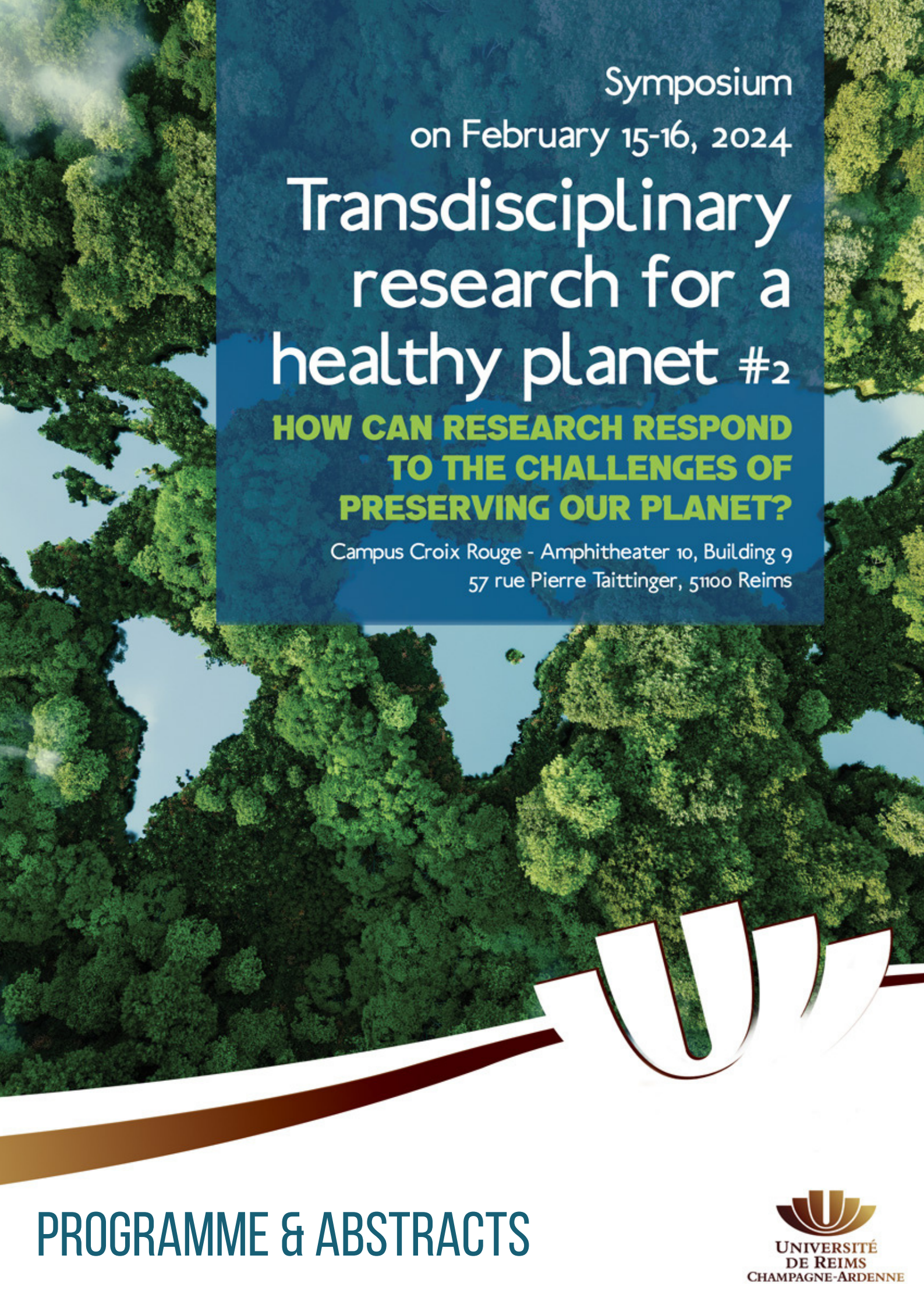

Symposium
on February 15-16, 2024

Transdisciplinary research for a healthy planet #2

HOW CAN RESEARCH RESPOND TO THE CHALLENGES OF PRESERVING OUR PLANET?

Campus Croix Rouge - Amphitheater 10, Building 9
57 rue Pierre Taittinger, 51100 Reims

PROGRAMME & ABSTRACTS

UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

SUMMARY

PROGRAMME

DAY 1: FEBRUARY 15, 2024

9:00 am - 9:30 am: Official welcome and opening of the symposium

9:30 am - 10:30 am: OPENING CONFERENCE

"Climate change and transformation challenges"

Dr. Valérie MASSON-DELMOTTE,
CEA Research Director, Université de Paris-Saclay, France

10:30 am - 11:00 am: Coffee break

11:00 am - 12:00 pm: PANEL DISCUSSION

How to spice up your PhD with an international flavour?

Hosted by **Dr. Nina BOGATAÏA**, Administrative coordinator for Doctoral Schools, URCA

- **Pr. Essaïd AÏT BARKA**, *Vice-President for International Relations, Université de Reims Champagne-Ardenne*
- **Pr. Maria Luce FREZZOTTI**, *President of Doctoral School, University of Milan-Bicocca, Italy*
- **Dr. Angélique RAT**, *Junior Professor Chair, Micro3B, USC INRAE RIBP, Université de Reims Champagne-Ardenne*
- **Adithya Raveendran THOTTATHIL**, *PhD Student, UMR AgroParisTech/INRAE IJPB, Université Paris-Saclay*
- **Julian David RESTREPO LEAL**, *PhD Student, UMR INRAE FARE and USC INRAE RIBP, Université de Reims Champagne-Ardenne*

12:00 pm - 1:00 pm: Lunch break

1:00 pm - 2:30 pm: Poster session 1

2:30 pm - 5 pm: Session 1 - CLIMATE CHANGE SENTINELS

2:30 pm - 3:00 pm: Session introduction, chaired by **Dr. Hélène LACROIX** and **Pr. Lilian JOLY**

3:00 pm - 3:30 pm: *"Can we reverse the decline of Earth's habitability?"*
Dr. Wolfgang CRAMER, CNRS Research Director, Mediterranean Institute for Biodiversity and Ecology, France

3:30 pm - 4:00 pm: Coffee break

4:00 pm - 4:30 pm: *"Arctic and Antarctic: scientific, environmental and geostrategic challenges of the poles for France"*
Éric GIRARDIN, Member of the French National Assembly

4:30 pm - 5 pm: *"Space sentinels : unstinting guardians of our planet"*
Hervé JEANJEAN, Copernicus Program Manager, Strategy Department, Centre National d'Etudes spatiales, France

6 pm: Social Event - *Guided Tour of Reims main historical spots followed by a cocktail reception at La Maison Saint-Sixte*

DAY 2: FEBRUARY 16, 2024

9:00 am - 9:30 am: Welcoming coffee

9:30 am - 12:00 pm: Session 2 - PRESERVING ECOSYSTEMS

9:30 am - 10:00 am: Session introduction, chaired by **Pr. Claudia COSIO** and **Dr. Olivier FERNANDEZ**,

10:00 am - 10:30 am: "*Biodiversity, a tool for the future*"
Pr. Marc-André SELOSSE, Muséum national d'Histoire naturelle, France

10:30 am - 11:00 am: Coffee break

11:00 am - 11:30 am: "*Exploring the ocean multiverse with Tara Oceans*"
Dr. Chris BOWLER, CNRS Research Director, École Normale Supérieure, France

11:30 am - 12:00 pm: "*Working together to maintain a functional Lake Geneva ecosystem*"
Pr. Bastiaan IBELINGS, University of Geneva, Switzerland

12:00 pm - 1:00 pm: Lunch Break

1:00 pm - 2:30 pm: Poster session 2

2:30 pm - 5:00 pm: Session 3 - RESSOURCES AND SUFFICIENCY

2:30 pm - 3:00 pm: Session introduction, chaired by **Dr. Julien VASTENAEKELS**

3:00 pm - 3:30 pm: *"The governance of exnovation"*
Pr. Tom BAULER, Université Libre de Bruxelles, Belgium

3:30 pm - 4:00 pm: Coffee break
(Jury's deliberation – Poster Awards)

4:00 pm - 4:30 pm: *"Moving together towards "better": Stakeholder-centered research to catalyze agricultural transformation"*
Dr. Emily BURCHFIELD, Emory University, USA

4:30 pm - 5:00 pm: *"Politicizing sobriety in the epoch of the Anthropocene"*
Pr. Nathanaël WALLENHORST, Université Catholique de l'Ouest, France
In collaboration with Pr. Bruno VILLALBA, Professor of Political Science at AgroParisTech, France

5:00 pm - 5:20 pm: Posters Awards, presented by **Pr. Caroline RÉMOND**

5:20 pm - 5:30 pm: Closing remarks by **Dr. Hélène LACROIX**

5:30 pm: Closing Cocktail

PANEL DISCUSSION

How to spice up your PhD with an international flavour?

*Hosted by **Dr. Nina BOGATAÏA**, Doctoral School Coordinator, URCA*

***February 15:** 11am - 12pm*

This round table discussion aims to explore the **motivations and the initiatives for encouraging the international mobility of doctoral students and young researchers**, as well as the practical challenges associated with the planning, funding and logistics of these exchanges. Three enriching experiences from PhD students and post-doctoral positions, will bring a testimony on how nowdays, doctoral and post-doctoral programs can be an opportunity for international experiences. Additionnaly, the European Alliance INVEST will be introduced and presented as an opportunity for students to bring international experience in their curricula.

HOST OF THE PANEL DISCUSSION

Dr. Nina BOGATAÏA, Doctoral School Coordinator, URCA

Nina Bogataïa holds a Doctorate in Language Sciences and a Masters in International and European Relations. She is currently in charge of promoting the Doctorate programme at the University of Reims Champagne-Ardenne at national and international level. She also has extensive experience of cooperation with the French-speaking world through her work with the Alliance Française de Moldavie. She is currently a member of the RNCD - France PhD and takes part in the thematic meetings of the EUA-CDE.

SPEAKERS

Pr. Essaïd AÏT BARKA, Vice-President for International Relations, Université de Reims Champagne-Ardenne, France

Professor Essaid Ait Barka specializes in Plant Physiology at the University of Reims, where he obtained his Ph.D. in 1993. He continued his research journey with postdoctoral positions at Laval University in Canada and Penn State University in the United States. Later, he worked as a research professor at NSAC (Nova Scotia, Canada). With a strong interest in the interactions between plants and microorganisms, Prof. Ait Barka's current research revolves around the use of beneficial microorganisms as microbial inoculants to promote plant growth and provide biological resistance against both biotic and abiotic stresses. He delves into understanding the molecular mechanisms underlying the cross-talk between plant defense signal transduction pathways and beneficial microorganisms. Prof. E. Ait Barka has published over 130 peer-reviewed articles, 9 books, and two patents. Beyond his research contributions, Prof. Ait Barka is engaged in University of Reims life serving as VP of the Academic Council from 2017 to 2020, and VP for International Affairs since 2018.

Pr. Maria Luce FREZZOTTI, President of Doctoral School, University of Milan Bicocca, Italy

Maria-Luce Frezzotti is a Professor of Petrology and Dean of the Doctoral School at the University of Milano-Bicocca in Milan, Italy. She has a PhD in Petrology and an M.S. from Siena University. Her research focuses on fluid phases in geological processes, diamond formation, metamorphic processes, mantle metasomatism and magmatism. Maria-Luce has served on several committees and editorial boards, including Communications Earth and Environment. She was awarded the medal of the Accademia delle Scienze in 2019 for her scientific contributions and has led initiatives to promote equity, diversity, and inclusion throughout her career.

Dr. Angélique RAT, Junior Professor Chair, Micro3B, USC INRAE RIBP, Université de Reims Chamapgne-Ardenne

Angélique Rat is a microbiologist and a plant biologist, who started a Junior Professor Chair at the Université de Reims Champagne Ardenne, France in October 2023. She previously has worked in major international collaborations, first during her PhD in the MICROMETABOLITE project (MSCA doctoral network) at the Ghent University, Belgium ; then with her postdoctoral position in the PATHOCOM project (ERC-Synergy) at the University of New York, the USA. Her researches focus on the interactions plant-microbe, with the aim to contribute to a more sustainable agriculture by unraveling the complex biological processes involved in plant defence.

Adithya Raveendran THOTTATHIL, PhD Student, UMR AgroParisTech/INRAE IJPB, Université Paris-Saclay

Adithya Raveendran Thottathil is a 2nd-year doctoral student at INRAE Versailles working on novel lignin-first biomass fractionation strategies. After a bachelor's in chemical engineering from his native country of India, he completed the European Master in biological and chemical engineering for sustainable bioeconomy (BIOCEB), which included studies in France, Estonia, and Belgium, receiving a triple master's degree. His research interests are developing biomass fractionation strategies, biorefineries and biobased products.

Julian David RESTREPO-LEAL, PhD Student, UMR INRAE FARE and USC INRAE RIBP, Université de Reims Champagne-Ardenne

Julian David RESTREPO LEAL was born in Colombia in 1995. After obtaining his degree in Agricultural Engineering in his home country, Julian pursued an Erasmus Mundus Joint Master Degree in Plant Health, where he got the opportunity to study the first year at the Polytechnic University of Valencia, Spain, and the second year at the University of Göttingen, Germany. Subsequently, Julian obtained a PhD position in Plant Sciences at the University of Reims Champagne-Ardenne, where he is currently doing his third year.

SPEAKERS BIOGRAPHIES

Guest speaker of the Plenary Conference

VALÉRIE MASSON-DELMOTTE

CEA RESEARCH DIRECTOR
UNIVERSITÉ DE PARIS-SACLAY, FRANCE

Valérie Masson-Delmotte completed a Diploma of Advanced studies in Engineering with honours at the Ecole Centrale Paris in 1993. She also received her PhD from the same institution in 1996, in fluid physics and transfers. Her doctoral thesis was "Climate simulation of the Holocene means using general circulation models of the atmosphere; Impacts of parameterization".

After her PhD, Valérie Masson-Delmotte began to work as a researcher at the French Alternative Energies and Atomic Energy Commission (CEA), specifically the Laboratory of Climate and the Environmental Sciences. Since 2008, she has been a Research Director at CEA. Her research includes water vapour monitoring and combines past climate variability (ice cores, tree rings) with simulations, to address current climate models.

Valérie Masson-Delmotte served on numerous national and international projects including the Intergovernmental Panel on Climate Change (IPCC). Since 2014, she has been a member of the French Research Strategic Council.

She has published extensively, including several books for the general public, as well as children's books.

In October 2015, she was elected co-chair of Working Group 1 of the IPCC, which is the group that "examines the physical science basis". She was the co-ordinating lead author of the paleoclimate chapter in the IPCC Fifth Assessment Report (AR5) cycle.

She was associated with the nobel peace prize 2007 awarded to Al Gore and the IPCC.

WOLFGANG CRAMER

CNRS RESEARCH DIRECTOR,
INSTITUT MÉDITERRANÉEN DE BIODIVERSITÉ
ET D'ÉCOLOGIE MARINE CONTINENTALE,
AIX-MARSEILLE UNIVERSITÉ
FRANCE

Wolfgang CRAMER, geographer, ecologist and modeller of global ecosystem dynamics, is CNRS research director at the Institut Méditerranéen de Biodiversité et d'Ecologie Marine et Continentale (IMBE) based in Aix-en-Provence. He was co-chairman of the CNFCG until September 2021.

Wolfgang Cramer completed his academic training at the University of Gießen in Germany (Diploma in Geography in 1981) and Uppsala in Sweden (Doctorate in Plant Ecology, in 1986). From 1987 to 1993, he taught and carried out research in the Department of Geography at the University of Trondheim in Norway. In 1992, he joined the Potsdam Institute for Climate Impact Research (PIK) as Head of the Department of Global Change and Natural Systems. In 2011, he left Germany to help set up the Mediterranean Institute for Biodiversity and Marine and Continental Ecology (IMBE). In 2017, he was elected an associate member of the French Academy of Agriculture.

Wolfgang Cramer has been contributing to the IPCC at various levels of responsibility since 1992, and is currently Lead Author for the 6th Assessment Report. With Joël Guiot (CEREGE, Aix-en-Provence), he coordinates the MedECC (Mediterranean Experts on Climate and Environmental Change), and is (with James Ford, University of Leeds) co-editor-in-chief of the journal Regional Environmental Change published by Springer Nature Publishers.

ÉRIC GIRARDIN

MEMBER OF THE FRENCH PARLIAMENT
3RD CONSTITUENCY OF THE MARNE DEPARTMENT

In June 2022, Éric Girardin was re-elected for the 3rd constituency of the Marne Department.
Before being elected, he worked for over 30 years as a banker and an insurer, before setting up a company specializing in business transfers. At the same time, he was a lecturer in higher education.
At the French National Assembly, Éric Girardin is a member of the Economic Affairs Committee. In 2019, he leds a fact-finding mission on the Arctic and Antarctic poles.

HERVÉ JEANJEAN

COPERNICUS PROGRAMME MANAGER
STRATEGY DIRECTORATE
CENTRE NATIONAL D'ETUDES SPATIALES
TOULOUSE, FRANCE.

Hervé Jeanjean is a member of the French delegation at ESA Programme Board on Earth observation, focusing on the Copernicus programme. He was previously in charge of instructing the early phases of France 2030 projects implemented by CNES. Seconded to ESA between 2017 and 2020, and to the European Commission between 2009 and 2013, he has a deep experience in managing R&D projects in earth observation applications and data exploitation. His career started in tropical forestry management at CIRAD. Graduated in agricultural, forestry and environmental engineering, he has been awarded the Agricultural Merit, and has been auditor of the National Defence College Institute (IHEDN).

MARC-ANDRÉ SELOSSE

PROFESSOR,
MUSEUM NATIONAL D'HISTOIRE NATURELLE,
FRANCE

Marc-André Selosse is professor at Muséum national d'Histoire naturelle (Paris), and at Universities of Kunming (China) and Gdansk (Poland), where his is leading research teams. His works focus on the ecology and evolution of mycorrhizas, a major symbiosis between soil fungi and roots of most land plants. He also has a general interest for symbiosis and its evolution. He was head of the French Botanical Society for ten years and is now president of the Fédération BioGée, member of the French Academy of Agriculture and of the Institut Universitaire de France. He (co-)edits four international scientific journals: New Phytologist, Ecology Letters, Symbiosis and Botany Letter. All his papers (more than 210 scientific papers and 250 outreach papers) are downloadable at http://isyeb.mnhn.fr/en/directory/marc-andre-selosse-405. He published outreach books in French on microbiota (Jamais seul, 2017), tannins (Les goûts et les couleurs du monde, 2019) and soil (L'origine du Monde, 2021).

CHRIS BOWLER

CNRS RESEARCH DIRECTOR,
ÉCOLE NORMALE SUPÉRIEURE,
FRANCE

Chris Bowler is research director at the CNRS and director of the Plant and Algae Genomics Laboratory at the Institut de biologie de l'École normale supérieure in Paris. He received his PhD from the University of Ghent in Belgium, followed by postdoctoral studies at the Rockefeller University in New York. In 1994 he established his own laboratory working on signaling in plants and marine diatoms at the Stazione Zoologica in Naples, Italy, and in 2003 he took up his current position in Paris. He has been a member of EMBO since 1995, received the CNRS Silver Medal in 2010, ERC Advanced Awards in 2012 and 2018 and the Grand Prix Scientifique de la Fondation Louis D de l'Institut de France in 2015. In 2016-2017 he was a Fellow at the Radcliffe Institute of Advanced Studies at Harvard University, USA. In 2018 he was elected member of the French Academy of Agriculture, and during the academic year 2020-2021 he held the annual chair as Professor in biodiversity and ecosystems at the Collège de France. His main research interest is the understanding of the response of plants and marine diatoms to environmental signals, through functional and comparative genomics. Since 2021 he is the scientific director of the Tara Oceans project to explore the biodiversity, ecology and evolution of plankton in the world's ocean. In 2023 he was elected member of the Accademia dei Lincei in Italy.

BASTIAAN IBELINGS

PROFESSOR,
HEAD OF THE LABORATORY FOR MICROBIAL ECOLOGY,
UNIVERSITÉ DE GENÈVE, SWITZERLAND

Bastiaan Ibelings is professor and head of the laboratory for microbial ecology at the University of Geneva. His work focuses on biodiversity of microbial life in lakes, with a strong emphasis on phytoplankton and their grazers, Daphnia and Dreissena. To better protect biodiversity in lakes, we must truly understand the mechanisms that control biodiversity and the drivers of change in peri-alpine lakes like Lake Genevan(re-oligotrophication, climate change and invasive species). In our laboratory we study biodiversity at different levels: (i) the evolutionary origin of biodiversity - how do new species appear?, (ii) biodiversity at the population level – in particular how do parasitism and temporally and spatially variable lake environments contribute to genetic diversity?, (iii) biodiversity at the community level - how are populations assembled to establish communities?, (iv) the role of biodiversity in the provision of lake ecosystem services.

TOM BAULER

PROFESSOR,
UNIVERSITÉ LIBRE DE BRUXELLES,
BELGIUM

Tom Bauler holds the Chair « Environment & Economics at Université Libre de Bruxelles (Belgium). He mainly teaches ecological economics courses as part of the MAster in Environmental Sciences and Management. Within the Center for Sustainable Development Studies, he supports a team of researchers on aspects of governance and ecological economics in the field of environmental policy. His current fields of research cover alternative indicators to GDP as well as social and socio-technical innovation, as well as citizen alternatives and transition and degrowth processes. He is also co-director of the Interfaculty Institute for Socio-Environmental Transformations and Research Advisor to the Vice-Rector for Sustainable Development at ULB. Recently he has been member of the Haut Comité pour la Transition Juste at Belgian federal level.

EMILY BURCHFIELD

ASSISTANT PROFESSOR,
EMORY UNIVERSITY, USA

Emily Burchfield is head of FACES Laboratory at Emory University, Atlanta, USA. Her laboratory integrates social and environmental data to support transitions towards more sustainable, resilient, and just agricultural futures. Lab's ongoing projects include modeling the impact of shifting land use on agroecological outcomes, projecting shifts in U.S. cultivation geographies driven by climate change, determining the shared characteristics of productive and resilient agricultural systems, and identifying the multiscalar drivers of farm-level cultivation and conservation behavior. This interdisciplinary research integrates "big" geospatial data with "deep" qualitative and survey data to understand and support agricultural system transition at multiple scales. Emily Burchfield has a PhD in Environmental Engineering (Vanderbilt University) and a MS in Economics (UCLouvain, Belgium)

NATHANAËL WALLENHORST

PROFESSOR,
UNIVERSITÉ CATHOLIQUE DE L'OUEST,
FRANCE

Nathanaël Wallenhorst is Professor and Dean of the Faculty of Education at the Catholic University of the West (UCO). He is Doctor of Educational Sciences and Doktor der Philosophie (first international co-supervision PhD), and Doctor of Environmental Sciences and Doctor in Political Science (second international co-supervision PhD). He is the author of twenty books on politics, education, and anthropology in the Anthropocene. With Christoph Wulf, he is currently editing an Encyclopedia of the Anthropocene (Springer-Nature, 1000 chapters). Latest books: Qui sauvera la planète ? (Actes Sud, 2022) ; Vortex - Face à l'Anthropocène (with Laurent Testot, Payot, 2023) ; A critical theory for the Anthropocene (Springer-Nature, 2023).

BRUNO VILLALBA

PROFESSOR,
AGROPARISTECH, FRANCE

Bruno Villalba is Professor of Political Science at AgroParisTech and a member of the Printemps laboratory (CNRS UMR 8085). His research focuses on environmental political theory, notably through an analysis of the capacity of the democratic system to reformulate its project based on environmental constraints. He directs the Master's degree in Governance of the Ecology and Society Transition, Paris-Saclay/AgroParisTech. He has written or co-written a dozen books (Sociologie de l'environnement, Atlande, 2023 (with Paul Cary); Politiques de sobriété, Paris, Le Pommier, 2023; Günther Anders, Dix thèses sur Tchernobyl, Paris, PUF, Hors Collection, 2022; L'écologie politique en France, Paris, La Découverte, coll. Repères, 2022; Les collapsologues et leurs ennemis, Le Pommier, 2021…).

CHAIRMEN BIOGRAPHIES

CLAUDIA COSIO

PROFESSOR AND DIRECTOR
ENVIRONMENTAL STRESS AND BIOMONITORING OF AQUATIC ENVIRONMENTS
UMR-I 02 SEBIO
UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

Claudia Cosio is professor at the University of Reims Champagne-Ardenne and director of the SEBIO laboratory (UMR-I 02). The goals of her research are to understand the molecular mechanisms of how biota, transduce and adapt to simultaneous changes in environmental conditions affected by multiple pollution and climate changes. More in details, she aims to understand how organisms perceive and transmit stress signals and what function stress genes, metabolites and protein products have in conferring stress tolerance, as well as to understand their interaction with development. In this context, she addresses aspects of stress physiology and how alteration of multiple parameters of growth conditions affects the response to stress responses as well as how these processes interact with other aspects of metabolism and physiology.

OLIVIER FERNANDEZ

ASSOCIATE PROFESSOR
INDUCED RESISTANCE AND PLANT BIOPROTECTION
USC INRAE 1488 RIBP
UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

Dr. Fernandez was initially trained as an agronomy Engineer and Oenologist In Rennes and Montpellier in 2000. He worked for 6 years in the wine industry before deciding to pursue a PhD at the University of Reims, focusing on grapevine responses to environmental stresses.
His postdoctoral experiences include work on starch metabolism at the John Innes Centre in Norwich and investigation on stress metabolic markers in field crops at INRAe Bordeaux. Since 2017, he has been an assistant professor at RIBP Lab-Chair Maldive. His research topic is the study of grapevine trunk disease. He is responsible for “Diplôme National D’Œnologue” at the University of Reims.

LILIAN JOLY

PROFESSOR
MOLECULAR AND ATMOSPHERIC SPECTROMETRY GROUP
GSMA - UMR CNRS 7331
UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

Lilian JOLY, Professor at URCA, associated with a university chair and a second ANR (French National Agency for Research) industrial chair. His research activities at the interface between spectroscopy and atmospheric sciences are at the heart of societal issues relating to greenhouse gas emissions. He is in charge of the AEROLAB research and innovation cluster, which aims to provide expertise and solutions for monitoring and analysing atmospheric emissions (urban, agricultural, industrial, etc.) on different spatio-temporal scales.

HÉLÈNE LACROIX

DIRECTOR OF THE INTERNATIONAL INSTITUTE FOR BIOECONOMY AND ENVIRONMENT
UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

Holder of a PhD in Plant Biology from Imperial College London, she had the opportunity to work in the private sector at Syngenta (UK) and ARD (France) in the fields of Plant Biotechnology. From 2009, she moved into research support roles as a project manager at Inserm headquarters in Paris. From 2012 to 2021, she was in charge of the administrative and financial management of the CNRS bioeconomy research federation, SFR Condorcet, supported by the University of Reims Champagne-Ardenne, and bringing together 700 researchers from the Grand-Est, Hauts-de-France and Wallonia in Belgium in the field of bioeconomy. From 2021, she was appointed Director of Development for the Agrosciences, Environment, Biotechnologies and Bioeconomy Cluster at the University of Reims Champagne-Ardenne. Since 2023, she is project manager of EXEBIO project « Excellence in Sustainable Bioeconomy » funded by France 2030. Project which gave rise to the creation of the International Institute of Bioeconomy and Environment in January 2024 within the University of Reims Champagne-Ardenne.

JULIEN VASTENAEKELS

JUNIOR CHAIR PROFESSOR
"ECONOMICS OF ECOLOGICAL TRANSITION AND BIOECONOMY"
REIMS ECONOMICS AND MANAGEMENT LABORATORY
EA 6292 CRIEG
UNIVERSITÉ DE REIMS CHAMPAGNE-ARDENNE

Julien Vastenaekels holds, since January 2024, URCA's Junior Professorship in the Economics of Ecological Transition and the Bioeconomy. With an interdisciplinary background, his research focuses mainly on power dynamics in socio-ecological transitions, particularly with a view to understanding possible and desirable trajectories. Julien contributes to the work of CRIEG and the International Institute for Bioeconomy and the Environment on the sectoral and territorial dynamics of bioeconomy.

POSTERS ABSTRACTS

Poster 1 - Alexis Amo, EA 6292 CRIEG, URCA
Bioeconomy in response to challenges facing human societies: what bioeconomy, what for and to whom?

Poster 2 - Maoulida Ali Bouchrati, USC INRAE 1488 RIBP, URCA
Physiological and biochemical responses of Arabidopsis thaliana *to prolonged heat stress upon rhamnolipid application.*

Poster 3 - Simon Duchateau, USC INRAE 1488 RIBP, URCA
Role of rhamnolipid analogues and their lipid precursors in Arabidopsis thaliana *induced resistance triggered by beneficial bacteria.*

Poster 4 - Hajar El Habchi El Fenniri, UMR CNRS 7331 GSMA, URCA
Statistical evaluation of the performance of EM27/SUN measurements as part of the MAGIC initiative.

Poster 5 - Antoine Elie, L2n, UTT & UMR CNRS 7076
Detection of mercury ions at ng/L scale by Surface Plasmon Resonance (SPR) on DNA aptamer biochips.

Poster 6 - Adebo Jean-Daniel Houeto, EA 6292 REGARDS, URCA
How do bioclusters emerge?

Poster 7 - Aurore Huré, UMR-I 02 SEBIO, URCA
Evaluation of the ecotoxicological effects of cyanotoxins and emerging cyanopeptides on fish Cell lines (ToxCell).

Poster 8 - Clément Jacquemin, UMR CNRS 7331 GSMA, URCA
Infrared laser spectroscopy as a versatile tool for environmental quality monitoring.

Poster 9 - Nicolas Mangin, EA 3795 GEGENA, URCA
Environmental legacy of the Great War: impacts of the first world war on the properties and functioning of agricultural and forest soils.

Poster 10 - Amandine Moreno, UMR INRAE A 614 FARE, URCA
Enzymatic deglycosylation to obtain a molecule of cosmetic interest from a lignocellulosic feedstock.

Poster 11 - Nathan Noël, UMR CNRS 7312 ICMR, URCA
High-pressure as an energetically cost-free alternative to perform the reaction of unprotected glyconitrones with alkynes.

Poster 12 - Laure Parodi, UMR CNRS 7058 EDYSAN, UPJV & UMR CNRS 7312 ICMR, URCA
WWI: Forests don't forget.

Poster 13 - Rémi Pereira, UMR CNRS 7312 ICMR, URCA
Generation of chemical and stereochemical diversity with high atom economy.

Poster 14 - Adèle Poirier, EA 7548 ITheMM, URCA & LGPM, CentraleSupélec
Sustainable material development: Harnessing the potential of Brewer's spent grain.

Poster 15 - Julian David Restrepo-Leal, UMR INRAE A 614 FARE, URCA & USC INRAE 1488 RIBP, URCA
Differential carbohydrate-active enzymes and secondary metabolite productions by the grapevine trunk pathogen Neofusicoccum parvum Bt- 67 grown on a host and non-host biomass.

Poster 16 - Clarisse Seguin, UMR-I 02 SEBIO, URCA
Dietborne mercury bioaccumulation in D. polymorpha *using stable isotopes.*

Poster 17 - Mahasoa-Salina Souvenir Zafindrajaona, UMR CNRS 7312 ICMR, URCA & Institut des Procédés Chimiques de l'Académie Tchèque des sciences
Green approach for the preparation of biobased ionic liquids study of their properties for biopolymer dissolution.

Poster 18 - Juliette Stanek, USC INRAE 1488 RIBP, URCA
Synthesis and biological assessment of a p-coumarate-based library for plant protection.

Poster 19 - Charles Wroblewski, University of Guelph
Development and application of iron oxide nanoparticles for the removal of antibiotics (tetracycline) from aquatic environments.

Poster 1: Bioeconomy in response to challenges facing human societies: what bioeconomy, what for and to whom?

Alexis Amo

EA 6292 CRIEG, Université de Reims Champagne-Ardenne, Bâtiment Recherche, BP 30, 57 rue Pierre Taittinger, 51571 Reims cedex, France

Today bioeconomy is introduced to us as a new means of operationalizing sustainable development and implementing the ecological transition. It would thus make it possible to meet the challenges facing human societies and, in particular, climate change. However, it is not easy to define precisely what the bioeconomy is. According to the European Commission, in an updated report from 2018, the bioeconomy "covers all sectors and systems that rely on biological resources – animals, plants, micro-organisms and derived biomass, including organic waste – as well as their functions and principles". It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services." We can see here that bioeconomy means a new way to produce and to consume with the idea of developing the economy and solving the environmental crisis at the same time. Also, according to the OECD, the bioeconomy is defined as "a world in which biotechnologies contribute to a significant share of economic production" and "is based on three pillars: biotechnological knowledge, renewable biomass and the integration of technical applications". But it is relevant to question the conditions for the emergence of the concept of bioeconomy. The concept was actually popularized by Nicholas Georgescu-Roegen, and then other economists, in the 1970s under the name of "bioeconomics" with the idea of an epistemological revolution to restore the economy in the biophysical limits of the planet. Today, both concepts are struggling with opposed aims and contents and research in the social and human sciences can provide a better understanding of these debates and formulate new proposals.

Thus, it is essential to keep these historical and theoretical considerations in mind to know if the path we're taking is compatible with the desire to live in a healthy planet and if it can be satisfied by means of green growth. In this poster, lay out the diversity of historical and existing meanings of the bioeconomy. In this matter I rely on a review of an academic and grey literature as well as in the exploitation of several former semi-directive interviews realized between 2018 and 2020 with industrial and agricultural stakeholders by researchers of the BIOCA project (*Bioéconomie en Champagne-Ardenne*). Finally, we notice that the purpose of bioeconomy as part of the circular economy promoted by institutional and public policies is to create jobs, modernize industries and agriculture, decarbonize the economy and protect biodiversity and ecosystems. Nevertheless, we also observe that some goals stated as decarbonation and modernization of the economy to protect the environmental are closely linked with green growth seen as the further stageto achieve sustainability, which is a reinterpretation of the original concept and criticized by some ecological economists, post-growth researchers and degrowth movements.

Alexis Amo
University: University of Reims Champagne-Ardenne
PhD title: The Grand-Est area in France facing the challenge of a rooted bioeconomy.
Thesis year: 3rd
Doctoral School (for URCA PhD students only): Human and Social Sciences

Poster 2: Physiological and biochemical responses of *Arabidopsis thaliana* to prolonged heat stress upon rhamnolipid application

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Rising temperatures are one of the major threats to crop production and sustainability. These extremely high temperatures have a significant impact on plant growth and development, with serious consequences on the yield and the quality of agricultural production. Agronomic approaches proposed to mitigate heat stress include the use of molecules capable of triggering plant defense mechanisms against stress, such as microbe-associated molecular patterns (MAMPS) and phytohormones. Rhamnolipids, bacterial compounds produced mainly by *Pseudomonas* species, have been widely used to trigger defense mechanisms in various plants and confer resistance against several plant pathogens including *Leptosphaeria maculans*, *Pseudomonas syringae*, and *Botrytis cinerea*. These molecules have been receiving great attention due to their innate low toxicity and high biodegradability compared to various known MAMPS. Although their efficacy against biotic stresses and under normal conditions has been widely studied, it remains unclear how these molecules respond under stressful conditions such as heat stress. Here, we first investigated whether rhamnolipids can help mitigate the deleterious effects of prolonged heat stress on *Arabidopsis thaliana* (Col-0). To this end, we first assessed the impact of heat stress and rhamnolipids on photosynthetic parameters, mainly gas exchange and photosystem II activity, using the IRGA infrared gas analyzer (LI-6400XT) and the PAM monitoring fluorometer (MONI-PAM). In addition, the effects of heat stress on stress-related metabolites, including carbohydrates, osmolytes, and chlorophyll, were assessed.

Maoulida Ali Bouchrati
University: University of Reims Champagne-Ardenne & University of Göttingen
PhD title: Role of bacterial rhamnolipids on Arabidopsisthaliana tolerance to heat stress
Thesis year: 3rd
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 3: Role of rhamnolipid analogues and their lipid precursors in *Arabidopsis thaliana* induced resistance triggeredby beneficial bacteria

Simon Duchateau[1], Jérôme Crouzet[1], Sylvain Cordelier[1], Sandrine Dhondt-Cordelier[1], Célia Borrego[1], Florence Mazeyrat-Gourbeyre[1], Charles Gauthier[2], Fabienne Baillieul[1], Sandra Villaume[1], Maude Cloutier[2], Eric Déziel[2], Aziz Aziz[1] and Stéphan Dorey[1]

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Rhamnolipids are essentialmetabolites produced by bacteria of the genera *Pseudomonas* and *Burkholderia*. They are involved in bacterial surface motility, biofilm development and colonization of bacterial hosts. Rhamnolipids are synthetized from 3-(3-hydroxyalkanoyloxy)alkanoic acid (HAA) precursors.

We previously demonstrated that HAAs and rhamnolipids are perceived by plants through two distinct mechanisms. In Arabidopsis, HAAs are sensed by the bulb-type lectin receptor kinase LORE, inducing canonical immune signaling, whereas rhamnolipids trigger an atypical immune response, LORE- independent, and affected by the sphingolipid composition of the plant plasma membrane. Rhamnolipids and HAAs are both able to trigger local resistance to bacterial infection.

Other bacteria belonging to *Pantoea* sp. produce rhamnolipid analogues known as ananatosides. Like rhamnolipids, these glycolipids are synthetized from HAA precursors. In this work, the role of these bacterial metabolites in induced resistance to a fungal pathogen by the beneficial strain of *Pantoea ananatis* BRT175 was investigated in Brassicaceae.

The capacity of *P. ananatis* BRT175 to induce resistance of *A. thaliana* was first evaluated at local and systemic levels against the necrotrophic fungus *Botrytis cinerea*. While our data suggest that the beneficial bacteria is not able to induce a local resistance, we found that symptoms provoked by *B. cinerea* were significantly reduced when *P. ananatis* is applied in the rhizosphere of *A. thaliana*, highlighting its ability to induce a systemic resistance. We showed that *P. ananatis* BRT175 can associate with roots of *A. thaliana*, independently of HAA/Ana production. We also showed evidence that HAA/Anasynthesis by the strain of *Pantoea* is activated in presence of plant tissues. More importantly, our data demonstrated that *Pantoea*-triggered systemic resistance to necrotrophs is LORE-dependent and show the direct involvement of lipids inthis ISR.

Altogether, this research work highlights an essential role of lipid-derived invasion patterns in plant immunity triggered by beneficial microorganisms and the potential of *P. ananatis* BRT175 as a biological control bacteria in Brassicaceae.

Simon Duchateau
University: University of Reims Champagne-Ardenne
PhD title: Role of ananatosides and their precursors in the resistance induced by *Pantoea ananatis* BRT175 in plants
Thesis year: PhD defended in 2023
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 4: Statistical evaluation of the performance of EM27/SUN measurements as part of the MAGIC initiative

Hajar El Habchi El Fenniri[1], Lilian Joly[1], Bruno Grouiez[1], Abdelhamid Hamdouni[1], Yao Te[2], Pascal Jeseck[2], Christof Janssen[2], Corinne Boursier[2], Hao Fu[2], Christel Guy[3], Caroline Bes[3], Denis Jouglet[3], Hervé Herbin[4], Morgan Lopez[5], Josselin Doc[5], Simona Latchabady[5], Michel Ramonet[5], Marc Delmotte[5], Deniel Carole[6], Nicole Montenegro Varela[6], Neil Humpage[7], Carlos Amberti[8], Frank Hase[8], Vincent Casse[9], Bruna Silveira[9], Cyril Crevoisier[9]

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Measuring the concentration of greenhouse gases (GHGs) has become a major concern in modern society because of the growing impact of human activity on the global climate system (Hui et al. 2022). Satellite observations give an unique opportunity to observe the GHGs total columns at a global scale, but these space missions need to be validated from ground-based measurements.

In order to enhance cal/val activities of current and future space missions and to better understand the spatial and vertical distributions of GHGs in different key regions for carbon and methane cycles, the MAGIC (Monitoring of Atmospheric composition and Greenhouse gases through multi-Instrument Campaigns) initiative was launched in 2018 by CNRS and CNES, brining now together more than fifteen international teams (https://magic.aeris-data.fr). Various instruments, including research aircrafts, balloons and ground-based measurements, have been used yearly over intensive measurement campaigns. The EM27/SUN Fourier Transform Spectrometer is one of the ground-based measurement instruments used as part of this initiative. This device offers the practical advantages of portability and access to column mole fractions of dry air of CO_2, CH_4, CO and H_2O from solar spectra.

The main objective of this study is to carry out a statistical evaluation of the EM27/SUN data collected during the MAGIC measurement campaigns. The EM27/SUNdevices (LERMA, LSCE, GSMA, CNES and KIT) have been deployed at various measurement sites since 2018. For the last two years, 2022 and 2023, measurements of CO_2 and CH_4 total column have been carried out in the city of Reims as a pilot site representative of medium-sized cities on a European scale, with the aim of estimating emissions of the main greenhouse gases on a city scale. The results obtained can also be compared with data from currentsatellite missions (S5P, IASI, GOSAT-2) for cal/val purposes.

Keywords: Climate change, Greenhouse gases, Ground-based FTIR, EM27/SUN, Reimsbroadcasts, Comparison

Hajar El Habchi El Fenniri
University: University of Reims Champagne-Ardenne
PhD title: Deployment and operation of a portableFourier transform EM27/SUN spectrometer for the monitoring of greenhouse gases and the cal/val of satellites GHGs
Thesis year: 2nd
Doctoral School (for URCA PhD students only): Basic Sciences and Health

Poster 5: Detection of mercury ions at ng/L scale by Surface Plasmon Resonance (SPR) on DNA aptamer biochips

Antoine Elie[1], Yann Niberon[1], Aurélien Bruyant[1], Claudia Cosio[2], Laurent Arnaud[3], Komla Nomenyo[3] and Julien Proust[1]

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[3] *PhaseLab Instrument SAS*

Mercury pollution is an important environmental problem due to its toxicity for humans, even at very low concentrations. Presently, several methods enable the detection of this element at concentrations of the order of the 10 ng/L. Although sufficiently sensitive in most cases, measurements are typically made punctually. We present here the development of a continuous flow detection system for two mercury forms: the mercuric ion (Hg^{2+}) and the methylmercury ion (CH_3 -Hg_+). We used a compact SPR device based on gold chips functionalized with tailored aptamers. Leveraging the specific affinity between DNA aptamers and mercuric ions, this reliable technique allowed the detection of mercuric ion concentrations in the ng/L range. The high sensitivity is attributed to the expected DNA folding into a hairpinshape in presenceof the mercuric ions. Circular dichroism spectroscopy confirmed the triggering of conformational DNA change for 3 mercuric ions per aptamer. This study highlights the strong potential of compact SPR associated with specific DNA aptamers for the realization of a portable real-time detection device.

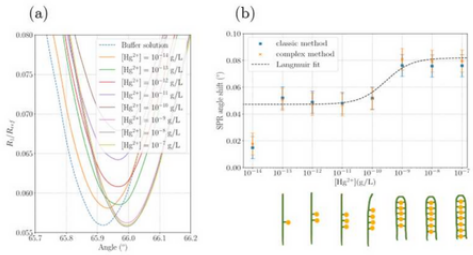

Figure 1: Mercuric ion detection. (a) Interpolated data of the amplitude of the reflection depending on the angular shift at different concentration of mercuric ions. (b) SPR angle shift in function of the concentration of mercuric ion by classic and complex methods.

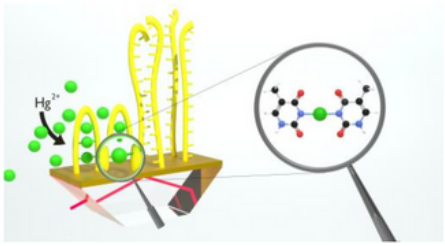

Figure 2: Schematic representation of the hairpin-shaped thymine/Hg^{2+} interaction on the gold surface of an SPR prism + zoom on the T-Hg^{2+}-T complex formed.

Figure 3: "IPSOLab", a 2 channels compact SPR.

Antoine Elie
University: Technology University of Troyes (UTT)
PhD title: Real-time monitoring of chemical contaminations in complex aquatic environments by DNA nano-sensors
Thesis year: 1st

Poster 6: How do bioclusters emerge?

Adebo Jean-Daniel Houeto

REGARDS (EA 6292) / Université de Reims Champagne-Ardenne – 57 rue Pierre Taittinger 51571 Reims Cedex, France

To meet the challenges of the 21st century, such as climate change, food security and the depletion of natural resources, European institutions have placed the development of the bioeconomy at the heart of their public policies. This bioeconomy, seen as a development model capable of responding to each of these challenges while enabling continued growth, is being rolled out across the Union's member states, in particular by encouraging the creation of bioclusters. If bioclusters have such a crucial role to play in the deployment of the bioeconomy, the question arises as to the conditions of their emergence. How do they emerge and structure themselves in a given region? Is it possible to replicate existing models in other regions? What about their sustainability?

This poster reports on the results of a doctoral thesis that addressed the question of the conditions for the emergence of bioclusters by analyzing, on the one hand, the European smart specialization strategy, a major policy framework for the deployment of the bioeconomy at the level of European regions, and, on the other hand, the current structuring of the industrial hemp bioeconomy in the department of Aube, around the "Pôle Européen de la bioraffinerie territorial du Chanvre" project.

By bringing together the proximity economy and the heritage economy, we have shown that bioclusters are emerging, due to an imaginary according to which the deployment of the bioeconomy requires the creation of bioeconomy clusters. This imaginary, based on the myth of the omnipotence of geographical proximity, shapes public policies promoting the bioeconomy and is performative for territorial players engaged in non-food biomass valorization activities.

We have also shown that this imaginary, by targeting territorial heritage, can lead to ecological contradictions. In fact, by focusing on dominant value chains and dominant players in territories in order to build bioclusters, this imaginary can lead to lock-ins, thus leaving unexploited the rich diversity of bioeconomy models, which is nonetheless invaluable for the ecological transition of territories. Moreover, the resulting bioclusters are neither a guarantee of optimality nor sustainability, even though they are part of the bioeconomy.

Adebo Jean-Daniel Houeto
University: University of Reims Champagne-Ardenne
PhD title: An economic analysis of the conditions for the emergence of bioclusters. The case of the industrial hemp bioeconomy in Aube.
Thesis year: PhD defended in 2023
Doctoral School (for URCA PhD students only): Human and Social Sciences

Poster 7: Evaluation of the ecotoxicological effects of cyanotoxins and emerging cyanopeptides on fish Cell lines (ToxCell)

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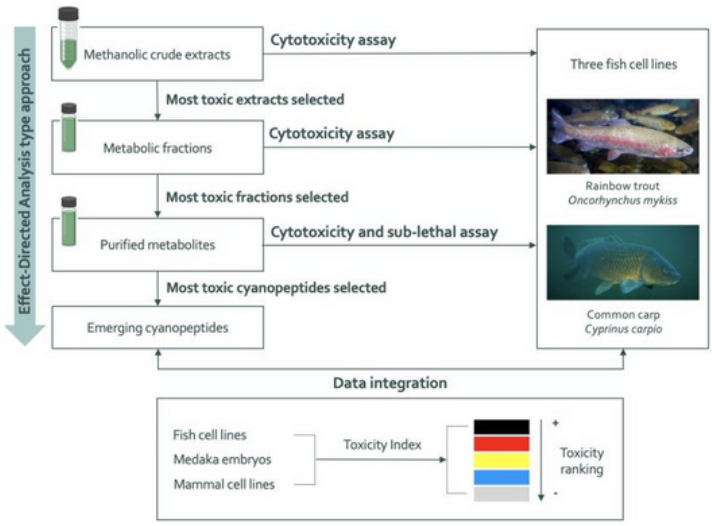
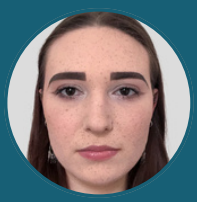
Cyanobacteria blooms are intensifying for years due to eutrophication and global changes. This growing worldwide phenomenon poses a major health issue since cyanobacteria produce toxic cyanopeptides like microcystines (MCs). These hepatotoxins are responsible for intoxication that can be lethal. The WHO therefore set a regulatory concentration for MCs in drinking water at 1 µg.L^{-1} in 2003, revised by the ANSES to 0.3 µg.L^{-1} in 2020. However, a wide diversity of cyanopeptides, other than microcystins, has beenidentified in the literature and some of them proved to have toxic or bioactive effects. Comparedto microcystin, toxicitydata for these other cyanopeptides remain less extensive.

The ToxCell project aims to collect new cell toxicity data on emerging cyanopeptides and to compare them with MCs as a reference cyanotoxin. For this project, three fish cell lines were selected from rainbow trout (rainbow trout liver RTL-W1) and common carp (carp leucocyte culture CLC, common carp brain CCB). These fish cell lines will be exposed to cyanotoxins and cyanopeptides at different concentrations, using an EDA-type (Effect-Directed Analysis) approach to identify the most toxic strains, then fractions, and finally purifiedcyanopeptides. Cytotoxicity and sub-lethal responses (ROS, phagocytosis activity, wound healing assay, etc.) will be assessed by flow cytometry and microscopy. This PhD project is a part of the ANR project MC-Tox in which other toxicity data on the same extracts, fractions or purified cyanopeptides will be obtained on fish embryos and on mammalian cell lines. Overall toxicity data will be integrated following a Weight of Evidence-based data analysis, resulting in toxicity indexes allowing for extracts, fractions and cyanopeptides ranking. Emerging cyanopeptides, associated with toxicity index values, will be ranked in comparison to MC. The purpose is to raise awareness and suggest regulatory consideration on emerging cyanopeptides based on their toxicity ranking in relation to theregulated MC toxicity.





Aurore Huré
University: University of Reims Champagne-Ardenne
PhD title: Evaluation of the ecotoxicological effects of cyanotoxins and emerging cyanopeptides on fish Cell lines (ToxCell)
Thesis year: 1st
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 8: Infrared laser spectroscopy as a versatile tool for environmental quality monitoring

Clément Jacquemin, Florent Defossez, Raphaël Vallon, Bertrand Parvitte and Virginie Zéninari

Université de Reims Champagne-Ardenne, Centre National de la Recherche Scientifique, Groupe de Spectrométrie Moléculaire et Atmosphérique, France

One of the greatest challenges facing humanity is how to reconcile the growing demand for energy with the population and economic growth without causing irreparable damage to the environment. The continuous exhaust of chemical pollutants such as nitrous oxides (NO_x), ammonia (NH_3), methane (CH_4), sulfur oxides (SO_x), perfluorocarbons (C_xF_y) and carbon dioxide (CO_2) from industrial, agricultural and automotive activities are responsible for many phenomena, including acid rain, air quality degradation, climate change and the thinning of the ozone layer.

Monitoring environmental quality is a key element. Identifying the sources that have an impact on the environment enables us to take action. Regular measurements also enable us to monitor the effects of an environmental policy, enabling us to adapt our actions according to the response observed.

Infrared laser spectroscopy is a tool that can identify and quantify chemical species in the gas phase, and especially those mentioned above. Several measurement techniques are derived from this tool, enabling highly accurate and sensitive measurements. Detection thresholds of the order of parts per million to parts per billion are all the more appropriate given that the presence of certain chemical species in trace amounts is sufficient to have an effect on the environment. Each of them has a special feature, such as no need for regular calibration, remote measurement, low cost or high immunity to mechanical vibration.

This versatility makes it possible to develop suitable measurement systems for a wide range of applications. Thanks to innovative semiconductor infrared laser sources, it is possible to design measurement instruments with a small footprint that can be deployed outdoors.

Clément Jacquemin
University: University of Reims Champagne-Ardenne
PhD title: Optimization of infrared laser spectrometers for the detection of gases of atmospheric interest
Thesis year: PhD defended in 2023
Doctoral School (for URCA PhD students only): Digital & Engineering Sciences

Poster 9: Environmental legacy of the Great War: impacts of the first world war on the properties and functioning of agricultural and forest soils

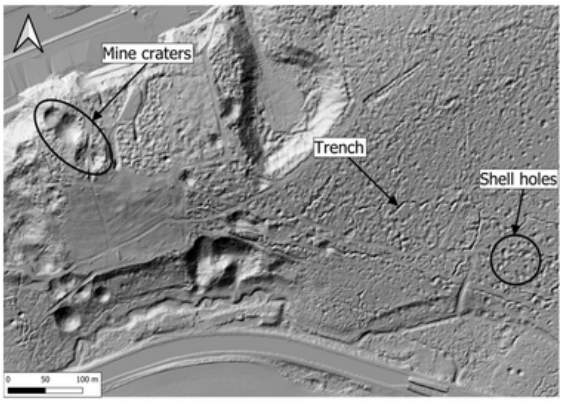
Nicolas Mangin Benjamin Cancès, Marie Ponthieu, Béatrice Marin, Alain Devos, Théo Krauffel

GEGENA, EA 3795, Université de Reims Champagne-Ardenne, Reims, France

Military activities greatly and durably deteriorate soils, from a physical, chemical and biological point of view. More than a century after the end of the first World War (WW1), soils in the Grand Est region still have visible (in forest) or hidden (in agricultural context) marks of the conflict. Artillery, mine warfare and defense networks have strongly impacted soil structure and functions, at both local and regional scale.

With the centenary of the end of WW1, academic research regained some interest for this conflict and its consequences, but most of the studies on soils focused on strongly affected areas. Thus, representativity of the pollutions/disturbances studied can be questioned.

The current project aims at evaluating the influence of the main disturbances associated with WW1 on current functions of soils through a multi-disciplinary and a multi-scale approach. Along the former front line, the study will focus on both agricultural and forest soils developed over different parent materials (chalk in dry Champagne, Gaize in Argonne). The most common and representative remains of war disturbances will be covered, such as shell holes and trench networks. The objective is to study a diversity of geomorphological contexts, land use history, and intensity of disturbance in order to link the results of our analyses to a polemological gradient.



LIDAR image of polemoforms in Sapigneul area (Marne) mainly covered by forest

Vegetation index in a field near Saint-Hilaire-le-Grand (Marne) Credit: Alain Morisot

We have identified sites of interest using (i) GIS (Geographic Information System), (ii) recent and ancient aerial photography (from 1915 to current days), (iii) LIDAR images and (iv) documents from the military archives. The soil profiles will be described, sampled and further physical and chemical analyses will be conducted, focusing mainly on the structure changes, fertility and the possible pollutions caused by the war.

The results will be extrapolated at a larger scale and will allow to develop a method to estimate the global impact on plant productivity in the whole former front zone. These results will help us to enlighten our understanding on how wars (past and present) impact the soil environment and related services.

Nicolas Mangin
University: University of Reims Champagne-Ardenne
PhD title: Environmental legacy of the Great War: impacts of the first world war on the properties and functioning of agricultural and forest soils
Thesis year: 1st
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 10: Enzymatic deglycosylation to obtain a molecule of cosmetic interest from a lignocellulosic feedstock

Amandine Moreno[1,2], Louis-Nicolas Gombault[2], Caroline Rémond[1]

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In recent years, there has been a growing awareness of the environmental impact of the cosmetics industry. Synthetic molecules can be derived from polluting manufacturing processes and have a negative impact on the ecosystem. Plant extracts and ingredients of natural originare considered more sustainable and environmentally friendly.
Lignocellulosic biomasses are natural, renewable, and an abundant source of extractables biomolecules of cosmetic interest. However, extraction yields may be limited by the substrate recalcitrance. The complex structure of plant cell walls made of cellulose, hemicellulose, and lignin, makes it harder for the solvent to access and solubilize the target molecules from the plant cells. Therefore, the coupling of mechanical and biological pretreatment and extraction steps enable cell wall hydrolysis and molecule transformation.

Intensified innovation extraction processes are an effective way of adding value to plant biomass. Mechanical and thermal forces optimize material transfer, promoting contact between the liquid and solid phases. The accessibility to the molecules of interest is enhanced, while reducing the solvent input. Moreover, continuous system lower reaction times and dead volumes, making processes more sustainable.
Cellulase-based enzymatic cocktails can help to fractionate lignocellulosic substrates. The cellulase activity is commonly used to hydrolyze cellulose polymers. The β-glucosidase activity, which ensures the hydrolysis of cello-oligosaccharides to glucose, can also enable the deglycosylation of phenolic molecules. This reaction is of interest to obtain aglycone biomolecules from their glycosylated derivatives extracted from plant cells.

Therefore, an innovative extraction approach in two steps was developed at a lab batch scale to evaluate the combination potential of vegetal extraction and molecule transformation to enrich the vegetal extract in a target aglycone phenolicalcohol.
The alkaline hydrolysis of glycosylated phenolic ester followed by the enzymatic deglycosylation of the glycosylated phenolic alcohol were optimized. More specifically, a focus was made on the second enzymatic deglycosylation step. Indeed, the aim was to follow the deglycosylation kinetics over time by varying enzyme dose. The results open possibilities for coupling the enzymatic action with a continuous process with reduced residence times.

Amandine Moreno
Universities: University of Reims Champagne-Ardenne
PhD title: Pretreatment and enzymatic extraction of molecules of cosmetic interest from lignocellulosic feedstock
Thesis year: 1st
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 11: High-pressure as an energetically cost-free alternative to perform the reaction of unprotected glyconitrones with alkynes

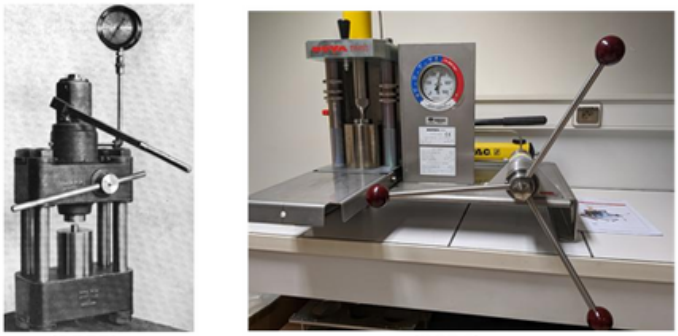
Nathan Noël, Fabien Massicot, Emmanuel Riguet, Jean-Luc Vasse, Jean-Bernard Behr

Université de Reims Champagne-Ardenne, ICMR, UMR CNRS 7312, 51687 Reims Cedex 2, France

A large number of chemical transformations, such as 1,3-dipolar cycloadditions, require harsh experimental conditions to occur (high temperature, long reaction time) giving possibly rise to side products and low yields. Alternative activation methods including organocatalysis, microwave irradiation, sonication or ball milling have been developed over the years in order to shorten reaction times and prevent reagents and products from degradation. Reactions might also be accelerated by compressing the initial volume through application of highpressure. The beneficial effect of high pressure on a given reaction has long been recognised, even for industrial applications (Figure 1).

On a theoretical point of view, intervention of pressure in reaction rate (characterized by the reaction constant k) correlates to the variation of volume of activation $\Delta V^{\neq}$, which is the difference between the volume of the transition-state complex and volume of the reactants. Mathematical correlation between k, P and $\Delta V^{\neq}$ shows that reactions with a negative volume of activation might be accelerated by pressure. Thus, rate enhancement is expected for reactions in which starting molecules merge into one another, such as cycloadditions.

In this work, we developed a new transformation of unprotected carbohyddrates via 1,3-dipolar cycloaddition of the corresponding nitrones with alkynes ***under hyperbaric conditions***. Such conditions are ***energetically cost-free*** since the only power used is the operator's force to rotate the wheel for hydraulic pressure adjustment (see the experimental device in Figure 1).



(1899) (2024)

Figure 1. High-pressure appartus for chemical transformation

The formed isoxazolines were converted into biologically relevant compounds by few additional steps. The synthetic sequence, taken as a whole, constitutes a very straightforward procedure for the transformation of aldoses, ***highly compatible with the principles of green chemistry*** in terms of atom economy, energy cost, use of renewable feedstocks or protecting-group free synthesis.

Nathan Noël
University: University of Reims Champagne-Ardenne
PhD title: Agro-sourced pentoses and hemicelluloses functionalization for high value added molecules synthesis
Thesis year: 3rd
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 12: WWI: Forests don't forget

Laure Parodi[1,2], Lola Gogniat[1], Nicolas Maurin[2], Déborah Closset[1], Stéphanie Sayen[2]

[1]*UMR CNRS 7058 EDYSAN / University of Picardie Jules Verne- 1 rue des Louvels, 80000 Amiens*
[2]*UMR CNRS 7312 ICMR / University of Reims Champagne-Ardenne - Moulin de la Housse, 51687 Reims Cedex*

The World War I (WWI) fighting have deeply affected the forests of northern and eastern France, destroying ecosystems, disturbing soils and burying between two and three hundred million unexploded ammunition. These munitions are gradually disintegrating, allowing their toxic chemical compounds to be dispersed into the environment. These chemicals may thus contaminate soils and groundwater and be taken up by plants.

Investigating the former WWI battlefields of Somme and Argonne, the aim of the study is to assess the resilience of these forests and to identify any lasting changes in their functioning (plant communities, life-history traits) following soil disturbance. Identified vegetation changes (plant communities, physiological features) will be relied to the presence of war pollutants in soils and plant tissues (metals, nitro-aromatic compounds, perchlorates). For this purpose, a comparative approach was carried out by selecting sites in the "red zone" (i.e., totally destroyed areas) and control sites in the "green zone" (i.e., untouched by WWI).

Initial fieldwork revealed dissimilarities in the composition and richness of plant communities, pointing out a long-term influence of the war. The chemical analyses of samples collected *in natura* in the different studied sites are currently in progress and will allow us to rely vegetation adaptations to the pollutants inherited from the WWI.

Laure Parodi
University: University of Picardie Jules Verne
PhD title: Influence of pollutants inherited from the Great War on the assembly and functioning of polemo-ecosystems
Thesis year: 2nd

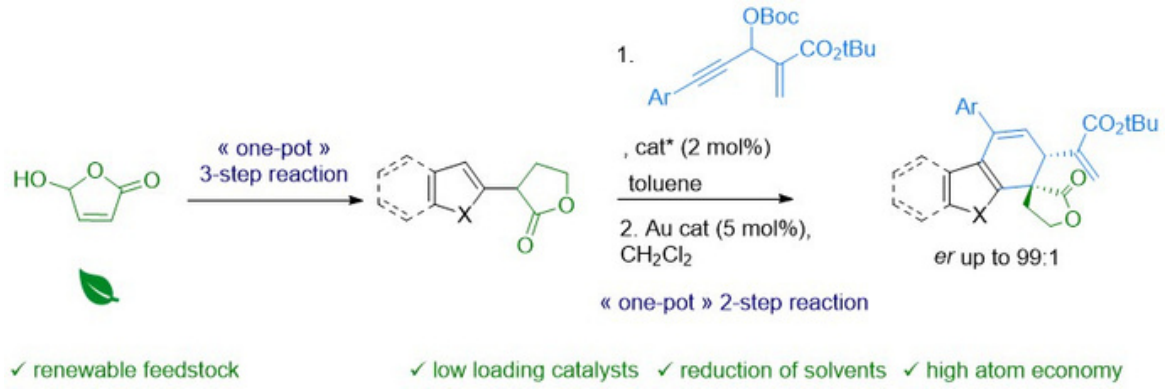
Poster 13: Generation of chemical and stereochemical diversity with high atom economy

Rémi Pereira[1], Bastien Gitton[1], Aurélien Blanc[2], Fabienne Grellepois[1], Emmanuel Riguet[1]

[1]*Université de Reims Champagne-Ardenne, CNRS, Institut de Chimie Moléculaire de Reims, UMR 7312, 51097 Reims, France*
[2]*Université de Strasbourg, CNRS, Institut de Chimie de Strasbourg, UMR 7177 4 rue Blaise Pascal, CS90032, 67081 Strasbourg, France*

Asymmetric catalysis represents the most efficient and powerful pathway for the synthesis of original optically active compounds, which are in increasing demand for chemical, pharmaceutical, agricultural, and material science applications.

In 2021, Benjamin List and David Mac Millan were awarded the Nobel Prize in Chemistry for their development of a new and ingenious tool for molecule building, the asymmetric organocatalysis. This efficient approach is atom-economical, cost-effective and environmentally benign, helping to make chemistry greener. In essence the most-environmentally-friendly reactions are those designed so that the final product contains the maximum proportion of the starting materials, without wasting atoms.
Our recent results, merging organo- and gold-catalysis applied to substrates derived from hydroxyfuranone will be presented in this communication focusing on the versatility of this approach to reach various original highly functionalised scaffolds.



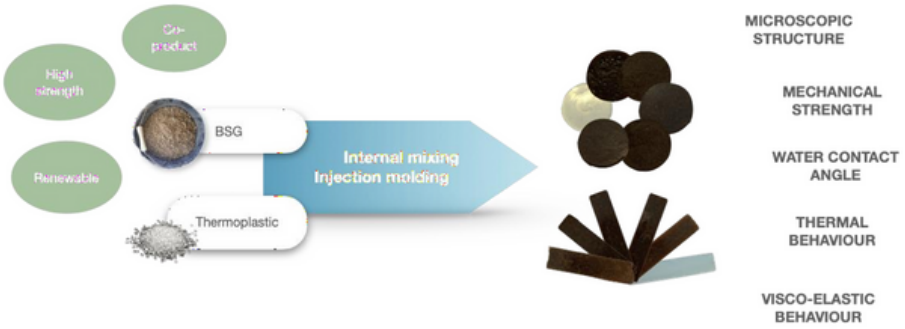
Rémi Pereira
University: University of Reims Champagne-Ardenne
PhD title: Dearomatization and C-H bond functionalization reaction of aromatic compounds : New approaches based on the Cope Aromatic reaction
Thesis year: 2nd
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 14: Sustainable material development: Harnessing the potential of Brewer's spent grain

Adèle Poirier[1,2], Catherine Lacoste[1], Pedro Augusto[2], Patrick Perré[2], Sébastien Alix[1]

[1] *Institut de Thermique, Mécanique, Matériaux - Université de Reims Champagne-Ardenne, 51100,Reims, France*
[2] *LGPM, Centrale Supélec, Centre Européen de Biotechnologie et Bioéconomie (CEBB), 3, rue des Rouges Terres, 51110 Pomacle, France*

As one of the oldest alcoholic beverages, beer is widely consumed around the world. Each year, more than 1 billion hectoliters of beer are produced worldwide by major brewering indutries. Recently microbreweries have experienced a surge in popularity. This proliferation goes hand in hand with the growing amount of by-products which are the major concern for brewing industry. The beer process generatestwo main wastes: Brewer's Spent Grain (BSG) and hot trub. BSG mostly consists of barley grain husks obtained as solid residue. As with all lignocellulosic materials, it contains cellulose, lignin, hemicellulose, but also proteins and minerals. BSG makes up around 85% of the total byproducts of the brewing process and can reach to hundreds of thousands of tons each year in the world. While it has traditionally been used as cattle feed, it has gained increasing attention in recent years due to its potential use as a sustainable and nutritious ingredient. Recently, researchers have begun to explore its potential as a valuable filler in green composites. Indeed, BSG is low- cost, abundantly available and a local resource in many countries. Moreover, industrials show a rising interest in replacing petroleum-based products with more sustainable ones. Using lignocellulosic wastes as fillers in green composites can therefore provide novel materials with a lower environmental impact by replacing part of the plastic fraction and also by being an effectivemean to sequester carbon over a long term. This work focuses on the development and characterization of environment friendly BSG thermoplastics composite materials. Samples made of 0 to 50% of BSG were produced using internal mixing then injection molding. Samples were characterised using flexural mechanical tests, melt rheological tests, water related behaviour and thermal tests. In addition, scanning electron microscopy was used to provide insights into the structural integrity of the interface between filler and polymer.



Scheme 1 : Advantages of using lignocellulosic feedstock and strategies used to manufacture and characterize composite

Adèle Poirier
University: University of Reims Champagne-Ardenne
PhD title: Bio-based composites from agricultural wastes : Formulation/process/properties
Thesis year: 2nd
Doctoral School (for URCA PhD students only): Digital & Engineering Sciences

Poster 15: Differential carbohydrate-active enzymes and secondary metabolite productions by the grapevine trunk pathogen Neofusicoccum parvum Bt- 67 grown on a host and non-host biomass

Julian David Restrepo-Leal[1,2], Jochen Fischer[3], Nicolas Richet[4], Caroline Rémond[1], Olivier Fernandez[2], Ludovic Besaury[1], Florence Fontaine[2]

[1] *Université de Reims Champagne-Ardenne, INRAE, FARE, UMRA 614, AFERE, 51100 Reims, France*
[2] *Université de Reims Champagne-Ardenne, INRAE, RIBP USC 1488, MALDIVE, 51100 Reims, France*
[3] *Institut für Biotechnologie und Wirkstoff-Forschung gGmbH (IBWF), Hanns-Dieter-Hüsch-Weg 17, 55128, Mainz, Germany.*
[4] *Université de Reims Champagne-Ardenne, MOBICYTE, URCA/INERIS, Reims, France.*

Neofusicoccum parvum is one of the most aggressive Botryosphaeriaceae species associated with grapevine trunk diseases. This species may secrete enzymes capable of overcoming the plant barriers, leading to wood colonization. In addition to their roles in pathogenicity, there is an interest in taking advantage of its carbohydrate-active enzymes (CAZymes), related to plant cell wall degradation, for lignocellulose biorefining. Furthermore, *N. parvum* produces toxic secondary metabolites that may contribute to its virulence. To increase knowledge of the mechanisms underlying pathogenicity and virulence, we evaluated the *N. parvum* Bt-67 capacity in producing lignocellulolytic enzymes and secondary metabolites when grown *in vitro* on two biomasses: grapevine canes (GP) and wheat straw (WS). We performed a multiphasic study combining enzymology, transcriptomic and metabolomic analyses. Enzymatic activity assays showed higher xylanase, xylosidase, arabinosidase and glucosidase activities when the fungus was grown on WS in contrast with GP. Infrared spectroscopy confirmed the lignocellulosic biomass degradation caused by the secreted enzymes. Transcriptomics revealed up- regulation of 134 CAZymes-coding genes, where 94 were expressed in both biomass growth conditions. Lytic polysaccharide monooxygenases, glucosidases and endoglucanases were the most represented CAZymes. The secondary metabolites diversity was variable depending on the carbon source. This diversity was higher when growth occurred with GP. Our results provide insight into the influence of lignocellulosic biomass on virulence factor expression. Moreover, this study opens the possibility of optimizing the enzyme production from *N. parvum* with potential use for lignocellulose biorefining

Julian David Restrepo-Leal
Universities: University of Reims Champagne-Ardenne
PhD title: Optimizing Botryosphaeriaceae effector production to control their pathogenicity and to use their lignocellulolytic enzymes
Thesis year: 3rd
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 16: Dietborne mercury bioaccumulation in *D. polymorpha* using stable isotopes

Clarisse Seguin[1], Océane Asensio[2], Emmanuel Tessier[2], Damien Rioult[1], David Amouroux[2] and Claudia Cosio[1]

[1] *UMR-I 02 SEBIO, Université de Reims Champagne-Ardenne, France*
[2] *CNRS - IPREM UMR 5254, Université de Pau, France*

Bioaccumulation of methylmercury (MeHg) in the food chain is a recognized health risk, yet studies on effects of waterborne inorganic Hg (IHg) at high concentrations are predominant in the literature. This work quantified the bioaccumulation of dietborne MeHg and IHg in the freshwater mussel *D.polymorpha*. Microalgae *Chlorella vulgaris* were exposed 2h to 2 fg/cells of ^{199}IHg and 0,2 fg/cells of ^{201}MeHg. Mussels were fed with microalgae for 4 days using 1.10^6 cells.ml^{-1} every 24h. Subsequently, during 3-day-long depuration phase mussels were fed with non-contaminated microalgae. Quantification of Hg was performed with double tracer approach based on stable isotopic tracers (^{202}MeHg and ^{198}IHg) in exposition water, microalgae and mussel whole tissues at 0, 1, 2, 3, 4 days and at 5 and 8 days during depuration. In mussels, MeHg concentrations increased with time, while IHgconcentrations were constant. Methylation and demethylation processes are discussed. Only Hg trace was measured in the water, supporting that mussels were exposed to Hg by diet only. In microalgae, MeHg appears to be mainly located intracellularly, while IHg is mainly bound to cell walls. Overall, this experiment showed that we can measure the trophic transfer of mercury at low concentrations and MeHg seems to be more bioaccumulated than IHg in the zebra mussel.

Clarisse Seguin
University: University of Reims Champagne-Ardenne
PhD title: Fate and impact of mercury in aquatic food chains
Thesis year: 2nd
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 17: Green approach for the preparation of biobased ionic liquids study of their properties for biopolymer dissolution

Mahasoa-Salina Souvenir Zafindrajaona[1,2], Jean-Pierre Mbakidi[1], Zdenek Wagner[2], Magdalena Bendova[3], Sandrine Bouquillon[1]

[1]*Institut de Chimie Moléculaire de Reims (ICMR) - Université de Reims Champagne-Ardenne - UMR CNRS 7312, UFR Sciences Exactes et Naturelles, Bât 18, BP 1039, F-51687 Reims Cedex 2, France*
[2]*Institut des Procédés Chimiques de l'Académie Tchèque des sciences (IPCF) Rozvojová 135/1, 165 02 Prague 6 - République Tchèque*
[3]*Institut de chimie physique, Université de Chimie et de Technologie, Technická5, 160 00 Prague 6 - République Tchèque*

Lignin, the second most abundant biopolymer after cellulose, is a heteropolymer composed of three monomers linked *via* different bonds such as among other β-O-4 or carbon-carbon ones. Its complex structure is a hindrance to its valorization. Despite this, the valorization of lignin is an issue for scientists and industries. Thanks to the 3 major entities which composed the lignin which represent a great interest for the chemical industry, it is therefore a real challenge to find a way to valorize it. Indeed for a few years, studies on the dissolution and the treatment of lignin have been developed to valorize this biopolymer. Scientists have used different ionic liquids or deep eutectic solvents as solvents.

This presentation will address a green approach for the synthesis of ionic liquids qualified as biobased (Fig.1) from specific agro-resources according to several principles of green chemistry. As these solvents could be used to solubilize lignocellulosic biomass and/or to extract bioactive compounds, it's important to present their physicochemical characteristics (density, viscosity, speed of sound and heat capacity) in pure form or in mixture with water. The aim of this work is therefore to select the most promising ionic liquids for the dissolution of the lignin by inference a structure/activity relationship. Preliminary results concerning this last point will be presented.

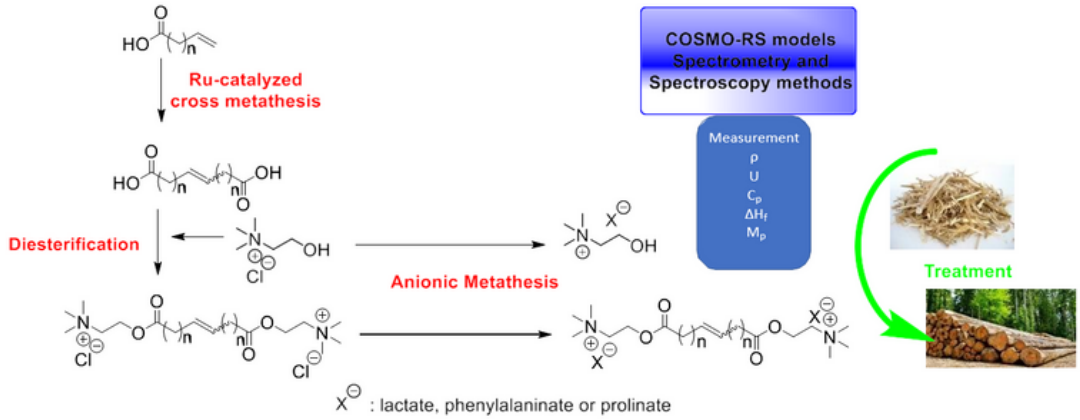


Fig. 1 Illustration of the different step of this work

Mahasoa-Salina Souvenir Zafindrajaona
University: University of Reims Champagne-Ardenne/University of Chemistry and Technology
PhD title: Green, greener, greenest : thermodynamic properties of aqueous solutions of biobased ionic liquids for biomass derivatization
Thesis year: 3rd
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 18: Synthesis and biological assessment of a *p*-coumarate-based library for plant protection

Juliette Stanek[1], Cyrian Thaeder[2], Célia Borrego[1], Fanny Brunissen[2], Sandrine Dhondt-Cordelier[1], Jérôme Crouzet[1], Stéphan Dorey[1], Florent Allais[2], Amandine L. Flourat[2], Sylvain Cordelier[1]

[1] *Université de Reims Champagne-Ardenne, INRAE, RIBP USC 1488, 51100 Reims, France*
[2] *URD Agro-Biotechnologies Industrielles (ABI) AgroParisTech, CEBB, Pomacle, France*

In a context of sustainable agriculture aiming to reduce the use of synthetic pesticides, the discovery of new plant defense stimulators or biofungicides, which can be used in the biocontrol of cryptogamic diseases, represents a major research challenge.

Plants synthesize many phenolic compounds involved in different metabolisms and in particular in defense responses. Certain phenolic compounds, such as phenylpropanoids derived from *p*-coumaric acid, have shown direct antifungal activities to fight against pathogens. The *p*-coumaric acid was functionalized with fatty acid chains of different lengths to determine whether these new molecules possessed direct antimicrobial activities and were able to stimulate defenses in plants. The production of around twenty functionalized derivatives of *p*-coumaric acid was developed through chemo-enzymatic synthesis in order to improve their physico-chemical properties.

The evaluation of these molecules for their direct antimicrobial activity against pathogenic fungi and their ability to stimulate defenses in plants was carried out. The molecules having presented the most important biological activities are those displaying a fatty acid chain of 10 and 12 carbons with a strong hydroxylation, thus increasing their amphiphilic property.

The optimization of the functionalization of the molecules has made it possible to improve their biological activities for potential use in biocontrol.

Juliette Stanek
University: University of Reims Champagne-Ardenne
PhD title: Identification and characterization of genetic factors involved in rhamnolipids perception and signaling in *Arabidopsis thaliana*
Thesis year: 2nd
Doctoral School (for URCA PhD students only): Agriculture, Food, Biology, Environment, Health

Poster 19: Development and application of iron oxide nanoparticles for the removal of antibiotics (tetracycline) from aquatic environments

Charles Wroblewski, Rahul Islam Barbhuiya, Abdallah Elsayed and Ashutosh Singh

School of Engineering, University of Guelph, 50 Stone Rd E, Guelph, ON N1G 2W1, Canada

The widespread environmental exposure to pharmaceutical compounds has raised significant concern around global health and safety and sustainability of aquatic ecosystems. Antibiotics, among the various pharmaceutical groups available have played a crucial role in modern medicine having been used for treating infections in humans and livestock caused by harmful bacteria. However, antibiotic over- prescription and usage in combination with improper disposal practices in households, hospitals, and agricultural activities has led to substantial antibiotic contamination in wastewater, raising significant concerns about risks to both aquatic systems and human health due to the emergence and dissemination of antibiotic-resistant microorganisms. The work presented here focuses on the use of iron oxide (Fe_3O_4) nanoparticles for the removal/ recovery of tetracycline (TC) a broad-spectrum antibiotic from wastewater for remediation/ preservation of aquatic environments. Iron oxide nanoparticles were synthesized in lab and characterized based on enumeration of TEM images with its chemical compositions analyzed by XRD, and FT-IR. The sorption of TC onto iron oxide was studied using UV-Vis and was observed to show a dependency on based on time, temperate and mass loading. Higher nanoparticle mass loading demonstrated increased efficiency with maximum rate of sorption occurring during initial exposure. Further analysis of nanoparticles and sorbed TC were carried out using FTIR, SEM and TEM imaging alongside assessing thermal stability based on DSC. The findings indicate the potential utilization of iron oxide as a greener, cleaner, and more sustainable approach in the removal of antibiotics for aquatic environments.

Charles Wroblewski
University: University of Guelph
PhD title: Development and Functionalization of Iron Oxide nanoparticles
Thesis year: 3rd

SOCIAL EVENT




Social event will take place on **Thursday February 15, 2023 at 6pm**

We offer you a guided tour of **Reims**
followed by a cocktail reception at **La Maison Saint-Sixte at 7:30 pm**

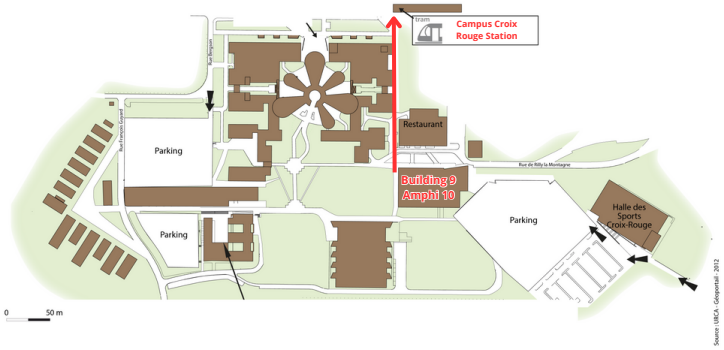
Participants should meet at 5:45 p.m. in front of the City Hall,
guided tour would be possible in English or French.

***

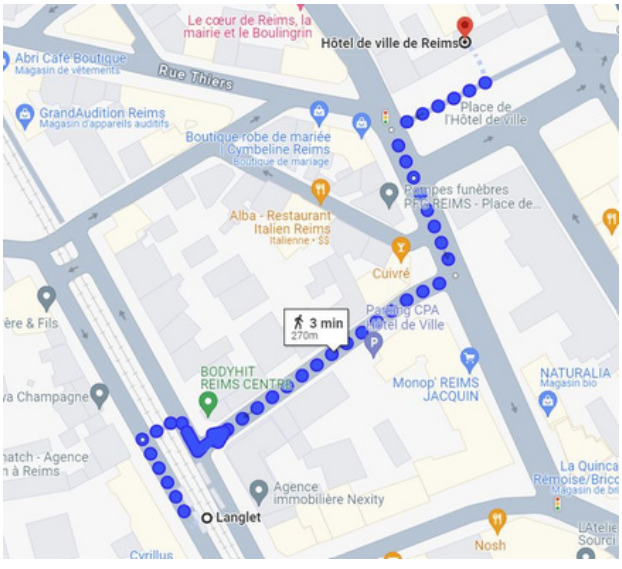
The first seminary in France was founded in 1564 at the Maison Saint-Sixte and became a major place for training priests
Regularly transformed, the premises were rebuilt by the architect Émile Dufay-Lamy: rooms, classrooms
and a chapel with stained glass windows by Jacques Simon are arranged around a vast cloister.

Useful addresses:
City Hall: 9 place de l'Hôtel de Ville, esplanade Simone Veil, 51100 Reims (GPS details: 49.25798797607422,4.031773090362549)
La Maison Saint-Sixte: 16 rue du Barbâtre, 51100 Reims (GPS details: 49.247901916503906, 4.040918350219727)

Direction by tram:
Follow direction bellow to reach "Campus Croix Rouge" tram station



Take line A B going to "Neufchatel", exit at "Langlet",
the City Hall is located at 3 minutes walking distance.



USEFUL INFORMATION

REIMS CITY

Reims is the most populous city in the French department of Marne, and the 13th most populous city in France. It lies 129 km (80 mi) northeast of Paris on the Vesle river, a tributary of the Aisne.

Founded by the Gauls, Reims became a major city in the Roman Empire. Reims later played a prominent ceremonial role in French monarchial history as the traditional site of the coronation of the kings of France. The royal anointing was performed at the Cathedral of Reims, which housed the Holy Ampulla of chrism allegedly brought by a white dove at the baptism of Frankish king Clovis I in 496. For this reason, Reims is often reffered to in French as la Cité des Sacres ("the Coronation City").

Today, Reims hosts 15 Champagne houses with prestigious names as Taittinger, Mumm, Piper-Heidsieck, Veuve Cliquot or Pommery.

Reims received a special economic boost in 2007 when it was connected to the TGV line between Paris and Strasbourg. This brought Reims closer to the Paris agglomeration and made it increasingly attractive as a place to live and a location for back-office operations of companies from the Paris region.

The cathedral and the old town as well as the surroudings with the vineyards on the slopes of the Montagne de Reims are particularly worth seeing. The introduction of the tramway in 2011 in particular has greatly enhanced the urban development of the city center of Reims.

TRANSPORTS SERVICES

Reims has numerous bus routes and two tramway lines serving many parts of the city. For all practical information, visit the Grand Reims mobilités website.

📍 **Useful stations:**

City center and Cathedral: Opéra Cathédrale
Croix Rouge Campus: Campus Croix Rouge
Reims centre Train Station: Gare Centre
TGV Train Station: Champagne-Ardenne TGV

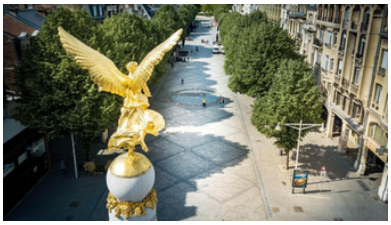
MAIN PLACES

The Cathedral

Champagne cellars

Saint Remi former abbey

Promenade
Jean-Louis Schneiter



Place Drouet d'Erlon

Parc de Champagne

La Maison Fossier

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