a transport fleet.By now the spatial location of physical objects, is limited to voluminous objects (lorries, boats, containers) or to people.

The aim of our research consists in showing the new inputs and benefits, in the use of a product location information flux, during the manufacturing process. This article presents an application: the automatic generation of flux simulation code on the basis of product location data during its passage through the production system. This data compose an information flux that can be assimilated as product traces.

If since some years, the simulation of product flux has been the main tool for the evaluation of the dynamic of manufacturing systems, it has often been shown that the modeling phase and the maintenance phase are constituted by delicate and time- demanding human operations. These reasons explain in itself the choice of this problem.

The main idea is to replace the biggest amount of human expert interventions in the construction of the simulation model, but at the same time in the maintenance and reconfiguration phases, for an automatic generator.

The suppression of the star-formation in galaxy clusters

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It has long been known that galaxy populations inside clusters differ considerably from those found in the general field: clusters of galaxies are preferentially inhabited by red, old and non-star-forming galaxies. The general field, on the other hand, is populated by active star-forming, bluer spiral galaxies.

Under the current cosmology paradigm, large structures, like clusters of galaxies, are assembled via merging and accretion of smaller ones. Therefore, galaxies that have recently become cluster members must have experienced strong transformations to account the different on populations. However, the exact process acting on galaxies has not yet been identified.

Recent studies have shown that among all galaxy properties, star-formation is the most sensible parameter. It has the strongest correlation with environment (measured by mass concentration). We present here a study that investigates the star-formation at large cluster-centric distances, where the galaxy concentration is very low. The results place strong constrains in the nature of the mechanisms that suppress the star-formation in clusters.

About the Organizers and the Sponsors

About the organizers

Matías Hernández

Matias was born in Antofagasta and lived in several countries before returning to Chile where he finished high school. He then moved to Sydney where he obtained his BSc (Honours) in Chemistry at the University of Sydney. His Honours thesis was done at the Key Centre for Polymer Colloids, at the time directed by Professor Robert Gilbert, employing tools developed by polymer Chemists to study mechanistic aspects of starch branching enzymes. He stayed on another year to complete his MSc, and then decided to change field and moved to Göttingen to pursue a PhD with a scholarship from CONICYT. He is currently in the middle of his PhD at the Max Planck Institute for Biophysical Chemistry in the department of Neurobiology headed by Professor Reinhard Jahn. His research topic is on the biophysical properties of SNARE-mediated fusion of large liposomes.

When not in the lab, Matias is a dedicated salsa dancer, he enjoys discussing and reading about politics in Latin America, and likes to watch and play tennis, when time permits.

Felipe Opazo

Dr. Felipe Opazo was born in Buenos Aires, Argentina and grew up in Santiago, Chile. He studied Molecular Biotechnology Engineering at the Universidad de Chile. He achieved his MSc there using biochemistry and molecular modelling to study the specificity of several compounds to inhibit Cdk5; a kinase believed to be involved in Alzheimer and other neurodegenerations. Felipe then attained a fellowship to start his PhD program in the Neuroscience International Max Planck Research School in Göttingen/Germany. There he did his doctoral thesis in the Department of Neurodegeneration and Restorative Research, which is directed by Professor Jörg Schulz, at the Georg August Universität of Göttingen. His doctoral studies had two main focuses; the study of the dopamine transporter using electrophysiological and imaging approaches, and the generation of a new fluorescent tool to detect alpha-synuclein aggregates in living cells. In the summer of 2008, Felipe started his post-doc at the European Neuroscience Institute (ENI) in the laboratory of Dr. Silvio Rizzoli using the diffraction-unlimited stimulated emission depletion (STED) technique to gain a better insight into the synaptic vesicles' composition and function.

Aldo Leal

Aldo was born in Valparaíso. He studied at the Faculty of Biochemistry and Pharmaceutical Sciences, University of Chile, obtaining the title of Biochemist in the year 2000. Around the same time, Aldo started a Master in Biochemical Engineering, at the Catholic University of Valparaíso, obtaining the degree of Master of Science in 2001. In parallel, Aldo worked as Associate Researcher (Daniel Alkalay Biotechnology Centre), and as Teacher Assistant of the courses "Biotechnology" and "Biochemistry", at the Technical University Federico Santa María in Valparaíso.

Tempted by the innovation and the work in multidisciplinary teams, Aldo applied successfully for a DAAD scholarship, and during 2003 he travelled to Germany where he pursued his PhD in Biochemistry (BioCity, University of Leipzig), in the field of Tissue Engineering and Biomaterials. In his PhD thesis, Aldo focused his attention on the interface of Cell-Biomaterials and in developing mathematical models to describe the proliferation and decay of cells immobilized on microcapsules. Since 2008 Aldo holds a Postdoctoral position in the Chair of Biomaterials, University of Bayreuth, Germany, where he is involved in research and development of new strategies to utilize bio-mimetic supports in Biomedicine and Biotechnology.

Aldo's main interest is the creation of a bridge between science and society. To this end, between 2003 and 2007 Aldo was a permanent columnist in the newspapers *GranValparaíso.cl* (Valparaíso) and "*Hecho en Chile*" (Santiago), in the field of science and education. Some of his published articles are "*Evaluation of the Scientific Press in Chile*" (2006), "*University Qualification*" (2005), "*Organ donation: the willpower to give*" (2004), or "*The Lady Conicyt's lover: the role of the scientist in Chilean society*" (2003), among others.

Max Planck Institute for Biophysical Chemistry

The Max Planck Institute for Biophysical Chemistry (Karl Friedrich Bonhoeffer Institute) in Göttingen is a research institute of the Max Planck Society. Currently, 730 people work at the Institute, 370 of them are scientists.

As one of the institutes within the Max Planck Society it combines the three classical scientific disciplines – biology, physics and chemistry. Founded in 1971, research in the institute initially focused on physical and chemical problems. It has since undergone a continuous evolution manifested by an expanding range of core subjects and work areas such as neurobiology, biochemistry and molecular biology.

The history of the Institute also lists numerous prizes to honor outstanding scientific achievements. In 1967, Manfred Eigen received the Nobel Prize for Chemistry for his unique contributions to the field of rapid reaction kinetics. Two scientists of the Institute, Erwin Neher and Bert Sakmann, shared the Nobel Prize for Physiology or Medicine in 1991, awarded for pioneering single channel recording techniques and applications.

The research conducted at the Max Planck Institute for Biophysical Chemistry covers a broad spectrum. Its aim is to understand biophysical and biochemical processes at a fundamental level. Currently the institute encompasses 12 departments and about 30 research groups.

Max Planck Institute for Experimental Medicine

The Max Planck Institute for Experimental Medicine was founded in 1947 as a "Medical Research Institution", and one year later taken over by the Max Planck Society. The Institute has been located since 1963 in a new facility in close proximity to the Medical School. In 1965, it was renamed to "Max Planck Institute for Experimental Medicine" as it is still known today.

From the very beginning, the focus of the institute has been on basic medical research. For years, the spectrum spanned from the study of the genetic material DNA, respiratory physiology and embryology to investigation into the immune system. In a series of new appointments, the Institute was given a uniform direction. Since the 1980s, molecular neuroscience has been at the heart of research activities. Research activities cover a wide spectrum of topics, ranging from basic molecular analyses of neuronal processes to clinical studies on novel therapies of neurological and psychiatric disorders in patients. The central aim of all these studies is to understand basic molecular and cellular processes in brain function, to analyze their pathological dysfunction in psychiatric and neurological diseases, and ultimately to develop novel therapies for these disorders. Recently, one department has been concentrating on the involvement of a neuronal potassium channel in cancer.

Today, the institute comprises three departments in basic research, and several independent research groups.

Bionexa

Bionexa is a web-based scientific collaboration network that, through active communication with its members, aims to promote knowledge and technology transfer between Hispanic researchers that live abroad and researchers and scientific companies based in their home countries. The idea is for network members to find in Bionexa a space in which they can share what they do, meet colleagues in other countries, and support the development of Science in Latin America.

Bionexa.org is committed to give visibility to the website's registered users. Its initial focus is to become the preferred communication channel between Latin American scientists living abroad and colleagues living in their home countries. On the other hand, Bionexa commits to facilitate the distribution and instruction of know-how, as well as job and training opportunities. Bionexa commits to take all possible actions to facilitate, embrace, and develop a scientific and entrepreneurial community that works to strengthen and expand the scope of basic and the applied science carried out in Latin America.

The Bionexa Team - Profiles

Cristián Hernández-Cuevas, Executive Director.

Molecular Biotechnology Engineer from Universidad de Chile with a Master in Bioscience Enterprise from the University of Cambridge. Throughout his career, Cristián has acquired invaluable experience in bio-businesses and technology transfer, both in Chile and in England. He has been a successful bio-entrepreneur, business consultant and Business Development Manager at Summit plc UK. He co-founded Bionexa in 2006 and currently works at Fundacion Ciencia para la Vida (Chile) as Director of Business Development
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Environmental Chemist from Universidad de Chile, Master in Science and PhD in Biotechnology from the University of Cambridge. During her PhD she generated several publications and patents, being awarded the „Young Investigator Award" by Hoffman LaRoche in 2005. In Cambridge, she started Paramata, a nanotechology company, where she worked actively for 2 years. Now she is based in Chile, and currently works as the R&D Director at Recalcine, the biggest pharmaceutical company in the country. e-mail: b.araya@bionexa.org

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PhD in Cell Biology (c) at the Central University of Venezuela in collaboration with the Pierre and Marie Curie University (France). Her research has been focused towards the cell stress response to thermal, toxic and parasitic stimuli. She currently works as a researcher of the Cell Biology Section at the Tropical Medicine Institute of the Central University of Venezuela. e-mail: a.rada@bionexa.org

Laura Arguedas Jiménez, Regional Director Costa Rica.

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About the sponsors

The organizers would like to thank the sponsors for their generous support

Federal Ministry of Education and Research (BMBF)

The BMBF performs a number of different tasks within the scope of its constitutional responsibilities:

GEFÖRDERT VOM

Bundesministerium
für Bildung
und Forschung

- Regulation of non-school vocational education and training and continuing education and the necessary policy and coordination tasks,
- Support for research,
- Legislation governing training assistance and its financing,
- Talent promotion, support for young researchers and
- Promotion of the international exchange of trainees, students, participants in continuing education programmes, instructors, academics and scientists.

Fundación Ciencia para la Vida

FUNDACIÓN
CIENCIA PARA LA VIDA

Founded in Chile in 1997 as a non-profit organization, Fundación Ciencia para la Vida has the mission of promoting the adoption and use of science-based innovations by Chilean and International companies. The fundación has specialized on building value by developing products and technologies that serve the needs of the Agriculture, Mining, Forestry, Aquaculture and Healthcare industries. It is actively building human resources capacities through the training of undergraduate and PhD students in collaboration with different local universities. It also promotes and participates in a number of global networks of scientific collaboration with local and international centers of academic excellence.

DICOEX

GOBIERNO DE CHILE
MINISTERIO DE RELACIONES EXTERIORES
DIRECCIÓN PARA LA COMUNIDAD DE CHILENOS EN EL EXTERIOR

The Direction of Chilean Communities Abroad –DICOEX (in Spanish) -proposes, coordinates and develops policies aiming at engaging Chilean nationals, both men and women, to the motherland. DICOEX also looks forward to advancing nationals human rights in their host countries.

In cultural terms, this Division promotes national identity preservation, as well as the inclusion of Chileans abroad in the development of the country.

Main tasks:

- Permanent contact with the Chilean community abroad.
- Defence of the Chilean community's human and social rights, regardless of their place of residence.
- Promote activities that strengthen the exercise of civilian rights in Chile and abroad.
- Provide updated information about Social Security Laws, bilateral international agreements about migrations, validation of studies, degrees and titles.
- Empower Chilean organizations abroad.
- Enable the networking among Chileans abroad according to their areas of expertise.
- Encourage the sentiment of national identity among communities.
- Help improve the capacity of the Chilean associations leaders abroad, in terms of enhancing their organizational skills.
- Coordinate the program "Government in the field", which takes regular services (social security, identity cards, pensions, etc.) that are usually given to the population in Chile in public facilities, to small villages abroad, located far away from our Consulates.

DECYTI

GOBIERNO DE CHILE
MINISTERIO DE RELACIONES EXTERIORES
DIRECCIÓN DE ENERGIA, CIENCIA Y TECNOLOGÍA E INNOVACIÓN

The Direction of Energy, Science, Technology and Innovation (DECYTI in Spanish) is the institution responsible for coordinating with foreign institutional issues regarding Energy, Innovation and Development. These could be, for instance, having access to new technologies and research development in Non-Conventional Renewable Energies (NCRE), among others.

Notably, DECYTI is involved in negotiating international treaties in the areas of their responsibilities, for example, agreements on Science, Technology, Energy and Education.

It also represents, as assigned by the Ministry of Foreign Affairs, the Government of Chile in multilateral forums, as well as collaborating in the organization of seminars and discussion forums on science and innovation.

Finally, it disseminates international opportunities in fields that might be useful to our country, participating in international networks of innovation, research and development.

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Program at a Glance

Wednesday, 11th of February

10:00 Registration

14:00 Welcome by the organizers

14:15 Welcome by the Max Planck Society

14:30 Welcome by Professor Dr. Álvaro Rojas Marín

Keynote Lecture

14:40 Cristián Hernández
Science made in Chile that is going Global

Physical & Mathematical Sciences

15:30 Sergio Rica
Supersolidity: Dissipationless Flow and Lattice Ordering in Helium

16:10 Coffee Break

16:30 Claudia Duran, Pablo Ferrada, Elias Urrejola
Silicon Solar Cells

17:00 Miguel Verdugo
Galaxy Evolution

17:25 Christian Muñoz
Computational Fluid Dynamics

Closing Lecture

17:50 Omar Larach
The Sweet Spot of Science & Business

18:30 Conference Buffet

Thursday, 12th of February

Informatics, Chemistry & Industry

9:00 Juan Reyes Martínez
Giving up sex for money? A `de-prostitution´ case of a physiologist/biochemist in the changing universe of science funding in Chile

9:40 Christian Griesinger
Neurodegeneration: an NMR spectroscopic view from both sides of the atlantic

10:20 Bernardita Araya
From a Chilean drugstore to an emerging Pharma with global presence

10:45 Coffee Break

11:10 Daniel Almonacid
Reaction Mechanisms in Enzymology

11:35 Diego Oyarzún
Metabolic Dynamics

12:00 Judit Lisoni
Thin Films

12:25 Lunch

Keynote Lecture

13:30 Ramón Latorre
Ion Channels and the Montemar: A Case Study of Successful Science in Chile

Biology, Biomedical & Biotech I

14:20 Miguel Allende
Finding a dual utility for the zebrafish model: an attempt to combine basic and applied interests

15:00 Walter Stühmer
A potassium channel as a tumour marker

15:40 Coffee Break

16:00 Erwin Neher
Ca^{2+} signals and short-term synaptic plasticity in the central nervous system

16:40 Inti Pedroso
Genetic Mapping

17:05 Nicolás Crossley
Design in Experimental Medicine

17:30 Short Coffee Break

Closing Lecture

17:40 Cristián Hernández
Career perspectives in Chile

Round table

18:10 Moderator: Cristián Hernández

19:00 Wine and Cheese

Friday, 13th of February

Biology, Biomedical & Biotech II

9:00 Reinhard Jahn
In vitro-reconstitution of membrane fusion in the secretory pathway – still a long way to go

9:40 Cristina Navarrete
Should we be establishing Cord Blood Banks in Latin America?

10:20 Coffee Break

10:45 Álvaro Lladser
Gene Therapy

11:10 Aldo Leal
Biomaterials for Tissue Regeneration

11:35 María Ignacia Fuentes
Plant Biotechnology

12:00 Lunch

Keynote Lecture

13:00 Claudio Wernli
The Chilean National System of Science, Technology and Innovation & The Millennium Science Initiative

Cooperation, Mobility & Funding

13:50 Jani Brouwer
CONICYT and its efforts to reshape Chilean Science through cooperation, mobility & networks

14:30 International Bureau of the BMBF
Germany's R&D System and International Cooperation & Instruments for Supporting Scientific and Technological Cooperation in Latin America

14:50 Coffee Break

15:15 VDI/VDE Innovation + Technik GmbH
Networks and Clusters – the Benefits of Cooperation

15:50 EU commission (Talk I)
Participation in the FP7 program

16:20 EU commission (Talk II)
Better Careers and More Mobility for Researchers and the EURAXESS Initiative

16:50 DAAD (Title to be announced)

17:20 Short Coffee Break

17:30 Fernando Guzmán
Creation of an advisory council for innovation of Chileans living abroad

Closing Lecture

17:40 Filippo Pacciarini & Suhky Dhaliwal
Developing Scientific Collaborations: the Bionexa & Nature Publishing Group affair

Panel discussion

18:10 Moderator: Matías Hernández

20:30 Conference Social Closing Event