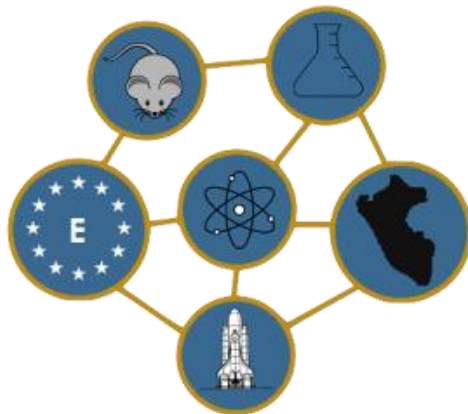


II ENCUENTRO DE CIENTIFICOS PERUANOS EN EUROPA

SINAPSIS 2017

Technische Universität Berlin (TU) (Universidad Técnica de Berlín)

Hardenbergstraße 16-18, 10623 Berlín, Alemania



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Octubre 2017

SINAPSIS 2017

La 2da edición de SINAPSIS, el Encuentro de Científicos Peruanos en Europa, se llevará a cabo en Berlín gracias a un grupo de jóvenes investigadores peruanos radicados en diferentes ciudades de Europa quienes se ha propuesto mantener el espíritu y la esencia de la primera versión, realizada en París en el año 2016. La creación de este espacio de encuentro y discusión en ciencia, tecnología e innovación debe convertirse con el paso del tiempo en un mecanismo de contacto y de apoyo efectivo a la comunidad científica en el Perú.

Esperamos que este segundo encuentro de paso a la consolidación de SINAPSIS, congregando a la diáspora científica peruana en Alemania y Europa, peruanos que desean continuar ligados al Perú sabiéndose pieza clave en el desarrollo de nuestro país.

Los invitamos a ser parte de esta iniciativa y participar activamente en éste y en los próximos encuentros SINAPSIS.

¡Nos vemos!

El Comité Organizador
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OBJETIVOS

El comité organizador de SINAPSIS, Encuentro de Científicos Peruanos en Europa ha propuesto alcanzar los siguientes objetivos:

Establecer SINAPSIS como la reunión de la comunidad científica peruana residente en Europa.

Establecer una red de contactos científicos peruanos, entre diversas instituciones europeas y peruanas.

Difundir los instrumentos existentes para el retorno de científicos peruanos residentes en el extranjero.

Iniciar conversaciones o identificar a los actores de posibles futuros acuerdos entre instituciones europeas y peruanas.

Difundir convocatorias para subvención de proyectos.

Informar a la comunidad científica peruana en Europa los diversos programas y herramientas creadas por el gobierno peruano.

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Programa

Jueves 5 de octubre del 2017

Time	Title	
8:30 - 9:00	Registration	
9:00 - 9:10	Welcome by the Embassy of Peru in Germany	
9:10 - 9:20	Welcome by Organizing Committee SINAPSIS 2017	
9:20 - 9:50	KEYNOTE LECTURE 1 	Quantum computers and quantum simulators Prof. Enrique Solano Department of Physical Chemistry, University of the Basque Country UPV/EHU, Bilbao, Spain
9:50 - 10:20	KEYNOTE LECTURE 2 	Impact of "Fenómeno del Niño" from Public Health Perspective Constantino Domínguez Barrera, MD Department of Preventive Medicine, Universidad Nacional Mayor de San Marcos, Perú
10:20 - 10:50	COFFEE BREAK	
10:50-11:05	O1 	RNAi-mediated strategy to control the African sweetpotato weevils <i>cylas puncticollis</i> and <i>cylas brunneus</i> (coleoptera, brentidae). Katterinne Prentice (Ghent University, Belgium)
11:05-11:20	O2 	Interferencia y compatibilidad electromagnética en dos sistemas de energías renovables. Ener Salinas (ABB Corporate Research, Sweden)
11:20-11:35	O3 	Physiological effects of short acute UVB treatments in <i>Chenopodium quinoa</i> Willd. Thais Huaranca Reyes (University of Pisa, Italy)
11:35-11:50	O4 	Re-thinking Ecological Infrastructure in contested periurban areas in cities in dry climatic conditions in the so called GlobalSouth. Rossana Poblet (University College London, UK)
11:50-12:05	O5 	Estimación del desplazamiento co-sísmico asociado al sismo de Acari del 25 de Setiembre de 2013 (Mw=7.0) y deformación intersísmica (2012-2013) en el sur del Perú usando geodesia especial. Wendy Quiroz (Instituto Geofísico del Perú, Perú)
12:05 - 13:15	Round Table 1	"Cooperation and Scientific Programs between Europe and Peru Chair: Organizing Committee SINAPSIS 2017 Participants: DAAD, GIZ, DFG Representatives"
13:15 - 15:00	LUNCH TIME	
15:00 - 15:30	KEYNOTE LECTURE 3 	Inherited Cancer Pål Møller, MD Oslo University Hospital, Oslo, Norway
15:30 - 15:45	O6 	El Niño forecasting based on network analysis" as part of EPICC (East Africa-Peru-India Climate capacities), a planned IKI-BMUB project for international climate research cooperation. Maria Martin (PIK, Germany)
15:45 - 16:00	O7 	Taxonomic revision and evolutionary history of the fern genus <i>salpichlaena</i> (blechnaceae). Glenda Gabriela Cardenas (Turku University, Finland)
16:00-16:15	O8 	Fabrication of nonperiodic metasurfaces by microlens projection lithography. Cesar Torres (Harvard University, USA)
16:15 - 16:30	O9 	Prioritizing natural product diversity in three <i>Alstonia</i> spp. endemic to New Caledonia through massive multi-informative molecular networks. Alexander Fox Ramos (Université Paris Sud, France)
16:30 - 16:45	O10 	Molecular studies of dyslexia susceptibility genes. Isabel Tapia Páez (Karolinska Institute, Sweden)
16:45 - 16:55	Assemble for Group Photograph	
16:55 - 17:15	COFFEE BREAK	
17:15 17:30		Palabras a cargo de Cienciaactiva Pamela Antonioli De Rutte Responsable de la Unidad de Desarrollo
17:30 - 18:30	Round Table 2	How to establish scientific research collaborations between Europe and Peru? Chair: Dr. Pål Møller, MD Status of current scientific collaboration between Peruvian institutions and Europe. Chair: Organizing Committee SINAPSIS 2017
18:30 - 21:00	OPTIONAL SOCIAL GATHERING - For menu and pricing information please visit http://cafe-hardenberg.com	

Programa


Viernes 6 de octubre del 2017

Time	Title
8:00 – 8:40	Registration
8:40 – 9:10	SINAPSIS Network in Europe
9:10 - 9:40	KEYNOTE LECTURE 4  El problema de los grafos isomorfos: el algoritmo de Babai. Prof. Harald Helfgott University of Göttingen, Germany
9:40 - 9:55	O12  OA-UNI DIMM Seeing Monitor: medidas de seeing astronómico en Huayao y Patacancha. Erick Meza (UNI, Peru) No se presentó
9:55 – 10:10	O13  Mapping the diversity of B cells subsets across blood and lymphoid tissues using multiparametric flow cytometry analysis. A. Rodriguez-Pozo (Université Paris Sud, France) No se presentó
10:10 – 10:25	O14  How <i>telipogon peruvianus</i> (orchidaceae) flowers cheat their tachinid eudejeania male pollinators? Carlos Martel (University of Ulm, Germany)
10:25 – 10:40	O15  Constructed wetland, a wastewater treatment approach for urban and rural areas. Maribel Zapater-Pereyra (UNALM & Munich University, Peru, Germany)
10:40 – 10:55	O16  Frequency Determination of the TEP1 alleles in <i>Anopheles gambiae</i> s.s. collected in Angola between 2002 and 2010. Estefania Torrejon (Instituto de Higiene e Medicina Tropical, Portugal)
10:55 – 11:15	COFFEE BREAK
11:15 - 12:45	Round Table 3 Current situation of Peruvian students (MSc, PhD) in Europe and their future in Peru. Challenges for the next generation Chair: Organizing Committee SINAPSIS 2017
12:45 – 14:15	LUNCH TIME
14:15 - 14:45	KEYNOTE LECTURE 5  Andean grains: Nordic perspective of food research and development Jose Martin Ramos, PhD Department of Food and Environmental Sciences, University of Helsinki, Finland
14:45 – 15:00	O17  Marine macrobenthic communities associated to peruvian scallop <i>Argopecten purpuratus</i> culture (macops): structural and functional diversity, feeding ecology and contaminant exposure. Ivan Loayza (Ghent University, Belgium)
15:00 – 15:15	O18  Chitosan/poly-cyclodextrin hydrogels and sponges for bone tissue engineering application. Carla Palomino (Univ Lille, France)
15:15 – 15:30	O19  Mitochondrial DNA and Y-chromosome diversity in the cloud forest area of northeastern Peru. Evelyn Guevara (University of Helsinki, Finland)
15:30 – 15:45	O20  A series arc fault location algorithm based on the impedance method for a domestic AC system. Edwin Calderon (Univ Lorraine, France)
15:45 - 16:00	O21  Layer-by-layer coating of a polyester non woven with chitosan and poly-cyclodextrin as antibacterial and anti-inflammatory wound dressing. Alejandra Mogrovejo (Univ Lille, France)
16:00 - 16:15	O22  Investigating the influence of sample size on the fatigue damage evolution in micro scale samples. Jorge Rafael Velayarce (Chair of Materials Science and Methods (MWW), Saarbrücken, Germany)
16:15 - 16:45	KEYNOTE LECTURE 6  Optical monitoring in atmosphere Prof. Ludger Woste Institut für Experimentalphysik, Freie Universität Berlin
16:45 - 16:55	Assemble for Group Photograph
16:55 – 17:15	COFFEE BREAK
17:15 – 18:30	Round Table 4 Networking in Europe of Peruvian scientists and Creation of thematical networks 1. <i>Nanoscience and Nanotechnology</i> 2. <i>Biological and Medical Sciences</i> 3. <i>Engineering and technology innovation</i> 4. <i>Basic Sciences and Mathematics</i>
20:00	CONFERENCE DINNER (Previous registration)

Programa

Sábado 7 de octubre del 2017

Embajada de Perú en Berlín

Time	Title
9:00 - 11:00	POSTER SESSION 1
11:00 - 11:30	KEYNOTE LECTURE 7  Harvesting energy with new thermoelectric effects Juan Carlos Rojas, PhD Institute Jean Lamour, Nancy, France
11:30 - 12:00	Former SINAPSIS Group Meeting and SINAPSIS Network (all invited)
12:00 - 14:00	POSTER SESSION 2
14:00 - 14:30	SUMMARY – CLOSING AND INVITATION TO BARCELONA 2018

Sesión Posters

ID	Name and Surname	Title work
P-05	Leonardo Solis	Aceleracion hardware de acoplamiento molecular usando opencl
P-07	Carlos Alberto Chero Dominguez	La globalización Andina: La construcción del sentido y antropología de la estrategia: el caso del Codex "Martínez Compañón"
P-09	Miriam Lopez	Turismo Sostenible, Economía Circular y Comunicación de la Sostenibilidad
P-10	Teresa Rojas	Linking up climate change mitigation and wildlife conservation: The case of Orangutans in Indonesia
P-13	C. Valencia-Sullca	Antimicrobial activity of chitosan films containing encapsulated eugenol in alginate microspheres
P-17	Sara Catalina Pineda Heresi	Atomistic modelling and simulation in materials science: investigation of transition metal iridium
P-18	Conny Guillen Huallpa	Estudio fitoquímico de Salvia pseudorosmarinus Epling (Lamiaceae) nativa del Peru
P-19	Margarita Montañez	Electronic properties of Cu ₃ (BTC) ₂
P-21	Nahuel Montebianco	Identificación y caracterización de minerales de tierras raras en peru
P-23	Elwin Luis Huaman Quispe	Linked data and public data to improve tourist information services
P-25	Isabel Janet Bejarano-Alva	Advances and challenges of the use of anion exchange resins as heterogeneous catalysts for the biodiesel production: a review
P-26	J. Biehl	Implementing SEA in Peru – on track from a donor-driven approach towards ownership?
P-27	Rosa Calderon	EKPA'PALEK: Empowering Latin Students Professional Development in your hands
P-28	Helen Pamela Pasapera Santos	Estimación de la edad dental en niños con osteogénesis imperfecta
P-29	Alexander Raqui	Diseño, fabricación y caracterización de sensores blandos multiescala
P-30	Khaterine Salazar-Cubillas	Estimación de proteína no degradada en el rumen y proteína bruta utilizable de forrajes tropicales usando técnicas in situ e in vitro
P-33	Elizabeth Rodriguez	Potencialidades del nostoc sphearicum para enfrentar la desnutrición crónica infantil y la tbc
P-36	Luis Alfredo Espinoza Espinoza	Helados saludables elaborados con aceite de oliva, castañas (castanea sativa, miller) y goma de tara (caesalpinia spinosa)
P-37	Luz Arelis Moreno Quispe	Desafíos de la Prevención de Caries dental en el Perú
P-38	Lorena Ramirez	Characterization of clock-output genes and stress response in potato (S. Tuberosum L.)
P-40	Gustavo Quino	Mediciones sonoras en materiales granulares
P-41	Jeannet Lingan	SISAY: Plataforma de Mentoría en Línea para estudiantes de Ciencias, Tecnología e Ingeniería
P-42	J.R. Barrios	Energética molecular de los antioxidantes tirosol, hidroxitirosol y resveratrol
P-43	Yurema Alencastre Andia	Dieta e hipersensibilidad dental: manifestaciones frecuentes de dolor y erosión en los dientes
P-44	Angela Quispe-Salcedo	Beyond the dental chair! - in vitro and in vivo approaches to analyze the process of tooth repair and regeneration
P-45	J.A. Dulanto	Hydrogenated aluminum nitride passivation layers doped with terbium and ytterbium rare earths for photovoltaic applications
P-46	Edilberto Vicente. Medina-Cabrera	Identification and Optimization of Exopolysaccharides (EPS) from Microalgae
P-47	Nahuel Montebianco	Cientificos.pe, el espacio de encuentro virtual de los científicos peruanos
P-48	Juan Carlos Bazo	Analysing weight after anti-psychotic drug treatment: understanding missing data behaviour and its impact on estimates in longitudinal electronic health records
P-49	J. Lamas-Valverde	Observatorio de política científica: El aporte de la ciencia para determinar necesidades, desafíos y oportunidades de desarrollo se constata en toda sociedad avanzada. En este documento la reflexión se concentra en la efectividad de las medidas en marcha y en cómo se integra el avance científico alcanzado por peruanos post-/graduados en el extranjero.
P-52	Manuel Encalada	Evaluation of the Tissue Transglutaminase activity on an in vivo model.
P-53	Dora Quispe	Horizontal Gene transfer contributes to plant evolution: the case of Agrobacterium T-dnas.
P-54	Greta Arias Merino	Mortalidad debida a enfermedades raras neurológicas en europa
P-55	Jorge Morales	Study of the interface between imidazolium-based ionic liquids electrolytes and lithium metal electrode
P-57	Antonella Raffo Romero	The early phase of microglial activation in leech CNS repair involves a tgfb-dependent signaling
P-58	K. Contreras	Iniciativas de cooperación internacional entre Francia y Latino-América: Ejemplo "Red nanoandes", "Spectra" y 'optoandina'

Quantum Computers and Quantum Simulators

Prof. Enrique Solano

Director of the research group "Quantum Technologies for Information Science (QUTIS)", www.qutisgroup.com,
University of the Basque Country, Bilbao, Spain

Abstract: I will pedagogically introduce quantum computers and quantum simulators from a wide interdisciplinary perspective. The goal is the systematic and scalable use of the fundamentals of quantum physics for the sake of computational speed-up. Along these lines, I will describe the key features that differentiate a variety of quantum computing and quantum simulation paradigms, as well as the diversity of quantum platforms that are being developed to realize them in the lab. Quantum computation and quantum simulation are two of the most challenging quantum technologies, which aim at transforming and enhancing the classical concepts of information processing and scientific modeling. Quantum supremacy, the moment in which scalable quantum machines outperform classical supercomputers, may be reachable in the upcoming years, paving the way towards the second quantum revolution.

Salud pública en el fenómeno del niño costero – 2017

Constantino Dominguez Barrera

Docente del DAMySP
Facultad de Medicina - UNMSM

El Niño Costero es una anomalía climática que se desarrolla exclusivamente en las costas de Perú y Ecuador, a diferencia del Fenómeno del Niño que se desarrolla a lo largo de las costas del Pacífico. Los efectos económicos del último fenómeno El Niño Costero parecen devastadores por la magnitud de los daños ocurridos en comparación con los de 1983 y 97-98. No solo por los 107 fallecidos, 35 heridos, 19 desaparecidos, más de 160,000 damnificados, 1'000,000 afectados, miles de kilómetros dañados (3 veces más que en el 97-98; 2,500 km vs. 720 aprox.) y centenares de puentes destruidos, sino también por el impacto en actividades productivas.

El Ministro de Economía y Finanzas, reconoció que la economía peruana pasará por una desaceleración en este año, pero luego se recuperará por un mayor gasto público en la reconstrucción: hay que reconocer que la economía peruana hoy día es diez veces más grande que la del 82-83 y cinco veces más grande que la del 97-98 entonces hay que ajustarlo por esos efectos por lo que las cifras de reconstrucción es aproximadamente de US\$ 25,655 millones. Sin embargo, cuando ocurre este tipo de desaceleración de la economía, pero después viene el proceso de reconstrucción y eso genera una expansión del gasto público. El asunto no solo es de dónde obtenerlos sino cómo priorizar los recursos que tenemos y sobre todo utilizarlos y gastarlos con pulcritud y eficiencia. Los recursos siempre serán escasos para las necesidades del Perú.

El sector salud tendrá la labor adicional en el control de epidemias por agua empozada, descomposición, insectos y plagas que acechan. La Salud Pública, es una disciplina científica, rama de la ciencia de la salud, que estudia el proceso histórico-social que desarrolla una sociedad para garantizar el derecho a la atención integral de la salud colectiva. Conscientes que la realidad sanitaria del Perú es heterogénea y rápidamente cambiante, consideramos necesario tener una visión más precisa de los impactos de los problemas de salud en la población, a través de indicadores determinen políticas inclusivas en el sector productivo.

RNAi-mediated strategy to control the african sweetpotato weevils *Cylas puncticollis* and *Cylas brunneus* (coleoptera, Brentidae)

Katterinne Prentice^{(1),(2)*}, Olivier Christiaens⁽²⁾, Marc Ghislain⁽³⁾, Godeleive Gheysen⁽²⁾, Guy Smagghe⁽¹⁾

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The African sweetpotato weevils *Cylas puncticollis* and *Cylas brunneus* (SPW) are considered the major threats to sweetpotato, which plays a vital role in food security and income generation for both the urban and rural poor in Sub-Saharan Africa (SSA). RNA interference (RNAi) technology can add genetic resistance against SPW in sweetpotato. The presence of an efficient RNAi response and the identification of suitable target genes are important prerequisites to use RNAi as pest control strategy. In this study, we confirmed the functionality of the RNAi mechanism in SPW by silencing *laccase2* through microinjection, a gene which is involved in the sclerotization of the exoskeleton. Subsequently, we performed a screening for lethality of 24 potential target genes by microinjection. Twelve and fourteen dsRNAs showed high toxicity with more than 90% mortality for both *C. puncticollis* and *C. brunneus*, respectively. Based on these results, the three most lethal dsRNAs were chosen for oral delivery assays. These revealed that dsRNA by oral exposure could elicit a significant toxicity on both insects, although less sensitive for *C. puncticollis*. *Ex vivo* assays confirmed that dsRNA uptake is affected by degradation in *C. puncticollis* digestive system. In this research, we proved that RNAi has the potential to control sweetpotato weevils, especially for *C. brunneus*, while the delivery of dsRNA and possible protection against degradation might have to be optimized in *C. puncticollis*.

Interferencia y compatibilidad electromagnética en dos sistemas de energías renovables

Ener Salinas

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Dos de las formas de energías renovables más conocidas y que más progreso han tenido en la última década son la energía eólica y la energía solar fotovoltaica (PV). Para poner un ejemplo, algunos pronósticos dan una capacidad PV instalada mundial que sobrepasará los 600 GW de potencia en el 2020, prácticamente doblando la capacidad PV actual (2017). Sin embargo estos desarrollos generan nuevos problemas que deben ser resueltos para mantener la eficiencia y la confiabilidad de estos importantes sistemas.

Uno de estos problemas es la interferencia electromagnética (EMI) que es la alteración o perturbación en el funcionamiento de un equipo electrónico o sistema eléctrico debido a campos electromagnéticos en la vecindad. EMI puede tener varios orígenes como atmosféricas (rayos), solares (eyecciones de masa coronal o CME). EMI también pueden ser causadas por los mismos componentes del sistema como convertidores que emiten campos magnéticos de alta frecuencia los cuales son capaces de acoplarse al cableado e inyectar EMI en la red eléctrica de transmisión y distribución.

Entonces utilizando simulación numérica de las ecuaciones de Maxwell y experimentación en el laboratorio se trata de hallar soluciones a dichas interferencias. Cuando esto se alcanza se dice que se ha hallado la compatibilidad electromagnética (EMC). Esta presentación se enfocará en EMI/EMC para sistemas grandes (> 1MW), como los parques eólicos y plantas solares gigantes; los cuales estarán conectados a la red eléctrica principal. Estos problemas están siendo tratados por varios grupos de investigadores en la organización CIGRE a los cuales el autor ha contribuido.

[1] J. Hoeffelman (Convener) CIGRE TB 320, “*Characterization of ELF Magnetic Fields*”, 2007.

[2] E. Salinas (Convener) CIGRE TB 373, “*Mitigation Techniques of ELF Magnetic fields*”, 2009.

[3] W. H. Siew (Convener) CIGRE TB 535, “*EMC in Power plants and substations*”, 2013.

[4] W. H. Siew (Convener) CIGRE WG C4.30, “*EMC in Wind Power Systems*”, TB submitted, 2017.

[5] E. Salinas (Convener) CIGRE WG C4.44, “*EMC for Large solar PV Systems*”, started in 2017,

<http://c4.cigre.org/WG-Area/WG-C4.44-EMC-for-Large-Photovoltaic-Systems>

Physiological effects of short acute UVB treatments in *Chenopodium quinoa* Willd

Thais Huarancca Reyes^{(1),*}, Andrea Scartazza⁽²⁾, Antonella Castagna⁽¹⁾, Eric Cosio⁽³⁾, Annamaria Ranieri^{(1),(4)}, Lorenzo Guglielminetti^{(1),(4)}

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Increased ultraviolet B (UVB) radiation due to global change can affect plant growth and metabolism. Here, we evaluated the capacity of quinoa to resist under short acute UVB irradiation. Quinoa was daily exposed for 30 or 60 min to 1.69 W m⁻² UVB. The results showed that 30 min exposure in 9 d-course did not cause severe alterations on photosynthetic pigments and flavonoids, but a significant increase of antioxidant capacity was observed. Otherwise, 60 min UVB in 5 d-course reduced almost all these parameters except for an increase in the de-epoxidation of xanthophyll cycle pigments and led to the death of the plants. Further studies of gas exchange and fluorescence measurements showed that 30 min UVB dramatically decrease stomatal conductance, probably associated to reactive oxygen species (ROS) production. Inhibition of photosynthetic electron transport was also observed, which could be a response to reduce ROS. Otherwise, irreversible damage to the photosynthetic apparatus was found with 60 min UVB probably due to severe ROS overproduction that decompensates the redox balance inducing UVB non-specific signaling. Moreover, 60 min UVB compromised Rubisco carboxylase activity and photosynthetic electron transport. Overall, these data suggest that quinoa modulates different response mechanisms depending on the UVB irradiation dosage.

Re-thinking Ecological Infrastructure in contested peri-urban areas in cities in dry climatic conditions in the so-called Global South

MSc. Rossana Poblet(1)* , Dr. Liza Griffin(2)

⁽¹⁾ *Architect and urban planner, former researcher at the Development Planning Unit, University College London (UCL) and Institute of Landscape Planning and Ecology (ILPÖ), University of Stuttgart*

⁽²⁾ *Development Planning Unit, University College London, United Kingdom*

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To respond to some of the modern urban challenges including climate change effects, ecosystems degradation and unsustainable urban development, international level sustainable planning and design approaches concepts, such as ecological infrastructure (EI) or green infrastructure (GI), have been developed signaling a shift from engineering-based approaches towards a new ecosystem-based approach. These new approaches, designed primarily in relation to temperate climates, are intended to recover and strengthen ecosystems and thereby support the provision of ecosystem services. Many of the principles, models and guidelines of EI and GI are gaining rapid acceptance between worldwide decision-makers, for instance, by the European Commission (EC) being its principles also adapted and transferred to other regions, including cities in arid climatic conditions. However, these concepts have mainly a scientific and technological-based approach overlooking social and cultural processes, eco-social cycles and the existing power relationships characterising cities in the so-called global south. Therefore, there is a risk of implementing technocratic fix designed to respond to economic and environmental needs, but that overlooks complex social relations. In this regard, my presentation aims to identify and reflect about existing “sustainable/ecological” concepts and its adaptation in different contexts. At same time it tries to reflect on the relevance of including social-cultural-economical processes in these concepts and how to effectively integrate local knowledge to co-led these processes/concepts. This research aims to build upon the international research projects “Integrated Urban Planning Strategies and Planning Tools: Lima Ecological Infrastructure Strategy – LEIS”¹ , part of the “Sustainable Water and Wastewater Management in Urban Growth Centres Coping with Climate Change - Concepts for Lima Metropolitana (Peru) - (LiWa)”² , Germany and Peru (2011-2014), and “Disrupting Urban ‘Risk Traps’: Bridging finance and knowledge for climate infrastructure resilience planning in Lima”³ , United Kingdom and Peru (2015-2016) and considering the 2030 Agenda for Sustainable Development and the New Urban Agenda.

¹ Eisenberg, B., Nemcova, E., Poblet, R., and Stokman, A. (2014), Lima Ecological Infrastructure Strategy, Integrated urban planning and design tools for water-scarce city. Institute of Landscape Planning and Ecology, University of Stuttgart, ISBN: 978-3-00-047557-3.

² <http://www.lima-water.de/>

³ <http://www.climasinriesgo.net/>

Estimación del desplazamiento co-sísmico asociado al sismo de Acarí del 25 de Setiembre de 2013 (Mw=7.0) y deformación intersísmica (2012-2013) en el sur del Perú usando geodesia espacial

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Los grandes terremotos ocurren en zonas de subducción como la que forma la convergencia de las placas Nazca y Sudamérica frente a las costas del Perú. Esto hace indispensable estudiar el ciclo sísmico asociado a dichos eventos con la finalidad de evaluar su potencial sísmico (magnitud del próximo evento) y la amenaza que representan para la población. En este contexto, el sur del Perú ha sido escenario de grandes terremotos como el sucedido en Agosto de 1868 que alcanzó una magnitud de 8.8 Mw con epicentro aproximado frente al puerto de Arica y extensión de ruptura de 500 kilómetros [Dorbath et al., 1990; Bejar et al., 2010]. Desde entonces sólo el terremoto de Arequipa 2001 [Tavera, 2002] de magnitud Mw 8.2, ha ocurrido en la región, la longitud de ruptura de este evento de aproximadamente ~300km (Pritchard et al., 2007), cubriendo parcialmente el área de ruptura del gran terremoto de 1868, por lo que se considera que el segmento de la zona de subducción entre Ilo y Arica está en un período de silencio sísmico. Este estudio muestra el actual campo de velocidades intersísmico en esta región basado en información obtenida de una red de estaciones GPS de campaña, así como estaciones permanentes instaladas mediante convenio de cooperación científica entre el IGP y el Institut des Sciences de la Terre (ISTERre) de Grenoble-Francia, entre 2010 y 2013. Se muestra también el movimiento cosísmico producido por un terremoto de magnitud Mw 7 ocurrido el 25 de setiembre de 2013 y cuyo epicentro fue localizado cerca de la localidad de Acarí (15.839°S, 74.511°W). Los resultados muestran que el campo de desplazamiento en las estaciones costeras en la zona epicentral es pequeño y particularmente el movimiento cosísmico en la estación BASU medido es de 1.6mm para la componente este oeste y de 5.7mm para la componente norte-sur.

Inherited Cancer

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Adult onset cancer is a function of age, which means that we all have a probability to contract cancer each year we live. This probability varies with gender and age and is influenced by environmental factors. From the previous belief that cancer was caused by growth-genes (oncogenes), it was clarified that these genes could not be better functioning than when normal, the problem was the regulatory systems turning them on and off. In short, the problem is that growth genes has to be turned off to control cell growth. These downregulating genes are referred to as supressor genes. With very few exceptions, inherited cancer is in-borne defects in supressor genes, with the consequence that cellular growth is not downregulated and cellular growth becomes out of control, which is the cause of a tumour leading to cancer. The consequence is that persons born with such genetic defects have a higher probability per year to contract cancer. In early embryonic life cells are destined to become different types of tissues, and all their offspring cells will have all other genetic information made unavailable.

The different tissues are using different systems of supressor cells to regulate cell growth. In consequence, inborn errors in given supressor gene will have different impact on cancer probability in different organs. When an organ is dependent on one system and have no very good back-up mechanism if this system fails, the person with a genetic inborn defect in that system will have an increased risk of cancer in that organ. The BRCA1/2 genes, despite being functional in all our cells every day, this way increase the risk for breast cancer and ovarian cancer when deranged. In contrast, the mismatch-repair genes MLH1, MSH2 and MSH6 - despite being instrumental in all our cells every day - increase the probability for gastrointestinal and gynaecological cancer when deranged.

**“El Niño forecasting based on network analysis”
as part of EPICC (East Africa – Peru – India Climate Capacities), a planned IKI-
BMUB project for international climate research cooperation**

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The overarching goal of EPICC is to strengthen resilience against disruptive weather phenomena and climate change at national, regional and local level in three partner countries: India, Peru and Tanzania. The project will cover four major complementary fields: *Climate, Hydrology and Water Resources, Agriculture and Migration*.

Next to close cooperation with national ministries and authorities (e.g. national meteorological services) as well as end users in relevant sectors (e.g. local water managers and farmer associations), research cooperation is a major goal. Co-production of relevant knowledge, based on state of the art research in the related fields, will lay the foundation for embedding improved climate services into sectors impacted by climate change through multi-lateral partnerships between sciences, governments and relevant end-users.

One of the research topics within the field of *Climate* is the long-term forecasting of El Niño. A method based on network analysis¹ has been successfully tested to forecast the 2015 El Niño more than one year in advance². The method is based on the observation that a large-scale cooperative mode is building up between the El Niño basin and the rest of the Pacific Ocean in the calendar year before a pronounced El Niño event. The analysis of the link strength between these two regions serves as the crucial indicator for the cooperative mode.

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Taxonomic Revision and Evolutionary History of the Fern Genus *Salpichlaena* (Blechnaceae)

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The neotropical fern genus *Salpichlaena* (Blechnaceae) is interesting both because it has an unusual climbing habit and because there has been much debate during the past three decades about how many species the genus contains. Some researchers recognize 2 or 3 species in the genus whereas others consider there to be just one. The habit of these plants has caused some difficulty for taxonomical work. They have twice pinnate twining leaves that can grow more than 15 m long, and the pinnae vary considerably in both size and shape according to their distance from the rhizome. We have now systematically observed 62 morphological traits on 183 herbarium specimens of *Salpichlaena*. We have also sequenced three plastid genes (*rbcl*, *rpoC1* and *rps4*), two plastid intergenic spacers (*trnH-psbA* and *trnG-trnR*) and a nuclear gene (*pgiC*) from 46 *Salpichlaena* and nine out-group specimens to run phylogenetic analyses. We found that pinnule apex shape, margin and texture of the lamina, shape of scales of the costules, buds and stomata are the most informative traits for distinguishing the species. Our preliminary results indicate the presence of at least three species in the genus *Salpichlaena*, and that their distribution is related to geographical and ecological factors.

Fabrication of nonperiodic metasurfaces by microlens projection lithography

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Optical metasurfaces, period, quasiperiodic, or aperiodic patterns of nanoscale metal or dielectric features with subwavelength spacing, enable a degree of engineered control over local and scattered electromagnetic fields not possible with natural occurring materials¹. These materials have the potential to become key components in sensitive chemical and biological sensors and flat optics. Current methods cannot fabricate new designs with the required feature sizes both rapidly and over moderate areas ($\sim\text{mm}^2$ - cm^2) despite several strategies have been proposed.

This work describes a method for fabricating infrared metasurfaces that combines the simplicity of self-assembly with the precision of projection lithography to offer new capabilities in the rapid-prototyping of periodic and quasiperiodic metasurfaces, particularly those with feature sizes in the range of 0.4 – 10 μm . This method of “template encoded microlens projection lithography” (TEMPL) enables rapid prototyping of planar, multiscale patterns of similarly shaped structures that are defined by local projection lithography with a single microsphere acting as a lens. The use of TEMPL was explored for the fabrication of a broad range of two-dimensional lattices with varying types of nonperiodic spatial distributions. The matching optical spectra of the fabricated and simulated metasurfaces confirm that TEMPL can produce structures that conform to expected optical behavior.

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Prioritizing natural product diversity in three *Alstonia* spp. endemic to New Caledonia through massive multi-informative molecular networks

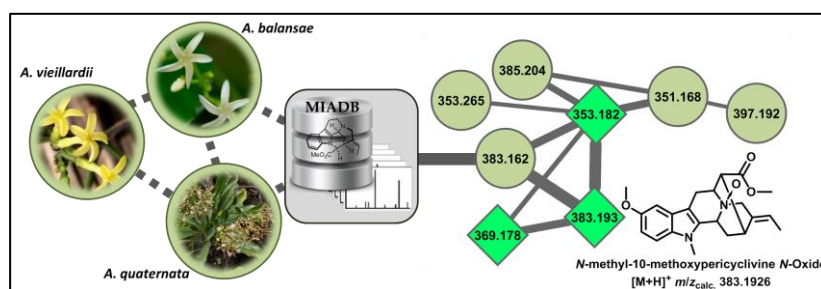
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Throughout the six past decades, Apocynaceae plants have drawn the interest of generations of chemists due to their content in Monoterpene Indole Alkaloids (MIAs), a therapeutically valuable class of natural products. [1, 2] Recent advances in bioinformatics and analytical chemistry, particularly in mass spectrometry, have enhanced the field of natural product discovery. Recently, molecular networking is emerging as a promising computer-based approach to visualize and organize tandem MS/MS data sets and to automate database searches for secondary metabolite identification within complex mixtures. In that context, this dereplication technique has been exploited by our team to undertake the phytochemical study of three New-Caledonian *Alstonia* spp. [3] Using this approach, we have sought to develop an efficient tool able to prioritize identification and isolation of new MIA-type alkaloids from complex plant natural extracts, with the objective to create a large chemical library for biological screening. This tool is based on the implementation of an in-house MIAs MS/MS DataBase (MIADB), which benefited from our historical collection of natural alkaloids. [4] The present communication describes the dereplication of eighteen known alkaloids from the dried stem barks and leaves of *Alstonia balansae* Guillaumin, *Alstonia vieillardii* Van Heurck & Müll.Arg., and *Alstonia quaternata* Van Heurck & Müll.Arg., as well as the MS/MS guided isolation of six new alkaloids.



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Molecular studies of dyslexia susceptibility genes

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The era of molecular analysis of developmental dyslexia (DD) started in 2003 by the publication of the first candidate gene for dyslexia susceptibility, *DYX1C1*. Later, discoveries based on a combination of genetic approaches have dramatically increased the number of susceptibility genes for DD. *DYX1C1* and *DCDC2* among other genes have been confirmed in a number of studies, and we have the first neurobiological insight to the mechanisms of dyslexia. Much of this progress is coming from the last 4-5 years and led us to propose dyslexia as a new group of ciliopathies affecting neuronal migration, axonal guidance and causing structural effects on brain specific regions.

In the long run, we hope that a deeper knowledge acquired about the genes and proteins involved in DD will be reflected in earlier detection and support better diagnosis for the DD individuals and that understanding mechanisms regulating this specific cognitive problem may yield insight into the evolution of language capabilities that are specific to human, among all species.

El problema de los grafos isomorfos: el algoritmo de Babai

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Sean dados dos grafos - digamos, dos diagramas de moléculas. Supongamos que son bastante grandes. ¿Como podemos determinar si son, en verdad, el mismo grafo? Este es el problema del isomorfismo de grafos. Existen algoritmos prácticos para resolver este problema, pero no siempre funcionan. Examinaremos el reciente algoritmo de Babai, el cual siempre da la respuesta correcta, y funciona en tiempo cuasi-polinomial. La explicación será una versión ligera de aquella en mi reciente charla en el seminario Bourbaki.

Ow *Telipogon Peruvianus* (Orchidaceae) Flowers Cheat their Tachinid *Eudejeania* Male Pollinators?

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Telipogon is a Neotropical orchid genus that grows exclusively at mid elevations in the moist and cloud forests of Central and South America. The pollination system in *Telipogon* is through sexual deception in which the flowers mimic the females of their tachinid fly pollinators. *Telipogon peruvianus* has evolved a particular pollination system in which male tachinid flies of *Eudejeania* aff. *browni* developed precopulatory behavior only. However, the basis of how tachinid male pollinators are attracted to the flowers are largely unknown. Therefore, our aim was to identify the basis of the pollinator attraction in *Telipogon peruvianus*. To do so, we carried out floral scent collection, chemical analysis, electrophysiological analysis, colorimetric analysis and behavioral experiments in wild populations of Peru. We show that male pollinators are able to smell some compounds of the odor floral bouquet of *T. peruvianus* flowers and that synthetic mixtures of those electrophysiologically active compounds are attractive as much as the flowers of *T. peruvianus* itself. Some of those electrophysiologically active compounds were also found in the cuticular hydrocarbon extracts of the pollinators' attractive females.

Furthermore, *Telipogon peruvianus* flowers also reflect UV wavelengths as it was observed in the flowers of *Dendrophorbium longilinguae*, on which the tachinid pollinators feed. We propose that *T. peruvianus* flowers imperfectly mimic two models, the female tachinid fly and the flower where tachinid pollinators feed. Our conclusion is that although both olfactory and visual stimuli are important for pollination attraction, olfactory stimuli are key in the cheating of *Eudejeania* aff. *browni* males and guarantee the pollination success of the sexually deceptive *Telipogon* orchids.

Constructed wetland, a wastewater treatment approach for urban and rural areas

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Natural wastewater treatment technologies like constructed wetlands (CWs) are efficient approaches to increase the sanitation coverage around the globe. The goal 6 of the Sustainable Development Goals expects in 2030 to "achieve access to adequate and equitable sanitation and hygiene for all and end open defecation" and CWs are a simple low-cost technology accessible to everyone. This technology is not only able to treat wastewater to meet water reuse and disposal quality guidelines, but also to fit within the urban and rural environment since it provides green areas. The recent drastic increase in the world's population has led to the main disadvantage of rapid urbanization and more dark-construction (concrete) in spaces that used to be natural open spaces. The only water resource that grows together with the population is wastewater. Therefore, treating this resource with a green technology, that increases the green areas in a city, and to reuse the water for the needs of the population is a valid initiative towards fulfilling the basic right of sanitation in urban but also rural areas, where the distance to the centralized treatment plant is always problematic [1].

This study summarizes the benefits of CWs to be implemented around the globe and will focus on: (i) types of CWs and efficiency, (ii) weather conditions to guarantee treatment success, (iii) green areas and CWs - Water Sensitive Urban Design Concept, (iv) the challenge to built CWs in megacities and (v) case-studies and possibilities to develop and spread them in Peru.

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Frequency Determination of the TEP1 alleles in *Anopheles gambiae s.s.* collected in Angola between 2002 and 2010.

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Human malaria is a parasitic disease caused by five species of the genus *Plasmodium* that are specifically transmitted by *Anopheles* mosquitoes. The importance of the gene TEP1 in the mosquito immune response to *Plasmodium* infection has been demonstrated [1,2]. This gene has four alleles, two of them associated to the resistance against *Plasmodium* infection (R1 and R2) and two associated with susceptibility to infection (S1 and S2).

The present work aimed at genotyping the TEP1 gene in the malaria vector *Anopheles coluzzii* collected in Luanda, Angola, in 2006 and 2010. For the purpose, a PCR-RFLP assay was performed using three different restriction enzymes (*Hind III*, *BamH I* and *BseN I*) in DNA samples from mosquito specimens previously identified to species by PCR.

Nineteen specimens from 2006 were all genotyped as S1/S1 (susceptible). Forty-five samples from 2010 were analyzed and the genotype frequencies were 80.1% S1/S1, 4.4% S1/S2, 13.3% S1/R2 and 2.2% S1/R1,

These preliminary results show the presence of R1 and R2 alleles only in the sample of 2010, suggesting a recent introduction/selection of *Plasmodium*-resistance alleles in this vector population. However, more samples need to be analyzed to confirm these results.

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Andean grains: Nordic perspective of food research and development

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The potential of Andean grains as *food for the future* has been recognized by scientists, governmental agencies and international organizations such as FAO. One of the best-known characteristics of Andean grains such as quinoa (*Chenopodium quinoa*) is their high-quality protein, comparable to that of animal origin. Upon cultivation, plants can be very resilient to draught, low temperatures, high salinity of soils and fungal infections thereby increasing their adaptability to foreign cultivation areas (outside the Andean Plateau). Despite this, the recent popularity of Andean grains in Nordic countries responds to a hype for gluten-free products that should also satisfy consumers' nutritional needs and expectations. Thus, Andean grains are formidable candidates for food development in Nordic countries but there are still major challenges regarding their sustainability. Andean grains are mostly imported from South America (Peru and Bolivia) and this increases the carbon footprint associated to their utilization. At University of Helsinki, primary focus was given to: (i) the mechanical, physicochemical and sensory properties of extruded snacks (cereal breakfast) and confectionary products (liquorice) following the incorporation of three Andean grains: quinoa, amaranth (*Amaranthus caudatus*) and kañiwa (*Chenopodium pallidicaule*), (ii) the study of protein oxidation in oil-in-water emulsions obtained from quinoa and amaranth proteins, (iii) characterization of starch granules from individual cultivars of quinoa and kañiwa, (iv) screening of mycotoxins in cultivars of quinoa and kañiwa harvested in South America and Northern Europe between 2015 and 2017. In conclusion, studies have gone beyond whole-grain food development, into the fractionation of grain components (from individual cultivars) in order to assess their potential as novel ingredients.

Marine Macrobenthic Communities Associated To Peruvian Scallop *Argopecten Purpuratus* Culture (Macops): Structural and Functional Diversity, Feeding Ecology And Contaminant Exposure

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An integrated approach was developed in order to determine different environmental status in Sechura Bay (SB) and front the Illescas Reserved Zone (IRZ) - Piura. Metals, stable isotopes, fatty acids and sediment quality parameters were analyzed in samples from southern and northern of SB and IRZ (summer ENSO-2016 sampling). Subsequently, a non-metric multidimensional scaling method (nMDS) (Bray Curtis similarity) and one-way analysis of similarity test (ANOSIM, the biochemicals: non-essential metals and biomarkers (fatty acids) in scallop *Argopecten purpuratus*, snail *B. ventricosa* and food sources (seston, POM and sediment) showed no differences between locations (one way ANOSIM; $p > 0.005$). The only significant differences ($p = 0.001$) were found between the trophic position components (primary consumer, carnivorous consumer and food sources) without any spatial variation. Based on $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$, crabs *Hepatus chilensis* and *Romaleon polyodon* showed the highest trophic level with $\delta^{15}\text{N}$ values of 12.68 ‰ and 12.29 ‰, respectively. The lowest values (down to 1.10 ‰) were measured for the food sources. *A. purpuratus* was more $\delta^{15}\text{N}$ -depleted (6.96 - 8.45 ‰) than its potential predators. This points at its role as intermediate consumer and main food item for the predators in the benthic food webs of SB and IRZ. Mean $\delta^{13}\text{C}$ values for predators of *A. purpuratus* were between -12.25 and -15.26 ‰, while the food sources showed high variations because the fresh and brackish-water input. For metals, around 20 and 30% of molluscs and crustaceans exceeded the maximum residue levels (MRLs) for inorganic As, while 10 and 40% for Cd. Other metals such as Cr, Ni, Cu, Zn and Pb exhibited generally concentrations below the MRLs. Integrated risk indexes were estimated to determine if there is a health risk for consumption. Provisional tolerable weekly intake (PTWI) for Cd was exceeded in *Bursa ventricosa* at IRZ. Target cancer risks (TRs) for inorganic As were always higher than the threshold (1×10^{-6}), therefore a cancer risk could be posed.

Keywords: Benthos, metals, stable isotopes, fatty acids, Piura

Chitosan/poly-cyclodextrin hydrogels and sponges for bone tissue engineering application

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Bone defect repair using the tissue engineering (TE) approach is viewed as an efficient alternative to the traditional use of bone grafts. Hydrogels, as well as sponges, can be used as TE scaffolds to mimic extracellular matrix topography and to deliver bioactive agents. Chitosan (CS), a natural cationic polymer, is an excellent excipient to prepare hydrogels due to its non-toxicity, biodegradability, and capacity to form composite scaffolds with other polymers or inorganic materials. A physical CS-hydrogel preparation by non-covalent strategies avoids the use of cross-linkers, and consequently the cytotoxicity thereof. The aim of this study is to develop a physical hydrogel, based on polyelectrolyte complex of CS with an anionic polymer of cyclodextrin (PCD) that could be used for bone TE.

A CS with a deacetylation degree of 73.3% and a molecular weight of 150 kDa was used in this study. Hydrogels were prepared by firstly co-milling the powder of CS and PCD in a mixer mill (10 Hz, 3 min) to obtain a CS/PCD powder. Then the collected powder was mixed with a 1% lactic acid solution by two interconnected syringes. Different CS:PCD ratios, *i.e.* 3:3 and 3:5 w/w, were used. The obtained hydrogels were characterized by assessing their cohesion in phosphate-buffered saline (PBS, pH 7.4) and their rheological properties. Sponges were obtained by freeze-drying the hydrogels and thermo-treated at 140°C for 1.5 h. The microstructure, the swelling behavior and the degradation rate of sponges were evaluated. Response of pre-osteoblast cells (MC3T3-E1, ATCC) to the extract of sponges and to the sponges was evaluated via AlamarBlue® assay and scanning electronic microscope.

For both CS:PCD ratios, hydrogels showed a good cohesion in PBS till 1 h after injection in PBS, and rheological analysis indicates similar viscoelastic properties. In general, all sponges showed a high swelling rate (up to 3 times of its dry weight). The degradation study showed a similar profile for both ratios and reached a plateau after 24 h up to 5 days (~13% weight loss). All sponges presented a porous microstructure, good cytocompatibility (cell survival >95%) and cell adhesion inside the sponge was also demonstrated.

To conclude, CS/PCD hydrogels were developed and the ratios studied showed very similar characteristics both in hydrogels and in sponges. These promising materials could be injected into bony void or transformed into 3D sponge scaffolds for bone TE, respectively. Incorporation of hydroxyapatite into hydrogel will be studied for further improving their properties.

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Mitochondrial DNA and Y-chromosome diversity in the cloud forest area of northeastern Peru (O)

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Our research focuses on the origin and population history of the human communities that inhabit the cloud forests of northeastern Peru, with both contemporary and ancient DNA data. Here we report preliminary results and conclusions from the study of the contemporary genetic diversity. Previously, we used 23 Y-chromosomal STRs and mtDNA sequence (HVR1 and HVR2) data from four populations: Chachapoya, Huancas, Jivaro and Cajamarca. Both lineage marker data showed high levels of genetic diversity for all populations, especially in the Chachapoya (e.g. $h=0.9974\pm 0.0032$ / Y-chromosome). Interestingly, this population also shows signatures of population expansion for both markers such as unimodal mismatch distribution pattern, large Tajima's D ($D=-1.51132$, $p=0.0309$) and Fu's F_s ($F_s=-23.98616$, $p=0.0018$) values. Additionally, in Neighbor-Joining trees, the Chachapoya assumes a basal position among most South American populations (1). This evidence points to a complex and distinctive past demographic history in the region.

To deepen our understanding on various demographic processes in this area, located in the juncture of two major ecosystems, the Andes and the lush Amazon, we have produced a subset of whole mtDNA ($N=162$) and Y-SNP ($N=110$) data, which is currently being analyzed in a population genetic framework. This will allow us e.g. to make haplogroup assignments more accurately, but more importantly, it will serve to test several hypotheses such as the existence of a constant effective population size (N_e) through time in the Chachapoya. This and other questions of population genetic interest, in a region of South America little explored until now, will be addressed in this presentation.

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A series arc fault location algorithm based on an the impedance method for a domestic AC system

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Series arc faults appear frequently and unpredictably [1] in low voltage distribution systems when degraded and aged wires are in contact with each other. Many methods have been developed to detect this type of fault, including commercial protection systems, which have been successfully used in home electrical networks. However, a fault location methodology in low voltage systems has not been properly developed. In this context, knowing the distance at which a fault occurred could avoid damage as well as catastrophic incidents such as fires [2].

Much effort for locating arc faults has been devoted to developing algorithms using the impedance method, traveling wave methods and intelligent methods. However, these methods principally locate parallel faults on high power distribution systems. Some work based on reflectometry methods (TDR, STDR) has resulted in the development of algorithms for locating intermittent electric faults, mainly in the electrical systems in aircraft.

Few studies have been dedicated to locating parallel faults in short indoor power lines using the impedance method. The work developed by Yang Cao et al. [3] implemented an algorithm to locate a series arc fault in an experimental DC electrical system consisting of physical modules that emulate an indoor power line of 1200m. Using a similar approach, we have developed an algorithm for estimating the location of a series arc fault in a domestic AC experimental indoor power line using physical parameters of the electrical line (impedance method).

Our algorithm estimates currents at several hypothetical fault points on the line, using recorded data at both ends of the indoor power line, by looking for a current difference minimization. The test bench used for our purpose is composed of a 49 meter indoor power line used in domestic networks (220V–50Hz) and a 47 ohm power resistor load. An arc fault (carbonized path) can be inserted at many different points (40 are available) across the line.

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Layer-By-Layer Coating Of A Polyester Non Woven With Chitosan And Poly-Cyclodextrin As Antibacterial and Anti-Inflammatory Wound Dressing

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Chronic wounds represent a public health problem, the prevalence increases with age and patient health. The risk of infection of chronic wounds is important and associated to inflammation and delay of healing process. The aim of this work is to develop a bioactive textile based on a multilayer system which provides dual therapy (i.e. antibacterial (silver ion) and anti-inflammatory (Ibuprofen)) in order to enhance the wound healing process.

A non woven polyethylene terephthalate (PET) textile was functionalized by a citric acid crosslinked β -cyclodextrin polymer (poly β CD) to obtain a first negatively charged layer (PET-CD) and loaded with a silver sulfate solution (10g/L) to obtain the antibacterial layer (PET-CD-Ag). A stable layer-by-layer system was built by dip-coating technique with CHT as positive polyelectrolyte (0.5% w/v) and poly β CD as negative polyelectrolyte (0.3% w/v). The swelling ratio was determined in a solution containing 2.5 mM CaCl_2 and 142 mM NaCl. The antibacterial activity of the wound dressing was evaluated on *S. aureus* (CIP224) and *E. coli* (K12) by kill-time method. The silver amount was quantified by absorption atomic spectroscopy. Furthermore, the PET-CD-Ag-PEM textiles were impregnated in an ibuprofen solution (PET-CD-Ag-PEM-IBU). HPLC method with UV detection (254 nm) was used to determine the amount of drug loading into the textile. The release profile of ibuprofen was determined in dynamic condition with a USPIV apparatus (Sotax[®], 37°C, PBS pH 7.4 solution, 5 mL/min) coupled with a UV/Vis spectrophotometer.

The LbL construction (up to 10 bilayers) was linear and identical on PET-CD and PET-CD-Ag. The swelling ratios of textiles increased up to 50% allowing the hydration of the wound for the healing. Kill-time test revealed a 3 log reduction of *E. coli* and *S. aureus* in contact with PET-CD-Ag-PEM textile to avoid with faster action on *E. coli* (at 4 hours) compared to *S. aureus* (24 hours). After impregnation of textile in ibuprofen solution (1g/L), 30-fold improvement of drug loading was observed with PET-CD-Ag-PEM textile (0.823 mg/g vs 0.027 mg/g (virgin textile)). In dynamic condition, the ibuprofen release was extended to 4 hours in case of textile containing LbL system.

The textile coated with the LbL coating provided a sustained anti-infective activity against both bacteria strains and prolonged release of ibuprofen. These properties were due to both ion exchange and host-guest interactions of Poly β CD toward Ag^+ and ibuprofen, respectively. This work demonstrated the good potential of this method for the elaboration of as versatile wound dressing medical device.

Investigating the influence of sample size on the fatigue damage evolution in micro scale samples

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Fatigue is one of the leading causes of failure in many engineering components. The recent growing interest in small scale materials for micro-electro-mechanical systems have raised new questions regarding the physical-size influence on fatigue. As the scale is in the range of typical fatigue dislocation structures, i.e. persistent slip bands (PSBs), size limitations on the formation of PSBs, cell structures and the initiation of fatigue cracks at grain boundaries (GB) are some of the relevant questions to be answer.

Grain boundaries are important planar defects providing substantial strengthening mechanisms in polycrystalline materials. However, due to elastic and plastic incompatibilities additional stresses are created at grain boundaries, which could lead to slip transfer, fatigue crack nucleation, etc. Micron-sized bicrystals can be employed to estimate local stresses and strains, which are associated with the stress-strain response, to get a better understanding of the role of GB. *In-situ* micro-fatigue experiments not only provides information of microstructure and damage evolution, but also of local stresses (Figure 1). On that account, our research focuses on cyclic fatigue of single and bi-crystalline micro-samples under full load reversal in order to study the influence of the sample size, crystal orientation, the dislocation density and grain boundaries on the PSBs, cell structures and damage morphology.

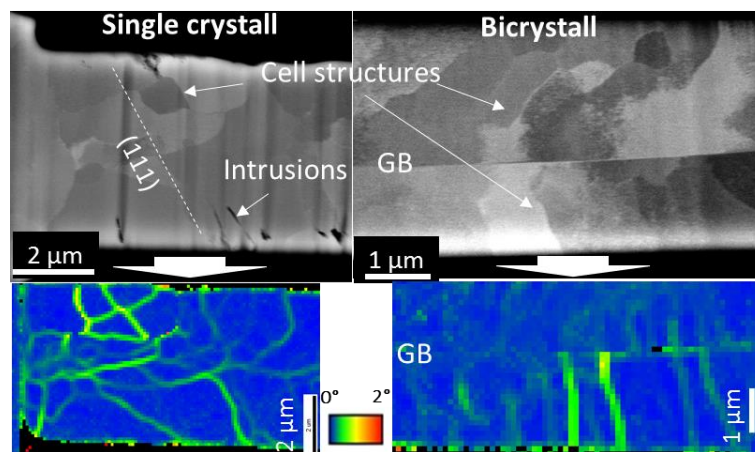


Figure 1. Backscattered electron and kernel average images of single and bi-crystals after micro-fatigue tests

Optical Monitoring of the Atmosphere

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LIDAR (Light Detection and Ranging) is the only remote sensing technique that is capable to provide 3-dimensional range resolved measurements of atmospheric constituents like pollutants, humidity or the aerosol, and of atmospheric parameters like temperature or wind. Further perspectives arise from the advent of ultra-fast high-power laser sources which are capable to generate extended plasma channels in the air, so called filaments. Their extraordinary properties, like backwards-enhanced white light emission, plasma generation along their trajectories, and their electrical conductivity provide further fascinating perspectives for applications in atmospheric research and beyond. Examples are remote multi-component analyses of the air and the aerosol, bio-aerosol detection, hard target analysis and even lightning control.

Harvesting energy with new thermoelectric effects

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Spintronics -which exploits not only the charge but the spin of electrons- tackled an important advance in information technology thanks to the discovery of giant magnetoresistance (GMR) reported in 1988. Spintronics, among others applications, allowed reducing the size and increasing the capacity of the hard disk in our computers. In 2007 the discoverers of GMR were awarded the Nobel Prize (Albert Fert and Peter Grumberg). Recently, spin-orbit coupling leads to the discovery of new phenomena in spintronics like interconversion of charge current into a spin current: Spin Hall Effect (SHE) for 3D systems like heavy metals and alloys (NM), Edelstein effect (EE) for 2D systems like the new states of materials: Rashba interfaces and topological insulators (TI). TI material is essentially insulator in the bulk but has metallic states in the surfaces. The longitudinal spin Seebeck effect (LSSE) takes advantage of a vertical temperature gradient to generate a spin current inside a magnetic insulator (FI) and convert such a spin current in an output voltage due to the reciprocal effect, ISHE (IEE) in FI/NM (FI/TI) structure. I will describe those phenomena to predict a giant output voltage in a YIG/ α -Sn structure, where YIG (Y₃Fe₅O₁₂) is a ferrimagnet insulator and α -Sn is a new type of TI with large efficiency of spin-charge current conversion at room temperature. Thus this new thermoelectric effect open a road towards applications taking advantage of the energy that is wasted as a heat.

Aceleracion Hardware de Acoplamiento Molecular Usando OpenCL

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Acoplamiento molecular (molecular docking) es una metodología utilizada extensivamente en el diseño moderno de fármacos. Su objetivo es el de predecir la posición de enlace de dos moléculas por medio del cálculo de la energía de sus poses de enlace. Una de las herramientas software de acoplamiento molecular más citadas es AutoDock [1]. Básicamente, AutoDock resuelve un problema de optimización al generar un espacio extenso de posibles soluciones, y buscar dentro de este espacio a la pose de enlace de menor energía. Este algoritmo es complejo y su ejecución serial en CPU requiere de tiempos extensos. Utilizando aceleradores hardware y aprovechando el paralelismo intrínscico del programa, estos tiempos de ejecución pueden reducirse significativamente.

Este trabajo presenta una implementación paralela de AutoDock en OpenCL (Open Computing Language) [2], y la evaluación de su rendimiento en aceleradores hardware basados en CPU multicore y GPU. Los resultados muestran que OpenCL permite obtener simulaciones de acoplamiento molecular áltamente eficientes, alcanzando ejecuciones hasta 4 y 56 veces más rápidas comparados con la versión original de AutoDock, asimismo se logra un ahorro del consumo de energía en el hardware de hasta 2 y 6 veces para CPU y GPU respectivamente. Hasta donde se tiene conocimiento, este es el primer trabajo [3] que analiza la eficiencia en el consumo de energía en hardware ejecutando programas de acoplamiento molecular.

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La globalización Andina: La construcción del sentido y antropología de la estrategia: el caso del Codex “Martínez Compañón”

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La siguiente presentación es una introducción teórica-explicativa desde el punto de vista de la comunicación y de la antropología de la construcción del sentido durante el proceso de globalización colonial en la cultura andina.

Para esta finalidad, **primero el modelo auto-comunicativo de Jurij Lotman** se presenta como un instrumento, con el interés de conocer los tipos de significación, construcción simbólica y emocional, que induce la experiencia del dolor y sufrimiento en la elaboración mental del individuo según su cultura. **Segundo el arte**, para este caso, es concebido como: técnica, acción, información y comportamiento que vincula la persona con sus realidades sociales, interculturales y de globalización de su vida cotidiana.

Considerando estos elementos, antropológicamente se inicia observar que el individuo desarrolla *estrategias comunicativas y culturales en el afán de salvaguardar sus intereses y/o sobrevivencia.*

Integrando estos referentes de observación, el objetivo de nuestro trabajo es vincular la experiencia de la construcción del sentido en el proceso de globalización de culturas, el análisis antropológico y semiótico-comunicativo, serán aplicados al problema de la comprensión intercultural y como el individuo elabora estrategias con el fin de proteger sus intereses económicos ya sean psíquicos que materiales.

En tiempos de modernidad, las sociedades se interrelacionan dinámicamente, *haciéndose realmente necesario el entendimiento del otro*; por ello, es importante incorporar en el análisis las circunstancias vinculantes, conflictivas y complejas que promueven procesos de cambios.

Debido a la finalidad etnográfica e histórica del presente tema y para el estudio de la Antropología Andina y la construcción del sentido, se analizará un texto de la Música Barroca del Codex “Martínez Compañón” de Trujillo-Perú (1780) llamada: “pajonal”

Turismo Sostenible, Economía Circular y Comunicación de la Sostenibilidad

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El Turismo es el sector con mayor crecimiento respecto a los otros sectores económicos en el mundo. Italia es el quinto país más visitado del mundo¹. El Lago de Garda es el tercer destino turístico más visitado de Italia². Los recursos turísticos naturales y culturales de la tierra son limitados, el aumento de la población viajera y la difusión de una mejor calidad de vida de los países desarrollados a los países en vías de desarrollo nos hacen aprender a vivir, producir y consumir en modo diverso. El turismo mal gestionado como el consumo de agua en cantidad, consumo de energía no renovable, emisión CO2 por el transporte aéreo y el uso de combustible pesante por los cruceros crean impactos negativos en el Ambiente y en la Sociedad. Para garantizar una buena gestión llamada Turismo Sostenible entre el Patrimonio Natural y Cultural, las empresas turísticas y la comunidad local se debe: planificar en base a los 17 objetivos del Desarrollo Sostenible, adoptar un nuevo modelo económico circular e integrada que pueda regenerarse sola o pueda durar un largo periodo y crear consciencia ambiental a la población viajera a través de la Comunicación de la Sostenibilidad (Cultura de la paz, de la diversidad cultural y de los estilos de vida en armonía y respeto con la naturaleza. En conclusión, el Turismo Sostenible es un instrumento de la Comunicación de la Sostenibilidad que crea consciencia ambiental entre la población viajera y la residente del Lago de Garda y construye la base para un nuevo modelo económico circular e integrada entre la empresa y la comunidad local.

Palabras Claves: Turismo Sostenible, Economía Circular, Comunicación de la Sostenibilidad y Destino Turístico.

¹ UNWTO : World Tourism Organization

² Giornale Bresciaoggi 2015.

Linking up climate change mitigation and wildlife conservation: The case of Orangutans in Indonesia

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Tropical peat swamps provide numerous environmental services and contain 30% of the world's sequestered (or terrestrial) carbon. In Peru, peatlands studies are at the beginning, whereas in Indonesia they are studied for long time. Indonesia has 50% of the world's tropical peat swamp. However, Indonesia peatlands are under pressure due to land use change, deforestation and fire occurrence. Indonesia is one of the top green greenhouse gas (GHG) emitters with about 2 GtCO₂ equivalents/year. Peatland and forest fires are by far the largest contributors to Indonesia's GHG emissions. In 2015, approximately 2.6 million hectares of land in Indonesia were burned, half of it on peatlands. Therefore, at the COP 21 in Paris the Indonesian government announced plans to ban new developments and forest clearing in peatlands. Moreover, the government instructed to rewet drained areas by blocking drainage canals in order to reduce CO₂ emissions.

At the same time, efforts are made by the worldwide biggest primate conservation NGO, Borneo Orangutan Survival (BOS) to contribute to the conservation of the Bornean orangutan and its habitat through the involvement of the local population. One of the intervention areas is Mawas, located within the ex-Mega Rice Project in Central Kalimantan. Mawas encompasses around 300,000 ha, most of them peatlands, and is the home to one of the last tracts of forest supporting wild orangutans. An estimated 3,000 wild orangutans and many other fauna and flora can be found in this area. A direct link to GHG mitigation is given through the role of Mawas as an important storage of giga-tonnes of sequestered carbon. Wildlife conservation activities involving forest conservation, reforestation and research thus unfold a direct positive impact on GHG mitigation.

This paper presents current work of BOS Foundation in cooperation with BOS Germany, Save the Orangutan (StO) and other international organizations, central and local governments, as well as local communities. The work focus on combine forest conservation and forest landscape restoration activities with Orangutan habitat protection in Mawas. Until now, reforestation of more than 40 ha is completed and 27 canals are blocked, which represent a total of 58.4 Km of drainage canals. These actions contribute that 1500 ha has been rewetted, which in turn is protecting an estimated area of 5000 ha of community forest. Moreover, new proposals, which seek to combine REDD+ activities with community development and Orangutan protection are in preparation.

Antimicrobial Activity of Chitosan Films Containing Encapsulated Eugenol in Alginate Microspheres

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Due to the highly perishable character of food products, there is an increasing need to promote the development of active packaging to extend their shelf-life. Moreover, the environmental issues related to conventional plastics may be somewhat reduced by the development of biodegradable materials for food packaging. In this study, chitosan films were formulated, and encapsulated eugenol in alginate microspheres was incorporated as an antimicrobial agent, using extrusion and ionic gelation. The release kinetics of this active component into four food simulants (ethanol 10%, ethanol 50%, acetic acid 3% and isooctane). A more retarded release of eugenol was observed in fatty systems (isooctane), but enhanced when acetic acid 3 % was used. Probably, the acetic acid 3 % promoted hydration and swelling of the CH polymer matrix and of the alginate microspheres, thus resulting in the active compound release. The films were tested as for their antimicrobial activity in an in vitro food system over 13 day storage at 10 °C. Circular samples 55 mm in diameter obtained from the different types of film formulation were placed on inoculated Tryptose Soya Agar (TSA) plates (solid medium test) and in TSB tubes (liquid medium test). Inoculated tubes and plates without film were used as control samples. A bactericidal effect was observed in samples inoculated with *Listeria innocua* or *Escherichia coli* in the liquid medium test. Likewise, in the solid medium test microorganisms was highly reduced in samples coated with films with encapsulated eugenol in alginate microspheres, as compared to the controls without this component. The sustained delivery of microspheres from the films into the sample affected the progress of the microbial counts throughout time.

Atomistic Modelling And Simulation In Materials Science: Investigation Of Transition Metal Iridium

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Materials science is an interdisciplinary field which brings together physics, chemistry and engineering to study new materials for application in science and industry. Nowadays it is possible and convenient to investigate properties of materials not only by experiments but also via various modelling and simulation methodologies. One of the fast growing modelling areas are atomistic simulations that enable us to explore fundamental properties on the atomic scale and to link chemical bonding to macroscopic materials behavior.

In this work, we investigated transition metal iridium using atomistic simulation. Iridium has a lot of applications in industry and medical research, but the high production cost makes experimental research difficult. Iridium exhibits useful properties such as high melting point and ability to maintain its physical properties at temperatures above 1600 °C [1]. However, this metal is relatively brittle at ambient temperatures. This brittleness is likely related to properties of crystal imperfections at the atomic scale. We examined Ir using two distinct atomistic simulation methodologies, namely, density functional theory and bond-order potential [2], in order to estimate various physical properties and crystal defects and to compare the results with experimental observations. We computed (1) the stable lattice structures of pure iridium and its corresponding lattice parameters, (2) their corresponding elastic constants and the elastic stability criteria, (3) vacancy diffusion in the most stable face-centered cubic structure of Ir, and (4) the brittle cleavage along some stable grain boundaries.

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Estudio fitoquímico de *Salvia pseudorosmarinus* Epling (Lamiaceae) nativa del Perú

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El estudio fitoquímico de las partes aéreas de *Salvia pseudorosmarinus* Epling, arbusto leñoso con hojas carente de peciolo, alternas, lineales, con nervadura lineal, con apice agudo, color verde claro glabro de contorno lanceolado, flores gamosépalo posee corolla labiada de color violáceo, originario de la cordillera negra de los andes Ancash-Perú [1].

La familia Lamiaceae comprende un gran número de géneros y especies, son importantes por la presencia de compuestos de tipo diterpenos que son interesantes del punto de vista biológico porque han demostrado poseer una actividad antitumoral. En particular el género *Salvia* tiene una gran importancia económica sobre todo el uso de algunas de sus especies se utilizan sus aromas naturales en perfumería y cosmética, el uso de varios extractos como antibactericos, espasmolíticos, hemostático y otras actividades terapéuticas [2].

El objetivo de la tesis es el aislamiento y la caracterización química de los metabolitos secundarios de las partes aéreas de *S. pseudorosmarinus* Epling, siguiendo la modalidad descrita: las partes aéreas han sido secadas, trituradas y sotopuesta a extracción sucesiva con solventes a polaridad creciente a partir de n-esano, cloroformio, cloroformio-metanol y metanol, obteniendo 4 residuos por el momento hemos analizado el residuo cloroformico (Rc), se sotopuso a un sistema de purificación Flash Biotage® Isolera™ Spektra, obteniendo 18 fracciones las cuales fueron analizadas con RF-HPLC, en fase inversa, llegando a isolar compuestos puros identificando un diterpene de nombre jewenol [3]. Otros compuestos pertenecientes a la clase de diterpenos *neo-clerodánicos* están todavía en fase de la determinación estructural.

La determinación estructural del compuesto aislado ha sido posible gracias a la técnica espectroscópica NMR mono e bidimensional en particular ¹H-NMR, ¹³C-NMR, DFQ-COSY, HSQC, HMBC y espectrometría de masa ESI-MS.

En conclusión por el momento el estudio fitoquímico ha conducido al aislamiento de varios compuestos puros pertenecientes a diferentes clases de metabolitos secundarios con datos existentes en literatura de la familia Lamiaceae en particular el jewenol.

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Electronic properties of $\text{Cu}_3(\text{BTC})_2$

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Metal Organic Frameworks (MOF) based thin films electronic devices have been emerged as promising candidates for sensing applications due to its tunable porosity which is tailored by changing the functionality of the linkers [1,2]. In this work, we report the fabrication of Metal Oxide Semiconductor (MOS) structures using the $\text{Cu}_3(1,3,5 \text{ benzenetricarboxylate})$ also known as $\text{Cu}_3(\text{BTC})_2$ as a dielectric layer [3]. $\text{Cu}_3(\text{BTC})_2$ thin films have been deposited on thermally growth SiO_2 surfaces by the spray method using 10 and 15 spraying cycles. Later the crystal structure of the $\text{Cu}_3(\text{BTC})_2$ was revealed by X-ray diffraction (XRD). The electrical characterization of the $\text{Si}/\text{SiO}_2/\text{Cu}_3(\text{BTC})_2/\text{Al}$ structure was performed by capacitance voltage (C-V) and current density voltage (J-V) measurements by applying the voltage gate swept from 0 to -3V and from -0.8 to 0.8, respectively. C-V curves of the $\text{SiO}_2/\text{Cu}_3(\text{BTC})_2$ structure show lower oxide capacitance in comparison with the SiO_2 . Additionally, the $\text{SiO}_2/\text{Cu}_3(\text{BTC})_2$ dielectric stack produce a small negative flat-band voltage (V_{FB}) shift.

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Identificación Y Caracterización De Minerales De Tierras Raras En Perú

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Las Tierras Raras (TTRR) son la base de los dispositivos tecnológicos más avanzados, como son las celdas de combustible, teléfonos móviles, pantallas planas, baterías para autos eléctricos, imanes permanentes para generadores eólicos, discos duros, fluorescentes compactos, etc. Sin embargo hasta la fecha el acceso a las TTRR está limitado pues China provee el 97% de la producción mundial. Es en este contexto que el Laboratorio de Materiales Nanoestructurados (LMN) de Universidad de Ingeniería y la Minera Rio Sol proponen el primer proyecto de innovación en el proceso de separación de minerales de TTRR, en directa colaboración con el Laboratorio de innovación para las tecnologías de energías renovables y los nanomateriales (LITEN) en Grenoble, Francia.

En esta presentación mostraremos los avances en la identificación y caracterización de las tierras raras dentro de minerales extraídos del yacimiento Capacsaya, un descubrimiento reciente de polimetálicos ubicado al norte de la ciudad de Cusco. Para la identificación de los minerales compuestos por TTRR se pusieron en funcionamiento dos técnicas utilizadas en el proceso de innovar las técnicas estándares: (i) la separación magnética y (ii) la separación electrostática, ambas forman parte de la primera etapa para la obtención de Tierras Raras. Técnicas espectroscópicas como ICP-MS y microscopia SEM-EDS fueron utilizadas para corroborar la presencia de TTRR en los minerales.

Como resultado, las muestras obtenidas del yacimiento Capacsaya mostraron una alta concentración Hematita, Feldespato-K y Dolomita. Esto fue comprobado utilizando la separación electrostática, magnética y análisis espectroscópicos como ICP-MS. Los resultados de la microscopía SEM-EDS muestran la presencia de La, Ce y Nd en Monacita-Ce, asociados al Feldespato.

Linked Data and Public Data to Improve Tourist Information Services

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Abstract: Peru is one of the developing countries of Latin America, which has not improved the availability or quality of public tourist data (e.g. hotels, tourist places, restaurants, shops)[1]. These types of data are generated and saved by public sector agencies like Ministries, Municipalities.

Currently, the Peru Government enhances the publication of open data and has a National Open Government Data Strategy for 2021, that is allowing to develop geolocation applications that allow locate museums of Lima, identify the most problematic districts and making data-based decisions[2]. However, Peru has only information about tourist places on its website although in an unstructured format which implies the information does not have a pre-defined data model and is not linked to other data. Besides, it does not include on its open data repository. The main aim of this study is to enhance the tourist information service by means of: i) the analysis of public data; ii) modeling a linked data format; and iii) publishing of tourist data.

To achieve this goal, we analyzed the properties of public tourist data, model a format using standard vocabularies and ontologies to link the information with external data. We generated rdf files using a linked data publishing methodology[3]. Finally, we launch a fuseki server that allows sparql queries and data exploitation[4].

The results of this study can improve the access for private and public organizations, which use tourist information to help industrial competitiveness through query, sharing, reusing, distribution and exploitation of public data.

Advances and Challenges of the Use of Anion Exchange Resins as Heterogeneous Catalysts for the Biodiesel Production: A Review

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The biodiesel is a low-emission diesel substitute made from renewable resources such, as vegetables oils and animal fats. New techniques have been investigated aiming to find clean processes, that allow the use of raw materials that do not pose a risk for food safety and the ecosystem. Also, these processes should allow the use of catalysts friendly from the environmental point of view.

Although homogeneous alkaline catalysis is the most used transesterification process for biodiesel production, since it requires less time and cost, heterogeneous catalysis has some advantages. Heterogeneous catalysis allows a continuous process and a simple separation of the catalyst-product mixture. The anion exchange resins have been investigated as heterogeneous catalysts showing promising results, such as: the possibility to reuse the resins, reduction of purification requirements, generation of less (or nothing of) soap; also, the feasibility to work with raw materials of high acidity as crude and waste oils.

This review will discuss the progressive advancement in research related to anion exchange resins and will highlight the advantages of these resins in relation to other heterogeneous catalysts. In addition, it will be presented the reaction models and process parameters, as well as, the challenges, limitations and possible solutions during the use of anion exchange resins. Finally, in order to find a continuous process, we will analyze studies and patents that evaluate the viability of the industrial use of anion exchange resins as heterogeneous catalysts for the high-quality biodiesel production.

Implementing SEA in Peru – on track from a donor-driven approach towards ownership?

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Strategic Environmental Assessment (SEA) for policies, programmes, and plans is currently implemented heterogeneously around the world. Recently, the SEA implementation focus shifted to countries of the Global South, although the status of legislation and practice varies widely amongst individual emerging countries [1]. Yet, international literature has paid little interest to Latin American environmental assessment systems compared to European or North American pathways to SEA [2]. Research was conducted in 2015 as part of the project ‘ProAmbiente’ initiated by the German-Peruvian development cooperation (APCI and GIZ) with the objective to analyse and strengthen the SEA practice in Peru based on action recommendations.

Our analytical methods included an analysis of key drivers, barriers, and framework conditions for implementing SEA in Peru. The research was based on a review of the statutory framework and 45 semi-structured expert interviews with key stakeholders of Peru’s contemporary SEA system. Additionally, we carried out a case study analysis of eight SEAs, three of which were explored in particular detail (both reviewing the planning and SEA document and interviewing key stakeholders) to characterise the SEA process. Subsequently, we gathered our information against a set of predefined criteria [3] for the making of substantial SEAs. The results allowed for a SWOT analysis (strengths, weaknesses, opportunities, and threats) of the implementation status of SEA. We structured our results by applying a constellation analysis [4], which assisted in providing a broader perspective.

Ultimately, the analysis of the *status quo* of the SEA implementation and the review of state-of-the-art international scientific literature led to the formulation of recommendations to overcome identified weaknesses and threats. Recommendations have been clustered in nine priority areas and were assigned an implementation horizon from mid- to long-term. After completion of the research project ‘Analysis of the SEA implementation in Peru’, a new ministerial resolution (R.M. N°175-2016-MINAM) has been passed by the Ministry of the Environment, actively implementing recommendations expressed throughout the project [5].

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EKPA'PALEK: Empowering Latin Students Professional Development in your hands

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Millions of students are limited in pursuing their professional dreams due to economic problems. By having no money, they have no access to technology and up-to-date information/education. Also, they do not have a professional network of support and especially women and indigenous communities are limited by sexism. How much professional talent are we wasting in Latin America? At the same time, have you ever wondered what would happen if we unleashed all this talent and potential? This is what we are asking, and this is how the idea of creating a platform that helps the professional development of Latin-American students emerged called Ekpa'palek. We provide opportunities for professional development through open (free) programs, which include:

1) A Mentorship Program for professional development; 2) A women empowerment program; 3) A Blog which features articles, stories and interviews about professional development; 4) A YouTube Channel where we have webinars, tips and recommendations for professional development and fireside chats; 5) Scholarships for improving the professional development of Latin-American students; 6) Promotion of the Sustainable development goals (We are ambassadors in Peru for the agenda 2030); 7) Indigenous Languages for empowering in Quechua and soon more indigenous languages

At Ekpa'palek we aim to empower Latin professionals and promote the social and economic development of Latin-American countries.

Estimación De La Edad Dental En Niños Con Osteogénesis Imperfecta

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La osteogénesis imperfecta (OI) es un trastorno hereditario caracterizado por fragilidad ósea y deformidades esqueléticas. En la gran mayoría de los casos, OI es causada por una mutación en uno de los dos genes que codifican el colágeno tipo I (COL1A1, COL1A2). Durante los últimos años, Varias mutaciones en otros genes también han sido identificados en la OI. Estos genes codifican proteínas que participan en la modificación postraduccional del colágeno tipo I, el plegamiento y el desarrollo de osteoblastos.

Además de las características esqueléticas, las manifestaciones típicas de OI incluyen escleróticas azules, pérdida de audición, exceso de laxitud articular, deficiencia de crecimiento, y dolor óseo. Las anomalías dentales, como la anormalidad estructural de la dentina, la hipodoncia, también son frecuentes. De hecho, sólo el 22% de los pacientes con OI se ha informado que no tienen ninguna anormalidad dental detectable, la oclusión y anomalías en el desarrollo dental es también frecuente y grave en los pacientes con OI.

El propósito del presente estudio fue examinar si la edad dental en niños con OI difiere de la edad cronológica, para lo cual se realizó la estimación la edad dental en niños con osteogenesis imperfecta utilizando el método de Demirjian et al.

Es un estudio retrospectivo y transversal, en el cual se estima la edad dental en niños/as de diferentes tipos de osteogenesis imperfecta entre 3,0 a 16,5 años, que acuden a la clínica de Postgrado del Título Propio: "Especialista en Odontología Integrada en el niño con necesidades especiales", de la Facultad de Odontología de la Universidad Complutense de Madrid.

Los resultados que se encontraron están basados en la comparación entre la edad cronológica, la edad dental de una muestra franco-canadiense y la edad dental de una muestra madrileña de acuerdo al sexo, en niños/as con OI.

Así mismo, en la comparación de la edad cronológica y la edad dental de una muestra madrileña en niños/as con OI de acuerdo con sus características esqueléticas (tipo de OI).

Diseño, Fabricación y Caracterización de Sensores Blandos Multiescala

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El desarrollo de un novedoso sensor blando multiescala de presión con forma espiral empleando técnicas de litografía blanda (sensor con microcanales embebidos de líquido conductor metálico), son una de las líneas de investigación de la robótica blanda en la actualidad muy importantes para sistemas de control. El fin propuesto de este trabajo consiste en investigar un sensor multicapa de diferente escala, que pueda tener la capacidad de censar estímulos de presión en un determinado rango de intensidad y en paralelo mejorar la resolución espacial de un sensor espiral simple.

El presente trabajo de investigación se desarrolló en cinco etapas para su mejor entendimiento.

- a) DISEÑO Y FABRICACION DE SENSORES. En el diseño se utilizó un software CAD para introducir las nano medidas a los micro canales parte esencial de esta etapa que tiene como producto los respectivos moldes elaborados en polímero acrílico curado UV con el detalle helado extremo.
- b) IMPLEMENTACIÓN DEL INSTRUMENTO DE MEDICIÓN EN LA IMPRESORA TOALA-PRINTER. Primero se diseñó en CAD todo el sistema de una balanza electrónica para luego instalarlo en el área de la bandeja de impresión de la impresora 3D TOALA PRINTER, para después confeccionarlo de material acrílico de 7 mm de grosor en impresión láser.
- c) DISEÑO Y CONFECCIÓN DEL DIAGRAMA ELECTRÓNICO DEL SISTEMA DE AMPLIFICACIÓN. Se usó como componente principal del circuito amplificador de señal INA128, realizando los diagramas electrónicos para los 22 sensores en el open source Eagle (programa de Diseño de diagramas para PCBs.)
- d) ADQUISICIÓN, PROCESAMIENTO Y ANÁLISIS DE DATOS. Esta etapa permite la obtención de valores por medio del open source Arduino Mega 6025 acompañado con el circuito electrónico de amplificación de señales (INA 128) mencionado anteriormente, y el procesamiento y análisis de los datos adquiridos y se trabajara con el Software MATLAB off-line como on-line.

RESULTADOS Y CONCLUSIONES Se elaboro una plataforma de caracterización que en función a los datos adquiridos por los estímulos y deformaciones que sufrió el sensor, resultaron cuadros estadísticos en 2D y modelación 3D. Por método de redes neuronales se usará como herramienta de visualización que permita ver la magnitud y ubicación de un estímulo de presión. La finalidad de la creación y estudio de este sensor es controlar otros dispositivos rígidos o blandos que ayuden a las diferentes áreas de la ciencia.

Estimación de proteína no degradada en el rumen y proteína bruta utilizable de forrajes tropicales usando técnicas in situ e in vitro

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La degradación de la proteína cruda en el rumen es un proceso complejo y su cuantificación es aún un reto para los nutricionistas de rumiantes. Sin embargo, información sobre proteína no degradada en el rumen (UCP) y proteína cruda utilizable (uCP) son necesarias para calcular proteína metabolizable en los sistemas de evaluación nutricional. Existen diversas técnicas para determinar UCP y uCP, como la técnica in situ, sin embargo éste es un proceso laborioso, y requiere de animales fistulados. Basados en estos problemas, técnicas in vitro son más comúnmente usados para análisis de degradabilidad de proteína como lo son el método modificado de producción de gas (moHGT) y el fraccionamiento de proteína de acuerdo al Sistema neto de carbohidratos y proteína de la Universidad de Cornell (CNCPS). Diversos autores han estimado ecuaciones de predicción para determinar UCP y uCP a partir de las fracciones del CNCPS, sin embargo estas ecuaciones están basadas en forrajes usados en las zonas templadas, las cuales difieren con los forrajes en zonas tropicales. Principalmente, debido a que los forrajes tropicales presentan una baja digestibilidad. Además, el alto contenido de lignina, el tipo de incrustación en el tejido de la planta y el bajo aporte de nitrógeno a los microorganismos del rumen generan un baja degradabilidad y pasaje de partículas al intestino, reduciendo de esta manera el consumo de alimento. El principal objetivo de este estudio es evaluar el nivel de exactitud en la predicción de UCP y uCP de técnicas in situ e in vitro en forrajes tropicales. Para ello se cuenta con un total de 66 muestras de 6 países tropicales (Brasil, Costa Rica, El Salvador, Etiopía, Kenia y Perú).

Potencialidades del Nostoc Sphearicum para Enfrentar la Desnutrición Crónica Infantil y la Tbc

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En el mundo existen más de 350 millones de niños desnutridos que constituyen el 55% de los 93 millones que mueren al año entre los 0 y 5 años de edad. La OMS reportó al Perú como el segundo país con más casos de TBC en Latinoamérica y según el Movimiento Global para erradicar la pobreza, OXAFAM, el 43% de niños peruanos entre 6 y 36 meses. El riesgo de muerte está en relación directa con el grado de malnutrición. La desnutrición conlleva a la reducción de la inmunidad, produce reducción en la capacidad física e intelectual, así como también influye en los patrones de comportamiento durante la adultez. Por otro lado, el científico peruano Augusto Aldave descubrió hace más de veinte años el Nostoc o cuhuro. Esta es una alga que habita las lagunas altoandinas a más de 3000msnm de forma natural y el Perú es depositario de 12 300 lagunas. Según el nuevo estudio realizado por el laboratorio internacional Mérieux NutriSciencias(España) confirma la composición de Aldave(2015)[1] en 100 gr de materia seca contiene 30% de proteínas, 147 miligramos de calcio(leche 120), 83,6mg de hierro(lentejas 7,6) y los ocho aminoácidos esenciales. El Nostoc se puede utilizar en la alimentación de los niños y adultos dignosticados con desnutrición crónica y tuberculosis por su alto contenido de hierro, proteínas y calcio. Es considerado un alimento nutracéutico por nutrir, alimentar y resolver el problema de salud. Su bajo costo y su sabor neutro, color verde azulado y consistencia gelatinosa hacen posible su preparación en una variedad de dietas dulces y saladas.

[1] Aldave, A.(2015). Algas toda una vida. Editorial UCV.

Helados Saludables Elaborados Con Aceite De Oliva, Castañas (*Castanea Sativa*, Miller) Y Goma De Tara (*Caesalpinia Spinosa*)

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La Comunidad Autónoma de Galicia produce el 40% de la leche en España, con entregas de 2,6 millones de toneladas anuales, los precios son los más bajos del mercado, (29,8 céntimos de euro el litro). La castaña es un producto estacionario de buena calidad nutritiva, destinada principalmente a la exportación, la goma de tara es producto peruano escasamente valorado. Los problemas alimentarios son alarmantes, el índice de obesidad en niños se ha triplicado en los últimos años, la elevada incidencia de enfermedades cardiovasculares, entre otros, por ello la industria alimentaria y la población han optado por consumir alimentos bajos en grasa de origen animal, limitando también las proteínas, carbohidratos, fibra, vitaminas, minerales entre otros necesarios en la dieta diaria. El objetivo de este estudio fue formular un helado y valorar alternativas para hacer un producto más saludable, se desarrolló 8 fórmulas distintas, aplicando un diseño factorial de 2x2x2, habiéndose considerado tres variables de sustitución (materia grasa, edulcorantes y estabilizantes) con dos alternativas para cada una. Se caracterizaron todas las muestras y se compararon entre ellas mediante análisis fisicoquímico, determinación del contenido de ácidos grasos y su calidad organoléptica. Como resultado se observó que todos los helados mostraron pH cercano a la neutralidad, el porcentaje de derretimiento fue superior al 90% en las formulaciones que contenían sacarosa, mientras que en los elaborados con stevia son menores a 16%. Las muestras que no contenían sacarosa, presentaron valores proteicos y de cenizas superiores al resto. El perfil de ácidos grasos mostró que los helados cuya formulación contenía grasa láctea evidenciaron principalmente la presencia de los ácidos palmítico, oleico, mirístico, esteárico y linoleico, mientras que las muestras formuladas empleando aceite de oliva, presentaron al ácido oleico, palmítico y linoleico, el análisis sensorial demostró que las fórmulas que contenían aceite de oliva y goma de tara, presentaron puntuaciones más altas para el color, textura y sabor, a excepción de las fórmulas que contenían stevia. En conclusión es adecuado formular un helado sustituyendo completamente la grasa de origen animal por el aceite de oliva y los estabilizantes por la goma de tara, además, teniendo en cuenta que los ácidos grasos esenciales linoleico y linolénico no pueden ser sintetizados por el organismo humano, los helados que contienen goma de tara y aceite de oliva, son productos de buena calidad nutricional.

Desafíos de la Prevención de Caries dental en el Perú

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La caries dental es una enfermedad multifactorial que afecta a la población en general, especialmente peruana. En la literatura científica, no se identifican estudios sobre el índice de caries dental en la población policial peruana. El objetivo fue describir los desafíos de la prevención de la caries dental y la prevalencia de esta enfermedad en la población policial de la región Ancash, Perú.

Se trata de un estudio de prevalencia. Se examinó a cada sujeto desde mayo 2012 a mayo de 2013. El estudio fue autorizado por el Director del Policlínico PNP-Huaraz Ancash como parte de las actividades del personal civil SERUMS en el área de odontología. La muestra fue censal con 925 sujetos. Los datos se sistematizaron siguiendo la metodología recomendada por la OMS. La estadística se analizó empleando SPSS versión 20.0 para Windows mediante el test Chi cuadrado con significación $p < 0.05$, test Pearson y ANOVA.

La prevalencia de caries en la población policial fue 73.4%. El índice CPOD fue 10.63 ± 4.96 ($p < 0.01$). El índice de caries dental fue ligeramente menor que los varones: 10.43 y 10.67 respectivamente. Existe una relación inversamente proporcional en el número de dientes obturados con amalgama dental en policías mayores de 35 años versus el número de dientes obturados con material distinto a amalgama dental en menores de 35 años. Sólo un 0.8% 7/925 tenían prótesis dental y 58.6% (542/925) de los sujetos necesitaban rehabilitación oral.

La prevalencia de la caries dental es alta, se requiere un programa de salud bucal integral que mejore en corto, mediano y largo plazo la calidad de vida de los pacientes.

Palabras clave: CARIES DENTAL, SALUD BUCAL, PREVALENCIA CARIES DENTAL, POLICÍAS PERUANOS

Characterization of clock-output genes and stress response in potato (*S. tuberosum* L.)

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Potato tuberization is strongly influenced by photoperiodic, during short days induce tuberization while long days repress it [3]. Cultivated *tuberosum* subspecies have been developed to produce tubers in a wide range of days lengths. This subspecies contains an allele that generate a truncated form of *StCDF1* gene that changes the molecular pathway favoring tuberization but also increasing drought susceptibility [1,2]. By studying others clock genes like *CDF2*, *CDF3* and know how they participate and influencing in the circadian cycle network, will allow us to obtain an efficient potato crop. The purpose of this thesis is to analyze the gene expression of CDFs genes during different time points in 24 hours. Moreover, evaluate phenotypic differences between available of transgenic and non-transgenic genotypes that are crosses with different combinations of *CDF1* allele under drought stress and under normal conditions. Currently, since the project has just started, it is in the standardization stage of qPCR technique for the analysis of gene expression.

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Mediciones sonoras en materiales granulares

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En este trabajo, se presenta una nueva técnica experimental, alternativa a la conocida técnica de emisiones acústicas. Se basa en el uso de sensores sonoros para complementar la evaluación del comportamiento mecánico de materiales. En este caso, se muestra su aplicación en muestras granulares. Conjuntamente con observaciones microscópicas durante pruebas de compresión in-situ, fue posible capturar detalles adicionales sobre el complejo comportamiento de los materiales granulares. Se demostró que la nueva técnica puede detectar fracturas, al asociarlas con eventos sonoros grabados mediante sensores apropiados. Las ventajas de este método por sobre las técnicas tradicionales, entre las cuales también están la simplicidad y el coste, fueron claramente validadas.

SISAY: Plataforma de Mentoría en Línea para estudiantes de Ciencias, Tecnología e Ingeniería

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En abril de este año, se lanzó el programa Sisay Mentores, una iniciativa voluntaria de un grupo de peruanos radicados en diferentes países, que se juntó alrededor de la idea de facilitar conexiones para compartir experiencias y conocimientos entre profesionales peruanos en todo el mundo y jóvenes estudiantes, de pocos recursos y en su mayoría, primera generación en estudios superiores.

El equipo diseñó una plataforma y un programa de capacitación en línea para conectar a profesionales del campo de la ciencia, tecnología e ingeniería con jóvenes que se encuentran estudiando una carrera afín. El fin es que los estudiantes participantes progresen en el desarrollo de sus competencias profesionales e interpersonales, aprendan a gestionar el logro de sus objetivos y tomen conocimiento de las oportunidades presentes en su profesión. Todo ello a partir de la relación participante- mentor y del acompañamiento y guía brindado por este último.

La misión de Sisay es aportar a la formación del capital humano en el Perú a partir de la creación de espacios de orientación y colaboración entre jóvenes estudiantes y profesionales en ciencia y tecnología que puedan contribuir al desarrollo de competencias de dichos jóvenes durante su etapa formativa y previa a su inserción laboral.

El proyecto piloto se realizó en asociación con Pronabec quienes facilitaron la participación de estudiantes de Beca 18 como beneficiarios del proyecto. El piloto recibió 39 expresiones de interés de mentores. El 64% de ellos fueron hombres y 35% mujeres. 74% residían en Perú y 25% en el extranjero. La proporción de carreras de los mentores interesados fue: Ingenierías (Industrial, sistemas, metalúrgica, mecánica, etc.) 51%, Ciencias Básicas (biología, física, química) 36%, Otros (educación, psicología, sociología) 13%.

En los resultados obtenidos del piloto, el 80% de los estudiantes que respondieron a la encuesta de monitoreo expresaron que les fue fácil contactarse con su mentor o mentora y el 100% que se sintieron cómodos conversando con sus mentores respecto a su carrera y futuro profesional. El 100% de ellos nos dice que aprendió cosas nuevas relacionadas con la planificación de su carrera, oportunidades de becas y estudios de posgrado y oportunidades en el campo laboral.

El programa se va a ir desarrollando a partir de las lecciones aprendidas de este primer año y espera contribuir a través de la colaboración con otras iniciativas.

Energética Molecular De Los Antioxidantes Tirozol, Hidroxitirozol Y Resveratrol

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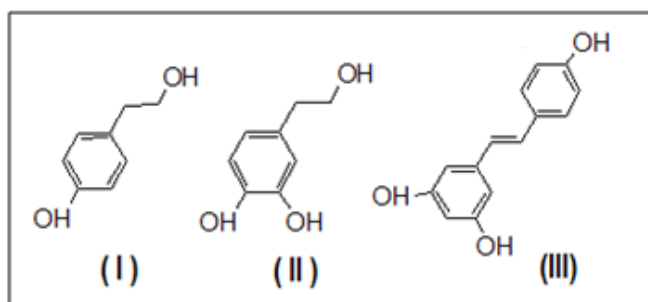
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En este trabajo presentamos estudios experimentales y cálculos computacionales (*ab initio* y DFT/M05-2X) sobre la estabilidad termodinámica de los antioxidantes tirozol (I), hidroxitirozol (II) y resveratrol (III). Cuantificamos experimentalmente propiedades termofísicas (puntos y entalpías de fusión, capacidades caloríficas) y termoquímicas. Determinamos la entalpía de formación estándar en fase gas $\Delta_f H_m^0$ (g) del tirozol ($-299.4 \pm 5.0 \text{ kJ}\cdot\text{mol}^{-1}$) utilizando calorimetría de combustión y la técnica de Efusión de Knudsen. Dada las dificultades experimentales encontradas para los casos II y III, utilizamos métodos computacionales (por atomización y reacciones isodérmicas) para deducir sus correspondientes entalpías de formación.

I y II tienen propiedades neuroprotectoras y anti-proliferativas, en particular II es un potente inhibidor de procesos angiogénicos [1] y III previene y ralentiza enfermedades diversas, incluyendo las neurodegenerativas y cardiovasculares [2-6]. Pese a la importancia de estas especies, la literatura apenas recoge información sobre sus propiedades químico-físicas.



Palabras clave: Antioxidantes, entalpía de formación, DFT (M052X), G3, G4

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Beyond the Dental Chair - In Vitro and in Vivo Approaches to Analyze The Process Of Tooth Repair and Regeneration

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Objective: The tooth is a tiny but complex organ formed by different kind of tissues, having each one, an specific function during its lifetime. Following tooth injuries (e.g. dental traumatism or a carious infection), the dental pulp, a soft tissue located in the center of the tooth, undergoes a complex healing process in accordance with the degree of damage. Thus, the ability of the teeth to induce new hard tissue to protect its damaged pulpal core is key for its recovery and regeneration. Previous studies have demonstrated the importance of the Eph-ephrin protein family during tooth development. In addition, the interaction of EphB receptor and its ligand ephrinB mediates odontoblastic differentiation *in vitro*. Nevertheless, the specific role of these molecular interaction during the process of reparative dentinogenesis is still unknown.

Methods: Dental pulp cells (DPCs) were harvested from 6-week-old C57BL/6 mice and cultured on plates with differentiation condition media with or without the addition of two commonly used dental materials: calcium hydroxide (CH) or mineral trioxide aggregate (MTA). For the *in vivo* experiments, we established an animal model for tooth injury using 4 to 8-weeks-old mice in both wild type (WT) and DMP-Cre-ephrinB1-floxed (ephrinB1 knockout) mice. The animals were euthanized on each observation point and processed for histological and microCT analysis.

Results: DPCs were treated with CH or MTA, showed an increase in the levels of Insuline growth factor 1 (IGF-1) and ephrinB1 gene expression. Interestingly, it was found that the treatment with CH induced the upregulation of ephrinB1 gene expression via the Akt/PKB signaling pathway. In the control mice, immunohistochemical analysis showed that ephrinB1 was expressed in the dental pulp tissue as early as 2 days after tooth injury. However, tertiary dentin formation was first observed under the injury site 2 weeks after operation, and became clearly evident after 4 weeks by histology and microCT analysis. Interestingly, odontoblast specific-ephrinB1 knockout mice showed abnormalities in the process of tertiary dentinogenesis 4 weeks after tooth injury.

Conclusion: The ephrinB1 ligand is a critical mediator for the process of tertiary dentinogenesis following mild to severe injuries. Further research is necessary to fully understand the role of these molecules and their potential for regenerative pulp therapies.

Hydrogenated aluminum nitride passivation layers doped with terbium and ytterbium rare earths for photovoltaic applications

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Hydrogenated aluminum nitride (AlN:H) thin films are suitable passivation layers for high-efficiency crystalline silicon (c-Si) solar cells [1], reaching efficiencies > 18% [2]. In addition, photon energy down conversion mechanisms demonstrated in the rare earths terbium (Tb) / ytterbium (Yb) have the potential to further enhance cell efficiencies [3]. AlN is a suitable host material for these rare earths. We previously performed a complete set of studies on AlN doped with Tb [4]. Thus, both features, passivation and down conversion, can potentially be combined in a single thin layer deposited over c-Si. Here, we investigate hydrogenated aluminum nitride thin-films doped with terbium and ytterbium (AlN:H:Tb/Yb) deposited via RF magnetron sputtering.

The scope of this study encompasses film structural properties, surface passivation and spectral quantum efficiency. We investigate the structural properties of AlN:H films on c-Si under different deposition conditions via X-ray diffraction (XRD). We compare the structural properties of the AlN:H films on c-Si with the interface properties. Their effect on the passivation is assessed via capacitance-voltage (CV) measurements. Quantum efficiency measurements of AlN:H:Tb/Yb layers on c-Si can give additional information about the surface passivation, as well as the photon down conversion processes.

This study reports our progress in the development of a single passivating layer with downconversion features.

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Identification and Optimization of Exopolysaccharides (EPS) from Microalgae

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Microalgae are photosynthetic microorganisms that are being researched extensively as sources for valuable products such as carbohydrate polymers with sometimes rare functional groups like methyl (CH₃) or sulfate groups (SO₄⁻²) [1, 2]. In general, two main types of polysaccharides are generated by microorganisms, intracellular polysaccharides, which serve as energy storage and the extracellular polysaccharides (EPS), exported into the surrounding.

Microbial EPS, such as xanthan, gellan, scleroglucan, and levan, to name a few, are valuable biopolymers with several applications in the cosmetic, nutraceutical, and surfactant industries [3, 4]. Although, the main sources of EPS are bacteria and some fungi, microalgae are being explored to obtain those polymers, what is also the focus of this study.

Two important aspects are presented in this work. Firstly, the most promising EPS producing microalgal strain will be identified by a screening approach of different type strains and novel isolates. By the first screening rounds, it was found that a yet undescribed Rhodophyta strain (*Porphyridium sordidum*), is a highly promising EPS producer. The EPS obtained from *P. sordidum* was evaluated and was compared to the *Porphyridium purpureum* polymer.

Secondly, the process conditions for EPS production have to be optimized, by identifying the most suitable conditions that could enhance the growth rate and EPS yield of *P. sordidum* and *P. purpureum*. Thus, several conditions, such as media composition and illumination were evaluated in different cultivation vessels such as air bubbled cylinders and photobioreactors. An in-depth characterization of the polymers and optimization strategies is on the way to further enhance productivity and EPS yields of these two highly promising microalgae strains.

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Científicos.pe, el espacio de encuentro virtual de los científicos peruanos

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La ciencia en los países más desarrollados e industrializados ocupa un lugar muy privilegiado dentro de las políticas de gobierno establecidas en estos países. La ciencia es considerada como la fuente del desarrollo industrial, de innovación y de creación de nuevas tecnologías. Países que basan su crecimiento económico en la inversión en ciencia, tecnología e innovación (CTI) son ejemplos del aporte directo de la CTI en la sociedad. Siguiendo este ejemplo, nuestro país en los últimos años ha invertido grandes cantidades de dinero en CTI. Un gran número de estudiantes con anhelos de superación en muchas áreas de las ciencias, han sido capacitados a través de maestrías y doctorados a nivel nacional e internacional. Asimismo, existe apoyo a proyectos en universidades e institutos de investigación, y también un constante estímulo para el retorno de científicos peruanos de excelencia.

Anteriormente, los científicos peruanos en el extranjero, muchas veces becados por nuestro gobierno, no han tenido un espacio de encuentro. *Científicos.pe*, (www.cientificos.pe) cubre esta brecha permitiéndoles libremente compartir y transmitir sus experiencias, sus investigaciones e ideas a las nuevas generaciones de estudiantes e investigadores. La falta de un espacio de encuentro podría contribuir a la pérdida de oportunidades y perder la oportunidad de generar puentes con centros especializados en Perú, como son los laboratorios en universidades o institutos de investigación. La comunidad de científicos peruanos, *Científicos.pe*, tiene como misión crear puentes entre la diáspora científica peruana en el mundo y nuestro país. Nuestra comunidad, hace uso de los últimos conocimientos y herramientas que nos brinda el internet, por ejemplo: websites, páginas sociales, apps entre otros. A su vez, *cientificos.pe* busca unificar y concentrar los diversos esfuerzos para el desarrollo de la ciencia tecnología e innovación entre la comunidad científica peruana en el extranjero y el Perú. Consideramos que este desarrollo científico y tecnológico debe llegar a la sociedad de una forma clara y directa de tal manera que generemos el interés en los más jóvenes. Hemos realizado más de 70 conferencias de investigadores peruanos en 5 Universidades Nacionales (Lima, Arequipa, Lambayeque y Trujillo) desde el año 2012. Las noticias, eventos y novedades de ciencia son seguidas por 22,000 personas en nuestras redes sociales, (twitter+facebook). Hemos logrado un máximo de 50,000 visitas a la página web por publicaciones de interés nacional, lo que nos muestra que la sociedad se interesa de los temas científicos cuando éstos son presentados de manera didáctica. El equipo multidisciplinario de *Científicos.pe* nos ha permitido consultar a expertos de diferentes formaciones, buscando siempre las opiniones de los mejores especialistas. En el año 2018 *Científicos.pe* busca incrementar la interacción entre los científicos peruanos, en continuo nexo con la sociedad y al mismo tiempo, *Científicos.pe*, espera ser el portal de referencia de todo lo relacionado a la ciencia en el Perú. Siendo la razón principal el crecimiento rápido y evidente con el aporte frecuente de los principales actores del desarrollo científico en el Perú, los científicos peruanos. En esta presentación, mostraremos las diversas actividades realizadas durante los últimos años y los proyectos y planes que tenemos para el año 2017-2018.

Analysing weight after anti-psychotic drug treatment: understanding missing data behaviour and its impact on estimates in longitudinal electronic health records

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Immediate weight gain is a known problem among patients treated with anti-psychotic drugs. However, further evaluation over long periods of exposure is needed, especially from real-life contexts. Electronic health records, such those routinely obtained in general medical practice, are good sources for obtaining this sort of information. Nevertheless, in this big longitudinal data, weight after drug treatment is hard to study due to missing data. Our main aim was to estimate weight change after initiation of four antipsychotic drug treatments, comparing estimates from four methods which deal with missing data: multiple imputation (MI) [1], inverse probability weighting (IPW) [2], maximum likelihood (ML) and complete case (CC) analysis [3]. The study sample comes from The Health Improvement Network (THIN) database, a large UK primary care database from which we observed four retrospective cohorts of patients with a diagnosed psychotic disorder, between 2005 and 2015. In there, we explored missing data patterns and mechanisms for informing decisions about their ulterior handling. For the substantive model of weight change, the exposure was anti-psychotic cumulative dose of olanzapine, risperidone, quetiapine and haloperidol (one cohort per drug) at 6, 12 and 24 months. In the same model, the covariates were sex, age, Townsend index, height, smoking, diabetes, systolic blood pressure and cholesterol, all at baseline. The missingness model (IPW) had sex, age and diabetes as covariates whereas the imputation model (MI) had the same covariates than the substantive one. Contrary to expected, missing data of weight records did not decrease after treatment initiation. We detected missing at random (MAR) mechanisms which biased estimates from CC analysis. In this sense, we found notable differences between CC, ML, MI and IPW estimates. Considering the missing data mechanisms, as well as the own properties of each method, estimates from MI were preferred. Our next step will be to perform a simulation study for evaluating these four methods in a more general scenario.

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Observatorio de política científica: El aporte de la ciencia para determinar necesidades, desafíos y oportunidades de desarrollo se constata en toda sociedad avanzada. En este documento la reflexión se concentra en la efectividad de las medidas en marcha y en cómo se integra el avance científico alcanzado por peruanos post-/graduados en el extranjero

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La dinámica de transformación de la comunicación postal a la digital se inició en el ámbito profesional. En el Perú la red científica peruana en los años noventa dio un soporte concreto a personas individuales u organismos que se fueron asimilando a la revolución digital que se inició con Internet. El IPEN⁴, por ejemplo, tuvo la oportunidad de entrar a ese terreno mediante la habilidad y curiosidad de sus profesionales iniciados al tema en alguna universidad de los EEUU. En el extranjero hubieron jóvenes científicos agrupados por países de residencia, donde llegaron para realizar doctorados principalmente, que estuvieron quizás entre los primeros a interconectarse por e-mail con el país, creándose así los nodos de una futura red mundial. Uno de esos nodos fue el CERN, donde se inventó el www. La red creada allí fue luego transferida al CONCYTEC⁵. Desde entonces el número de doctorantes en el extranjero ha crecido de manera sensible, pero las preguntas que ellos se hacen antes de retornar al país son las mismas: De qué manera se puede contribuir a impulsar o continuar de manera eficaz y efectiva la ciencia y en qué sectores de investigación en prioridad. EL autor propone aquí un estudio basado en un censo de las áreas de investigación patrocinadas en el Perú (que permiten un retorno efectivo programado o voluntario), combinado con los recursos utilizados y los resultados obtenidos que pueden ser medidos con indicadores apropiados (por ejemplo: en términos de número de publicaciones o de proyectos concretizados), con el fin de diagnosticar el modelo actual y, en una etapa posterior, modelar la toma de decisiones para compartirla con funcionarios de los gobiernos locales y gobierno central. El objetivo es triple, el primero es validar el modelo y anticipar las necesidades en el terreno, el segundo es dar continuidad y sostén sólido a los programas de investigación fundamental y aplicada, y el tercero es crear oportunidades para que emerjan nodos de desarrollo económico alternativos a la industria basada en la explotación de recursos naturales y turísticos. Desarrollar tecnología e innovación local alimenta el círculo virtuoso de la confianza en el futuro que las nuevas generaciones necesitan.

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Evaluation of the Tissue Transglutaminase activity on an *in vivo* model

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Celiac disease is a chronic autoimmune disorder, which is estimated to affect 1 in 100 people worldwide, caused by alimentary gluten in genetically susceptible individuals. The only treatment for celiac disease is lifelong strict gluten-free diet, therefore scientists are trying to search and develop an optimal and safe treatment.

Our prior research has led to the identification of the celiac disease autoantigen, tissue transglutaminase (TG2) and the establishment of the serum test for antibodies to TG2, which is now used worldwide for the diagnosis of celiac disease. TG2 plays a role in diverse biological functions and it is suggested that it exerts crucial roles in pathological processes.

Currently our research focuses on the role of TG2 in celiac disease pathogenesis, including the clinical development of a TG2 inhibitor as a novel treatment for celiac disease.

Several approaches to develop a mouse model for celiac disease are being investigated, including mice with a humanized immune system, to allow the preclinical testing of TG2-inhibition and immune modulatory therapies. Our first step to evaluate the TG2 inhibitor was to optimise an *in vivo* model that showed activation of TG2 in the intestine (TG2 remains inactive in physiological conditions), reproducing what might occur in celiac disease. Using the *in vivo* model, we aim to demonstrate the confirmation of the concept for the novel TG2 inhibitor and hence contribute with the ongoing preclinical and clinical development of the drug candidate. Furthermore, our preliminary results seem to be promising. We have evaluated intestinal and hepatic murine tissue with immunofluorescence and histological techniques to shed more light on the role of active TG2 in the intestine and to provide some clues concerning its role in the pathogenesis of celiac diseases.

Key words: celiac disease, tissue transglutaminase, animal model, TG2 inhibitor

Horizontal Gene transfer contributes to plant evolution: the case of *Agrobacterium* T-DNAs.

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Genes are usually transmitted vertically from parents to offspring. However, they can also be transferred horizontally between unrelated organisms – this is referred to as horizontal gene transfer (HGT). HGT is common in the microbial world including archaea and bacteria, where HGT mechanisms are widely understood and recognized as an important force in evolution. In eukaryotes, HGT now appears to occur more frequently than originally thought. Many studies are currently detecting novel HGT events among distinct lineages using next-generation sequencing. Most examples to date include gene transfers from bacterial donors to recipient organisms including fungi, plants and animals. In plants, one well-studied example of HGT is the transfer of the tumor-inducing genes (T-DNAs) from some *Agrobacterium* species into their host plant genomes. Evidence of T-DNAs from *Agrobacterium* spp. into plant genomes, and their subsequent maintenance in the germline, has been reported in *Nicotiana*, *Linaria* and, more recently, in *Ipomoea* species. The transferred genes do not produce the usual disease phenotype, and appear to have a role in evolution of these plants. In this paper, we review previous reported cases of HGT from *Agrobacterium*, including the transfer of T-DNA regions from *Agrobacterium* spp. to the sweetpotato [*Ipomoea batatas* (L.) Lam] genome which is, to date, the sole documented example of a naturally-occurring incidence of HGT from *Agrobacterium* to a domesticated crop plant. We also discuss the possible evolutionary impact of T-DNA acquisition on plants.

Keywords: HGT (Horizontal Gene Transfer), *Agrobacterium*, *Ipomoea batatas* (L.) Lam, T-DNAs, evolution.

Mortalidad Debida A Enfermedades Raras Neurológicas En Europa

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La Unión Europea ha definido a las Enfermedades Raras (ER) como aquella afección con riesgo vital o crónica debilitante con una prevalencia inferior a 5 casos por cada 10000 habitantes. En este estudio es realizado el análisis de mortalidad de ER neurológicas (ERN), específicamente la enfermedad de Huntington (EH), ataxias hereditarias (AH) y las enfermedades de la motoneurona (EMN). Se han analizado las tendencias temporales de las Tasas de mortalidad Ajustadas por Edad (TAE) y la variabilidad geográfica de la Razón de Mortalidad Estandarizada (RME).

Los resultados encontrados fueron: En la EH se identificaron 11342 defunciones entre 2001-2012, siendo la TAE media europea de 1,96 x 1000000 habitantes. La mortalidad por EH en Europa incrementó de 1,79 en el 2001 a 2,21 en el 2012. En cuanto a la variabilidad geográfica, destaca Malta que tiene el riesgo más alto de defunción por EH en Europa (RME 7,12). Reino Unido, Noruega, Dinamarca, Países Bajos, Bélgica, Suecia, Alemania y Francia también presentan riesgos superiores a los esperado para Europa (RME entre 1,07-1,60).

En la AH se han encontrado 2582 defunciones. La mortalidad debido a AH incremento de 0,44 x 1000000 habitantes en 2000 a 0,57 en 2012. En cuanto al análisis geográfico, los países del norte y occidente europeo mostraron las tasas más altas de mortalidad por AH. Finlandia, Países Bajos, Suiza y Reino Unido presentaron 1,50 veces más riesgo que el esperado para Europa (RMEs >1,50). El riesgo para Dinamarca, Suecia y España se encuentra alrededor de 1,30.

En las EMN se identificaron 101062 defunciones entre 2001 y 2013, siendo la TAE promedio europea de 14,67 x 1000000 habitantes (17,86 hombres y 12,09 mujeres). La TAE en Europa incrementó un 1,42% anual, pasando de 13,41 x 1000000 en 2001 a 15,56 en 2013. Finlandia y Reino Unido, presentaron los riesgos de mortalidad más altos de Europa (RMEs >1,50). RMEs entre 1,10-1,50 se han encontrado en Suecia, Países Bajos, Noruega, Dinamarca, Bélgica, Francia y Suiza.

En este estudio se ha detectado un aumento significativo de la mortalidad registrada debida a estas ERN. El análisis geográfico ha permitido detectar la existencia de riesgo más bajo en países situados al este. Por el contrario, los mayores riesgos de defunción se detectan en los países ubicados al norte, en el grupo de las AH no especificadas, o en el norte y oeste en la EH y en las EMN.

Study of the interface between imidazolium-based ionic liquids electrolytes and lithium metal electrode

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Lithium-ion batteries are the most popular choice as source of energy for nomad technologies. In this context, the use of lithium metal as material for negative electrode has emerged as a solution to improving the energy density and capacity of actual systems. However, the dendritic growth phenomenon that induces the formation of dead lithium and short circuit of the battery with eventual fire risks is the main obstacle for its commercialization [1]. On the other hand, the use of ionic liquids (ILs) as a promising choice to improve safety and suppress dendrite growth because of their characteristic properties such as retarded flammability, high thermal stability, and high ionic conductivity has been reported [2]. In this work, X-ray photoelectron spectroscopy (XPS) coupled to electrochemical impedance spectroscopy (EIS) and scanning electron microscope (SEM) have been used to study the side reactions between lithium electrode and imidazolium-based ILs. The impact of (1-Hexyl-3-methylimidazolium bis(fluorosulfonyl)imide) C_1C_6ImFSI and (1-Hexyl-3-methylimidazolium bis(trifluoromethanesulfonyl)imide) $C_1C_6ImTFSI$ has been studied showing an enhanced stability when using FSI as anion forming a homogeneous SEI layer. Finally, the lithium surface evolution under aging in equilibrium condition as well as under polarization depending on electrolyte composition will be discussed.

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The early phase of microglial activation in leech CNS repair involves a TGF β -dependent signaling

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The microglial cells constitute the first defensive line of the CNS. In vertebrates, microglial cells and infiltrating blood macrophages are involved in the protection of the CNS after an injury. This mixture has both neuroprotective and neurotoxic effects and in the mammalian brain, the discrimination of the respective roles is still unclear in the process of neuroinflammation.

Unlike vertebrates, the medicinal leech, *Hirudo medicinalis*, is able to functionally repair its central nervous system after an injury. Because of the insignificant infiltration of macrophages in the injured leech CNS, only resident microglial cells migrate to the site of lesion and trigger the axonal sprouting. Therefore, the leech CNS turns out to be an interesting model for studying and understanding the mechanisms of microglia recruitment and neuronal repair.

After a CNS injury, the microglial cells migrate and accumulate at the lesion site. This accumulation is known to be essential to the functional nerve repair. The microglial recruitment towards the lesion involves a TGF- β production by the injured axons and it's important in the early phase of microglia recruitment. Moreover, the accumulation of leech microglia at the lesion site is driven by chemotactic signals involving HmC1q (Hm for *Hirudo medicinalis*). Recent data in mammals show that TGF- β regulates neuronal C1q production to initiate microglia-mediated synaptic pruning. This process, developed during neurogenesis, could be repeated as a neuroprotective function in adult brain as suggested in leech.

In addition, in order to identify the protein signature TGF- β -dependent released for the microglial cells in the point of lesion, we realize one study by micro-extraction by liquid extraction surface analysis (LESA) to extract the proteins at the point of lesion and limit the extraction zone. Finally identified the proteins using mass spectrometry approaches. These studies will allow us to identify the proteins signature of microglial recruitment TGF- β dependent.

Taken together, these studies will allow us to better understand the neuroprotective functions of the resident microglia specifically. It will permit to explore their crosstalk with damaged neurons TGF β -dependent leading to the leech CNS repair.

Keywords: *Leech, Nerve cord repair and Microglia.*

Iniciativas de cooperación internacional entre Francia y Latino-América: Ejemplo “Red NanoAndes”, “Spectra” y ‘OptoAndina’

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Es en 2009, durante la conferencia SPECTRA en Lima, que la Embajada de Francia sugirió a la asociación franco-peruana Puya de Raimondi la creación de una red para la promoción de colaboraciones científicas en los países andinos. Debido a las posibilidades ofertas por las nanociencias de desarrollar la valorización de los recursos naturales y de alcanzar masas críticas de investigadores a través de su interdisciplinaridad, este tema fue elegido y la red “NanoAndes” creada. La representación inicial incluyo Venezuela, Colombia, Ecuador, Perú, Bolivia, Costa Rica, Argentina y Francia. Desde 2010, otros países de Latino América se unieron: México, Chile, Brasil y Uruguay

Hoy día, después de 6 años de funcionamiento, de puestas en marcha de colaboraciones y la formación de más de 400 estudiantes de maestría y doctorado durante las varias escuelas organizadas anualmente, la red evoluciona para disponer de recursos financieros recurrentes para ampliar sus iniciativas y ofrecer otras temáticas científicas o de interés para el futuro de la comunidad científica de América Latina.

En esta conferencia presentaremos las varias actividades de la red, las soluciones investigadas tanto para alcanzar una integración académica tal como para ayudar a crear un espacio común de investigación en América Latina.