Organisation des Nations Unies pour l'éducation, la science et la culture

Secteur des sciences exactes et naturelles

International Seminar

Ecotoxicology and toxicology: problems and decisions

Thursday November 26th, 2015

ABSTRACTS BOOK

Rovaltain area (Valence TGV)
Bâtiment *INEED – salle Forêt de Tronçais*
1 Rue Marc Séguin - 26300 ALIXAN- France

Organized within the framework of the partnership between TEU and the Rovaltain Foundation

RhôneAlpes Région

Acknowledgements :

We are grateful to speakers and all participants coming from different countries, to the members of Trace Element-Institute for UNESCO and Rovaltain Foundation for their expert help in building up the scientific program and for the time they devoted to the seminar organization and lastly, to Rhône Alpes Region and ADN association for their financial support to this seminar.

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Scientific program

9h	**Welcome**
9h15	**Presentation of TEU partnership with Rovaltain Foundation** Muriel Bost (TEU); Wilfried Sanchez (Fondation Rovaltain); Bernard Lacoste (Région Rhône Alpes)
9h30-10h15	**Aquatic ecotoxicology of metals: Trophic transfer, accumulation and effects and implications for environmental effects monitoring and environmental risk assessment** Patrice Couture, INRS, Québec
10h15-11h	**Green chemistry and sustainable development applied to metal toxicology** Pr Tarasova, Institute of Chemistry and Problems of Sustainable Development Mendeleev University of Chemical Technology of Russia, Russia
11h-11h45	**Green chemistry applied to analytical laboratory** Dr Stéphane SARRADE, Chef du Département de Physico-Chimie (DPC), Directeur de Recherche, Direction de l'Energie Nucléaire, CEA Saclay – Président IFS
12h	**Lunch**
13h30-14h15	**Vaccine aluminic adjuvant safety : biopersistence, biodistribution and neurotoxicity in animal models.** Pr Josette Cadusseau, INSERM U955 E10 & Paris-Est University, "Cellular interactions in the neuromuscular system", Créteil, France
14h15-15h15	**Human toxicosis : hemochromatosis and Wilson disease. Place of Reference Centers for Rare Diseases** Pierre Brissot, University of Rennes, CNR Hemochromatosis, Rennes – France Anne-Sophie Brunet / Muriel Bost, CNR Wilson, Hospices Civils de Lyon, Lyon - France
15h15-16h	**Speciation analysis involving elemental and molecular mass spectrometry : application in ecotoxicology and clinical toxicology** Véronique Vacchina, University of Pau, Pau - France
16h	**Conclusion**

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Presentation of TEU partnership with Rovaltain Foundation

Muriel Bost, President TEU

Wilfried Sanchez, Director Foundation Rovaltain

Trace Element – Institute for UNESCO and the Rovaltain Foundation for scientific cooperation decided to commit to a partnership supported by the Rhône Alpes administration (*Région Rhône-Alples)*.

The main objective of Trace Element – Institute for UNESCO (*http://www.trace-element.org*) is to develop, promote and coordinate inter-region, national and international actions in all areas related to trace elements, from basic knowledge to high-level research and its practical applications, in accordance with UNESCO recommendations.
The purpose of the Rovaltain foundation (*http://www.fcsrovaltain.org*) is to increase and circulate scientific knowledge in such areas as environmental health, toxicology and ecotoxicology by setting up requests for research proposals, scientific conferences and thematic days.

The goal of this partnership is to improve the knowledge on how toxic metals impact the connections between health and environment. It also aims to develop training and information in this particular area. A better understanding of the potential long-term effects of trace chemical substances on man is both a stake and a challenge for the scientific and medical communities.
This stake is equally shared by TEU and the Rovaltain Platform, whose development driving force lies in the very understanding of long-term effects of chemical, biological or physical substances on man and his environment. Trace elements, and especially metallic trace elements (MTE), are involved in many biological mechanisms and may be associated with the emergence of certain diseases, along with other chemical substances. MTE and the approaches allowing for the study of their potential effects on man are specific points of synergy between TEU and the Rovaltain Platform. Both structures can efficiently co-develop various fields of expertise and deal with the needs in terms of scientific monitoring and communication to the scientific community and the general public.
To increase, reinforce and speed up the regional, national and international spread of such knowledge, the partnership relies on the creation and exploitation of joint synergies in four fields of action: training, information, expert assessment and scientific monitoring.
This seminar is the first important event of partnership between the international TEU network and Rovaltain foundation. It is a great pleasure to welcome you on Rovaltain site and we wish you will attend fruitful conferences.

Patrice Couture is Professor at the « Institut national de la recherche scientifique, centre Eau Terre Environnement (National Institute of Scientific Research, Water, Land and Environment Center) » in Québec City, Canada. Comparative physiologist by training, in the twenty years of his career as a researcher, he has developed an expertise in metal ecotoxicology in aquatic organisms, with a strong focus on fish and freshwater systems. His research interests encompass fundamental aspects of metal-induced effects on metabolism and combined effects of metals and natural stressors, metal transfer along aquatic food webs and the development of tools for the identification of metal stress in aquatic organisms.

Aquatic ecotoxicology of metals: Trophic transfer, accumulation and effects and implications for environmental effects monitoring and environmental risk assessment

Couture P, Campbell PGC, Institut national de la recherche scientifique, Centre Eau Terre Environnement, Québec, Canada.

Leached from surface rocks or released by human activities, metals typically end up in aquatic systems, where they can be transferred, bioaccumulate and in some cases biomagnify along food webs and ultimately induce toxicity. The fate of metals in aquatic environments and their toxicity depends on a very complex suite of interactions with physical, chemical and biological factors. Indeed, life as we know it would not exist without some metals, which, due to their chemical properties, are essential for a wide range of metabolic functions. However, excess concentrations of essential metals, or trace amounts of non-essential metals, can lead to serious deleterious effects or even lethality. The propensity of a metal to be accumulated by living organisms depends on the affinity of the element for biological surfaces and its ability to cross external cell membranes, which, in turn, depend on its speciation. Once incorporated inside cells, the fate of the metal and its effects will depend on the ability of the organism to detoxify, and ultimately eliminate, the metal. Metals inappropriately bound to sensitive subcellular components, such as mitochondria or metabolic enzymes, can lead to oxidative stress and substantial metabolic costs. Each species within a food web possesses its own capacity for metal accumulation, storage, detoxification and elimination. This species-specific response, combined with behavioral and ecological considerations of predator-prey interactions, greatly affects the capacity of metals to efficiently transfer along food webs and to induce toxicity. Environmental risk assessment of metals in aquatic environments must take into account the complexity of metal interactions with abiotic and biotic components. Given the wide range of effects of metals at all levels of biological organization, from molecular to behavioral, the choice of tools for environmental effects monitoring of metals is vast and rapidly expanding.

Prof. Natalia Tarasova is the Director of Institute of Chemistry and Problems of Sustainable Development, D. I. Mendeleev University of Chemical Technology of Russia. Prof. Tarasova is a well-known scientist in the field of radiation chemistry and phosphorus chemistry. She is developing new methods of synthesis of polymeric forms of phosphorus (modified red phosphorus, phosphorus-sulfur co-polymers, polymeric phosphorus doped with metals, carbon, etc.) under high-energy irradiation. She conducts research related to green chemistry, sustainable development, risk assessment and management.

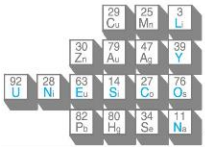
Green Chemistry and Sustainable Development

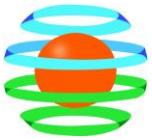
Natalia P. Tarasova, Anna S. Makarova, Stanislav F. Vinokurov, Vladimir A. Kuznetsov
D.Mendeleev University of Chemical Technology of Russia

Lack of understanding of complex links between environment and human well-being resulted in trying to treat the symptoms of a disease rather than getting to the root cause: human activities 'push the Earth system outside the stable environmental state of the Holocene, with consequences that are detrimental or even catastrophic for large parts of the world' (Rockström et al. 2009).

A concept of planetary boundaries defines nine planetary systems and the status of human disturbance within them. Thresholds have been identified that should not be transgressed if we want to maintain the stability of the Holocene state in which human civilizations have developed. If crossed, these thresholds can generate unacceptable environmental change. The nine processes, for which such thresholds were defined, are climate change, biodiversity loss, nitrogen and phosphorus load, stratospheric ozone depletion, ocean acidification, change in land use, chemical pollution and atmospheric aerosol loading. The boundaries in three of the systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle) have already been exceeded and are to bring consequences.

K. Raworth goes on to add a social dimension to this picture and describes humanity's XXI century challenge as a doughnut of planetary and social boundaries (Raworth, 2012). The environmental ceiling consists of the nine planetary boundaries, beyond which lie environmental degradation and crises in Earth systems. The social foundation, introduced by K. Raworth, consists of eleven top social priorities identified by the world's governments in the run-up to Rio+20 – and below this foundation **lays** unacceptable human deprivation such as hunger, poor health and poverty. The quest for the humankind, therefore, is to recognize the interconnection between these two layers and find a way to live inside this so-called doughnut. After the 2012 Rio+20 Conference on Sustainable Development, **its** outcome document, The Future We Want, initiated a process to develop a set of sustainable development goals. Countries then agreed that both dimensions need to come together to result in a single framework and an intergovernmental 30-member Open Working Group was established to develop a set of Sustainable Development Goals (SDGs). The objective was basically to produce by the





end of 2015 a set of universally applicable goals that balance the three dimensions of sustainable development - the environmental, social, and economic, - and are consistent with both the Millenium Development Goals and the principles of sustainable development formulated by the Rio+20 outcome document. Approved and adopted on 25th of September 2015, by the UN General Assembly, the SDGs will constitute the framework of international development. There is one more thing about the SDGs that is a contrast from the MDGs approach. 7 goals out of 17 are dedicated to tackling environmental issues – water management, access to modern and sustainable energy, sustainable cities, sustainable consumption and production patterns, urgent action to combat climate change, sustainable management of marine and terrestrial resources and ecosystems. Chemistry and chemical technology might be considered as the means to achieve these strategic goals until their expiration in 2030.
Several examples of the research dealing with “chemical footprints” of metals will be discussed.
The research was partially supported by the Russian Science Foundation, grant 15-17-30016.

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Josette Cadusseau PhD

Professor in Neurosciences UPEC , IMRB INSERM U955 Créteil FRANCE

My research has focused on plasticity and cell interactions in the CNS, more particularly on glial cells and inflammatory processes in various models of neurodegeneration. My current research is devoted to understand the mechanisms at work in macrophages myofasciitis (MMF), a condition associated with immunization using vaccines adjuvanted with aluminum. We are currently developping experimental projects in MMF rodent models to study the biodistribution, biopersistence and neurotoxicity of trace aluminum.

Vaccine aluminic adjuvant safety : biopersistence, biodistribution and neurotoxicity in animal models.

Pr Josette Cadusseau, INSERM U955 E10 & Paris-Est University, "Cellular interactions in the neuromuscular system", Créteil, France

Our team is concerned with the biopersistence, biodistribution and cytotoxicity of aluminic particles contained in vaccine adjuvants. Aluminic hydoxyde (alum) is a nanocrystalline compound introduced in vaccines in 1927 in order to enhance the immune response. Alum is generally well tolerated but rare individuals may have an unusual susceptibility leading to the presence of a long lasting granuloma at the site of former immunization. Particulate aluminum has been demonstrated in the granuloma macrophages/ monocytes and the presence of an aluminic granuloma is used to diagnose the Macrophagic Myofasciitis in patients suffering from diffuse myalgias and arthralgias, severe chronic fatigue and cognitive impairments characterized by attention and working memory disorders.

Development of new tools to tag aluminum using fluorescent compounds allows tracking of adjuvant aluminic particles throughout the body in animal studies. We have demonstrated the migration of alum particles from the muscular injection site to the draining lymphatic system and from there to blood circulation and target organs including brain where they accumulate over time. Particles translocation to the brain lies upon a trojan horse mechanism assumed by monocytes/macrophages and is potentiated by a leaky blood brain barrier. Both the route of alum particles administration, either subcutaneous or intramuscular, and the **animals'** genetic background are key factors in the translocation kinetic. Finally the neurotoxic effects of alum particles assessed by **behavioral** studies follows a non-monotonous dependency, the impairments being observed for the lowest doses tested and only these doses are associated with a significant increase of alum brain concentration. Such a result should indicate that decreasing the dose is not the solution in terms of aluminic adjuvant security.

Tel.: +
conta

Pierre BRISSOT is Professor of Hepatology and former Head of the French Reference Center for Rare Genetic Iron Overload at University Hospital Pontchaillou, Rennes (France). He has acted as Visiting Professor of Medicine at University of California San Francisco, Harvard Medical School (Boston), and University of California San Diego. His research interests include iron and the liver, with special focus on genetic hemochromatosis. He has authored or co-authored more than 300 peer-reviewed publications, and is co-chair of the Curriculum in Iron Metabolism (European School of Hematology). He is Past-President of the French

Hemochromatosis : A typical example of curable and preventable human chronic toxicosis

Brissot P, Cavey T, Ropert M, Jouanolle AM, Loréal O. Inserm-UMR 991, Faculty of Medicine, National Reference Center for Rare Genetic Iron Overload Diseases, University Hospital Pontchaillou, Rennes, France.

The hemochromatosis (HC) spectrum encompasses a variety of chronic iron disorders of genetic origin. The most frequent form is HFE-related HC, whose genetic predisposition is observed in 3/1000 of the **C**aucasian populations. The other, non-HFE related, forms are rare disorders, but present in both Caucasian and non-Caucasians. Most forms result from cellular deprivation in hepcidin, the mastor regulatory hormone of systemic iron metabolism. The **corresponding biochemical** phenotype involves an increase of plasma iron and transferrin saturation, with the subsequent formation of non-transferrin bound iron (NTBI). NTBI is very avidly taken up by the liver, the pancreas, and the heart, and involves a special form, called labile plasma iron (LPI) which is defined by its propensity to produce reactive oxygen species and is considered as the potentially toxic form of plasma iron. In this setting, chronic iron burden targets many organs, being responsible for morbidity (fatigue, joint pains, liver fibrosis, diabetes, **cardiac failure**) and mortality. Easily (but still insufficiently) diagnosed on **a** non-invasive basis, it can be efficiently treated by venesection therapy and should benefit, in the future, of hepcidin supplementation. Family prevention is a key step of the disease management. The role of the reference center, in the frame of a national network of expertise centers, is instrumental for helping practitioners to orientate appropriate genetic testing, for disseminating care guidelines, and for contributing to basic and clinical research.

Degree in Pharmaceutical and Biological Sciences, PhD in Pharmaceutical Sciences specializing in molecular biology**, Muriel BOST** is Biologist Pharmacist in Civil Hospitals of Lyon (France). She's responsible of the Laboratory of Trace Analysis and Toxic metals in the Pharmaco-Toxicology unit of The Edouard Herriot Hospital and also works in Laboratory of Neurogenetics and Laboratory of Hereditary Metabolic Diseases, East Biology and Pathology Center. Her scientific work mainly focuses on the study of Wilson disease, which it started with her PhD thesis prepared in France and USA. She took part in the creation of the French Wilson Reference Center for Rare Diseases in 2005 and participated in EuroWilson, an European project. She is author and co-author of 56 papers mainly on the genetics of Wilson disease and relationship between trace element deficiency or metal toxicity and health. She is President of Trace Element –Institute for UNESCO (Lyon, France), President of SFEMW (*Francophone Society for Wilson Disease Study*) and member of SFERETE (*Francophone Society for Study and Research of Essential and Toxic Elements*; President from 2002 to 2005), FESTEM (*Federation of European Societies on Trace Elements and Minerals*), ISTERH (*International Society For Trace Element Research in Humans*; secretary in 2003-2004) and SFTA (*Société Française de Toxicologie Analytique*).

Anne-Sophie Brunet is a medical Doctor currently working at the Pediatric Gastroenterology Hepatology and Nutrition Unit of the Children's Hospital of Lyon (Hospices Civils de Lyon, France). She's medical coordinator of the French National Reference Center for Wilson Disease in Lyon, and participated in Eurowilson working group, an European project. Her scientific work mainly focuses on the study of Wilson disease, pediatric Hepatology, liver transplantation and immunology.She is member of GFHGNP (Groupe Francophone Hépatologie Gastroentérologie et Nutrition Pédiatrique), and ESPGHAN (European Society for Pediatric Gastroenterology, Hepatology and Nutrition).

Official structures in France to take in charge Wilson disease

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1) **National Center of Reference for Wilson's disease** certificated by the Ministry of Health and Social Protection within the Rare Diseases framework programme (*Official Journal of 2005.10.06*)

Missions of centers of reference

- to facilitate diagnosis and define a strategy of therapeutic and psychological care and of social accompaniment;
- to define and circulate care protocols ;
- to coordinate research and participate in epidemiological surveillance, in association with the *Institut National de Veille Sanitaire (InVS);*
- to participate in training and information initiatives for health professionals, patients and their families ;
- to coordinate the networks of health and socio-medical care providers;
- to be the main interlocutors for the ministries and patients associations;
- To create and to follow a French database of WD patients.

Multidisciplinary team to provide appropriate responses to the WD patients and to the health professionals

- Expert advices
  - **Diagnosis** (including Molecular Biology)
  - **Treatments**
    - Chelating therapy, zinc therapy,…
    - Liver transplantation
    - Diet
  - **Rehabilitation**
- Follow up
- Socio-medical accompaniment for handicapped people,

2) **National Network of Molecular Genetics Laboratories** « Hereditary Diseases of Metabolism », metal group (DHOS/OPRC n°2005-243), 2005.05.25: French guidelines for molecular diagnosis

3) **European Project « EuroWilson »** (6th program – 2004):

- European database of Wilson patients
- European Interlaboratory Quality Control for mutation detection since september 2006

In France, collaboration of physicians (Reference Centre for WD) with network of molecular genetic laboratories gives a synergy to multidisciplinary approach of WD.

Update on a human toxicosis, Wilson disease. Place of the Reference Center for rare Disease

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Wilson disease (WD) (OMIM#277900), first defined in 1912, is an autosomal, monogenic, recessive disorder affecting copper (Cu) metabolism. It is due to mutations in *ATP7B* gene (MIM#606882; NG_008806.1; NM_000053.3) located on chromosome 13, composed of 21 exons spanning a DNA region of about 100 Kb and which encodes a Cu transporter, ATP7B. Over 600 mutations of the *ATP7B* gene have been identified throughout the length of the coding region, as well as in promoter and intronic regions. The ATP7B protein is essential for the Cu excretion by hepatocytes and Cu binding to apoceruloplasmin. Its dysfunction leads to an accumulation of toxic non-ceruloplasmin-bound Cu in the liver and secondarily in the brain and cornea.

The worldwide prevalence of WD is estimated at between one in 30.000 and one in 100.000 in most populations, with a carrier frequency of between 1 in 90. A recent genetic prevalence study in the UK suggested a higher carrier frequency, one in 40.

Early-onset presentations in infancy and late-onset manifestations in adult older than 70 years of age are now well-recognized. The disease expression is highly variable, ranging from totally asymptomatic subjects to patients with severe liver disease or movements disorders. WD can present clinically as liver disease (ranging from asymptomatic with only biochemical abnormalities to acute liver failure), as a progressive neurological disorder (hepatic dysfunction being less apparent or occasionally absent), or as psychiatric illness. WD presents with liver disease more often in children and younger adult patients than in older adults. Symptoms at any age are frequently non specific.
For diagnosis of WD, in many patients, a combination of tests reflecting disturbed Cu metabolism may be needed. It is based on (i) biological findings (serum ceruloplasmin and plasma Cu levels, 24h-urinary Cu excretion before and after chelation, liver Cu content in some cases); new biomarkers [REC (ration CuEXC / Total serum Cu) and the serum exchangeable copper (CuEXC)] seem to be promising tools for diagnosis and treatment-monitoring of WD respectively; (ii) clinical (hepatic and neurological symptoms) and radiological examinations (MRI imaging), (iii) search for Kayser-Fleischer rings and (iv) molecular genetic analysis by direct conventional Sanger sequencing or MLPA analysis. Family screening is a main step for the diagnosis to allow treatment of asymptomatic patients in order to avoid hepatic and neurological complications.

Early diagnosis of WD is critical because effective medical treatments are available, which can prevent neurological disabilities and / or cirrhosis. Different drugs are available for the treatment of Wilson disease, including chelating agents (D-penicillamine and trientine), zinc salts, and tetrathiomolybdate. Once the diagnosis has been made, treatment needs to be life-long. Liver transplantation can also be necessary for patients presenting with acute liver failure or decompensated cirrhosis due to WD.

In this present update, we want to present the multidisciplinary management of patients affected of WD according to guidelines of the French Reference Center for Wilson Disease concerning diagnosis and treatment.

Véronique VACCHINA obtained her Ph.D. in 2000 at the Bio-Inorganic and Environment Analytical Chemistry Laboratory. She then started working at UT2A (Ultra-Trace Analyses Aquitaine). Now she is an Application Chemist at UT2A where she is in charge of the foodstuff / biomolecules area. She obtained in 2013 her accreditation to direct research. Her research interests concern the speciation of trace elements by elemental and molecular mass spectrometry.

Speciation analysis involving elemental and molecular mass spectrometry: application in ecotoxicology and clinical toxicology

Véronique VACCHINA, UT2A, Pau

Mass spectrometry is now widely recognized as a method of choice for the speciation of trace elements (either essential or toxic) in almost all the matrices. However mass spectrometry covers various **techniques:** elemental and molecular mass spectrometry; low and high resolution mass spectrometry; and hyphenated techniques. Each one provides different and complementary information (such as quantitative and/or qualitative information).

The presentation will therefore firstly introduce these techniques in terms of basic principles and potential. Then different examples, such as the feed additives characterization or the bioavailability evaluation of trace elements, will be presented to illustrate the potential of these techniques.

Round Table *(reserved to International TEU Network)*

Friday November 27th, 2015

« Interest of the satellite center network within the framework of the partnership between TEU and the Rovaltain Foundation, in the areas of ecotoxicology and toxicology»

Program

9h	**Welcome**
9h30-10h	**Presentation of the future laboratory platform** *David Lejon et Martin Lawniczak* SAS RRco
10h-10h30	**Presentation of the satellite centers** *Activities on Ecotoxicology and Toxicology*
10h30-12h	**Collaboration between Foundation Rovaltain and TEU international network of satellite centers** Wilfried Sanchez, Foundation Rovaltain director
12h-13h	**SFERETE (France)/ FESTEM (Europe)/ SFTA and Society of Clinical Toxicology (France) / INRA international network, INRA Clermont-Ferrand, France**
13h	**Lunch**

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Presentation of the future laboratory platform
David Lejon et Martin Lawniczak

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SAS RRco

Rovaltain Research Company (RRCo) (http://rovaltainresearch.com) is a global expert service and contract research organization for ecotoxicology and environmental toxicology. We are a new company focused on a variety of innovative and traditional approaches for assessing potential risks of chemicals and biological contaminants in different contexts or with different types of clients (industrial R&D, processes evaluation, regulatory aspect, academic project...)
Based in Rhone Alpes region in France (Ecoparc Rovaltain) we offer a range of services from fundamental research, applied research, experiments to more classical studies concerning or dealing with environmental toxicology and ecotoxicology. Our commitment to high quality science, our state of the art facilities, apparatus and a dedicated team of scientists will ensure independent, accurate, on time and high quality results.

RRCo provides a range of services in ecotoxicology, environmental toxicology and environmental chemistry to industry and research laboratories. Our services can be adapted to your research and development needs and regulatory testing requirements. They notably include (for more information please visit our website):

- Ecotoxicology, screening for acute and chronic toxicity, metabolism and metabolite profiling: microorganisms, terrestrial macrophytes, aquatic macrophytes and microalgae, aquatic invertebrates (crustaceans, annelids, molluscs and insects), aquatic vertebrates (fish and amphibians).
- Fate and metabolism of substances and contaminants (distribution, accumulation, abiotic degradation and biodegradation).
- Higher tier indoor soil, aquatic and sediment systems.
- Qualitative and quantitative analyses of chemicals in environmental matrices and biofluids.

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Current team:

- Jean-Claude Ricomard, President
- Prof Bruno Combourieu, Scientific Director – Deputy General Manager – Environmental & Analytical Chemistry – Ecotoxicology
- Dr David Lejon, Ecotoxicology & Ecology
- Dr Marie-Laure Bayle, Analytical Chemistry & Mass Spectrometry
- Dr Damien Baudiffier, Ecotoxicology & Ecology
- Aymeric Bellemain, Ecotoxicology
- Antoine Buonomo, Analytical Chemistry
- Yann Gouriou, Cellular Biology & Mass Spectrometry Imaging
- Florence Lamirand, Analytical Chemistry

- Alexandre Sapin, Ecotoxicology and Aquaculture
- Martin Lawniczak, Sales Manager, Physiology in extreme conditions, Ecology and Ecotoxicology
- William Peysson, Pre-Sales and Analytical Chemistry

- Jean-François Granone, Health, Safety and Environment manager and head of Technical Services
- Myriam Jacquet, Administration, Finance and Human Resources Director
- Alex Guesné, Quality Assurance Manager
- Emilie Fernandez, Head of Accounts
- Audrey Raillon, Secretary & Administrative Assistance

Presentation of satellite centers

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Russian satellite Centre of Trace Element – Institute for UNESCO on the basis of The Center for Biotic Medicine

M.D., Prof. Anatoly Skalny
President of NGO “Centre for Biotic Medicine”
Vice President of Trace Element Institute for UNESCO
President of Russian Society of Trace Elements in Medicine (RUSTEM)
Director of Institute of Bioelementology, Orenburg State University
(Orenburg, Russia) Center for Biotic Medicine is the Russian leader in the field of new methods for diagnostics, treatment and correction of diseases related to imbalance of chemical elements in human body.
It is an active participant of the medicine market of Russia more than 27 years (from 1988), during this time effective help is realized to more than 500 000 people suffering from diseases of skin, nails, hair), allergy, metabolism violations, endocrine diseases, infertility, anemia, diseases of immune deficiency, chronic disorders of gastrointestinal tract, metalotoxicoses, including occupational diseases of miners, workers of metallurgy, extractive and motor-car industries, nuclear energy etc.

The Centre has own courses, lectures, seminars and publications in the field of medical elementology. The Centre is the main Russian base for scientific research in the field of trace elements in medicine and biology. One of the key focus area is conducting of epidemiological studies in different regions of Russia and other countries (e.g. Kazakhstan, Bangladesh, Taiwan etc.). Over the past few years, for example, carried out the following works for Ecotoxicology and Toxicology:
1. The project "Elemental status of the population of Russia" in frame of Russian Federal Special-purpose Programme "The National System of Chemical And Biological Security of the Russian Federation 2010-2014" with published five-volume monograph and atlas. The project is based on the data of the Center.
2. Work on monitoring of occupational exposure of toxic metals: examination and regenerative treatment by correcting of element homeostasis in workers of hazardous industries of workers (JSC "Khimprom" in Novocheboksarsk, VSMPO AVISMA, Novosibirsk Chemical Concentrate Plant, JSC "Severstal"); etc.
3. Examination and treatment of children living in conditions of high level of environmental pollution with heavy metals and arsenic (for example, cities Karabash, Plast, Kyshtym, Zlatoust in Chelyabinsk region, Saratov, Orenburg, Cherepovets, etc.);
4. Work on the rehabilitation invalids-veterans of the Chernobyl accident.

Services of Center for Biotic Medicine:
1. Determination of chemical elements, vitamins, amino acids in various biological samples.
2. **Treatment & correction**.
   - Medical technology “Identification and correction of mineral exchange disturbances in human organism”, approved by the Ministry of Health of the Russian Federation (ISO 9001:2008 Quality Management System);
   - 9 biologically active supplements containing macro- and trace elements in organic form;
   - Specialised medical consultations.

Hungarian Satellite Centre of Trace Element Institute for UNESCO

- Presentation of the director:

Gyula Záray is a professor and former head of the Analytical Chemistry Department of Eötvös Loránd University (ELTE), Budapest, Hungary. He is also the Head of the Environmental Chemistry and Bioanalytics Research Group. He obtained his PhD degree in Chemistry in 1980 at ELTE. In 1996, he was elected as Head of the Department of Chemical Technology of ELTE, where he initiated research in the field of Environmental Chemistry.

In 2005, he founded - and still presides - the Cooperative Research Centre of Environmental Sciences for the ELTE, supported by the Hungarian Government and European Union. He is member of the Editorial Board of Microchemical Journal. He authored 206 SCI articles, seven book chapters in the field of Ecology and published a book in Hungarian on Instrumental Analysis as well as one on analytical techniques for Clinical Chemistry in English.

- Presentation of the center, laboratory or institution:

instrumentation: high resolution inductively coupled plasma mass spectrometer; atomic absorption spectrometer; total-reflection X-ray spectrometer for determination of low Z elements; gas chromatography tandem mass spectrometer, head-space gas chromatograph; high performance liquid chromatograph; microwave-assisted digestion apparatus for inorganic and organic compounds; total organic carbon analyzer.

personnel: 3 professors, 4 associate professors; 2 senior lecturers; 2 PhD students and 4 MSc students.

- activities in Toxicology and Ecotoxicology:

investigation of heavy metal as well as arsenic uptake, accumulation, translocation and speciation; biomonitoring of surface waters; chemical characterization of biofilms; removal of xenobiotics from wastewater; speciation of toxic elements in airborne particulate matter; assessment of oxidative potential of fine particulate matter.

Tunisian satellite center of Trace Element Institute for UNESCO

DIRECTOR: KERKENI Abdelhamid , Emeritus Professor
PLACE: Faculty of Medicine, University of Monastir (Tunisia)
RESEARCHERS: From Faculty of Medicine, University Hospital, Faculty of Pharmacy and Institute of Biotechnology.

Objectives of the Tunisian satellite center:
--**To** evaluate the trace element status and antioxidant profile of the Tunisian population according to the different regions of the country
-- **To** identify the major public health concerns related to a deficiency or excess of trace elements
-- **To** organize training courses and meetings in the field of trace elements.
-- **To** investigate the role of trace elements and oxidative stress in pathophysiology of schizophrenia and bipolar disorder
-- **To** investigate the role of trace elements and oxidative stress in Parkinson and Alzheimer diseases
--Study the influence of trace elements (Zinc and Selenium) and oxidative

ACTIVITES IN TOXICOLOGY AND ECOTOXICOLOGY:

1. **Toxicity of cadmium and protective mechanism of Zinc and Selenium**

Our research focus is on understanding the mechanisms of toxicity of some substances and environmental pollutants, especially trace metals such as cadmium and zinc, on natural populations of some species of fish, such as Aphanius fasciatus, Gambusia affinis and Salaria basilisca. This is underpinned by the application of a full suite of techniques from animal morphology to molecular biology. Indeed, our group has an expertise in experimental exposure methods to trace elements, using model organism such as Zebrafish and Wistar rat. In addition, the group has long experience of environmental risk assessment, environmental monitoring and biomarker approaches.
Our current activities:
- The relationship between environmental cadmium exposure and occurrence of skeletal deformities in natural population of fish.
- The interactions between cadmium and zinc in physiological functions such as reproduction and bone metabolism.
- The protective effects of melatonin on cadmium-induced toxicity in bone tissue….

2. Inorganic nanomaterials: Toxicology and biomedical application for drug delivery

Toxicology traditionally addresses adverse poisoning effects of chemicals to humans, animals and the environment.
Recently nanotoxicology has emerged, years after the first boom of nanotechnology .While nanotechnology and the production of nanoparticles (NPs) are growing exponentially, research into the toxicological impact and possible hazard of NPs to human health and the environment is still in its infancy.

Our work aims to study the toxicology of NPs (notably inorganic nanoparticles including silicon NPs, titanium oxide NPs and carboxylates NPs), the mechanisms at the cellular levels, entry routes into the body and possible impacts to public health.

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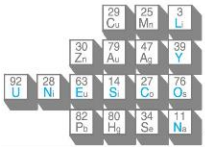
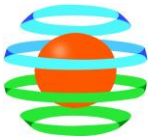
contact@trace-element.org www.trace-element.org





Proper characterization of the nanomaterial by several technics (XRD,IR,HPLC,DLS…), as well as understanding processes happening on the nanoparticle surface when in contact with living systems, is crucial to understand possible toxicological effects.

These inorganic nanomaterials will be finally investigated for biomedical applications notably in loading and releasing several drug molecules for cancer therapy and veterinary medicine.

Moroccan satellite center of Trace Element Institute for UNESCO

Pr. Azeddine SEDKI
30 years of experience on Ecotoxicology
Director of TEU-Morocco
Vice president of Moroccan society of Ecotoxicology (MSE)
Professor at Cadi Ayyad University
*Active member of the French Society for Study and Research on Toxic and Essential Elements **« SFERETE »**
*International Coordinator of the NGO **UNIAC-FEH** (Nutrition, Health and Environment)
*Permanent Correspondent of the European Academy of

Tel.: +
cont

- **MISSION** : **Research & development ETM:**

Air-soil & water pollution
toxicity Foods
phytoremediation
Environmental health
Training & education:
Licence Pro / Master / PhD
Cooperation:
several centers TEU / African & Arab Univers**ities**

- **Skill**

  • Food Toxicology: Risk of toxic agricultural and food products.
  • Environmental Toxicology: Use of bio-indicators for the study of environmental pollution by ETM.
  • Human Ecotoxicology: Impact of Trace Elements on human health (using biomarkers)
  • Health and safety
  • The economics of the environment
  • Bio-tests on CMR (Carcinogenic products, mutagenic and Reprotoxic)
  • Technology for Scientific and Environmental Education:
    presentation of activities in Toxicology and Ecotoxicology

Brazilian Satellite Centre of Trace Element Institute for UNESCO

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Nuclear Energy Center for Agriculture, University of São Paulo
13416-000 Piracicaba SP Brazil
Coordinator:
Prof. Dr. Elisabete A. De Nadai Fernandes

The Brazilian Satellite Centre is located in the Nuclear Energy Center for Agriculture (CENA), a research institute of the University of São Paulo (USP) created in 1966 with the purpose of providing adequate facilities for the application of nuclear techniques to agricultural research. CENA has grown and today it carries out a wide ranging research program with a multidisciplinary approach to agriculture and environment to improve the quality of life. It is recognized nationally and internationally as a center of excellence with an outstanding performance in the area of sustainable agriculture and its environmental impacts. CENA consists of 22 research and support laboratories, modern and well equipped, occupying a constructed area of 19,000 m^2.
Director: Prof. Dr. Tsai Siu Mui
Vice-Director: Prof. Dr. José Albertino Bendassoli

Research areas related to Ecotoxicology and Toxicology

- Ecotoxicological implications of nanomaterials in agriculture and environment
- Monitoring of antibiotics for veterinary and human use in water, sediment and fish
- LD50 of antibiotics found in water and sediments for native fish and microcrustaceans
- Antibiotics depletion in waters
- Mutagenicity tests with Allium cepa (onion) in water, wastewater and contaminated soils
- Behavior of pesticides in soil (degradation, leaching and adsorption)
- Contamination of feeding sites of sea turtles with derived oil products in the Brazilian coast
- Contamination of breast milk with organochlorine
- Toxicity of plastics found in the Tietê river to microcrustaceans and bacteria
- Pesticides in food served in public schools in Piracicaba
- Degradation of vinasse with basidiomycetes fungi
- Composting of solid waste (sludge) with basidiomycetes fungi
- Use of aquatic organisms (microcrustaceans, cnidarians and algae) for lethal concentration (LC50) of contaminants (metals, pesticides, ammonia) found in rivers, soil interstitial water and wastewater
- Soil contaminated effects on emergence and early growth of higher plants
- Arsenic, cadmium, lead and mercury in food
- Rare earth elements in the citriculture

In 2008, it was implemented the Collaborative Centre for Agricultural Defense: production of certified reference materials and organization of proficiency testing for residues and inorganic contaminants. The following biological and environmental CRMs for minor and trace elements have already been developed: Whole Rice, Whole Biodynamic Rice, Tomato Leaves, Tomato Pulp, Sugarcane Leaves, Soybean Flour, Forage, Mineral Mixture, Soil, Rock Phosphate, Bovine Liver, Ovine Lung, Ovine Kidney, Ovine Spleen, Ovine Heart, Ovine Liver, Ovine Muscle, Ovine Blood and Ovine Plasma.

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DIRECTOR: Pr Paola Borella

- Degree in Biological Sciences and Medicine, PhD in Preventive Medicine, full Professor of Hygiene at University of Modena and Reggio Emilia (Italy)
- Vice-President of the Steering Committee of the Federation of European Societies for Trace Elements in Medicine (FESTEM)
- President of the Italian Association for the Study of Trace Elements in Living Organisms (AISETOV) until October 2015

- Member of the Editorial Board of the Journal of Trace Elements in Medicine and Biology
- Author and co-author of 210 papers on the relationship between environmental risks and health; 122 are devoted to the relationship between toxic and essential elements and human health

INSTITUTION: University of Modena and Reggio Emilia-Italy
Department of Biomedical, Metabolic and Neural Sciences

Public Health Section: about 60 persons including staff and PhD students.
Scientific fields of interest: Public Health, Epidemiology and Biostatistics,
Occupational and Environmental Health, Human Nutritional Sciences.

TRACE ELEMENTS LABORATORY: sample preparation room; microwave digestion system; spectrophotometer; air-acetylene flame atomic absorption spectrometry; graphite-furnace atomic absorption spectrometry; ICP-MS; quality control procedures.

RESEARCH ACTIVITIES OF ITALIAN SATELLITE CENTER

- The role of trace elements in human chronic degenerative diseases (cancer, cardiovascular disease,…) which represent the most frequent death cause in our country;
- Mineral, essential and toxic elements in food and nutrition with special reference to baby food, Mediterranean diet;
- Risk of deficit of essential trace elements such as zinc and selenium in pregnant women with different cultural habits and diet;
- Trace elements and mineral content in public and domestic hot water and their relationship with human health, particularly tumours and/or cardiovascular disease;
- Reappraisal of trace elements role in microbial grow and infectious disease development.

Scientific Network

SFERETE

Presentation

The Francophone society for the study and research on toxic and essential elements (SFERETE) is a non-profit organization created in 1986 by Pr. Alain Favier. Our objective is to enhance the understanding of essential and toxic trace elements in the areas of analysis, medicine and industry. The gathering of such different scientific experts offers interactive, open and nourishing exchanges. The SFERETE is part of the Federation of European Societies on Trace Elements and Minerals (FESTEM) network, with which we organize an international symposium on trace elements and minerals every three years. Besides, our organization takes part in many other congresses and scientific events. We also provide information and training.

Our activities include:
- Exchanging information on trace elements and minerals
- Publishing works on the new aspects of the research on trace elements and minerals
- Organizing national and international seminars and congresses
- Taking part in training courses
- Awarding grants and prizes
- Initiating research and education projects, especially for multicentric studies

We gladly welcome motivated and dynamic candidates to energize our network and widen our range of activities. Young scientists are also vividly welcome to join the SFERETE, which will provide them with active support. We are willing to answer any question about toxic and essential trace elements, whether about their dosage, biological actions or associated diseases.

SFERETE board

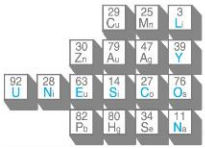
President: Laurent CHAVATTE (Pau, France)
Vice-president: Peter VAN DAEL (USA)
Secretary: Josiane ARNAUD (Grenoble, France)
Treasurer: Hugues PAUCOT (Pau, France)

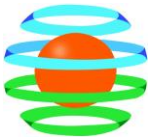
About the president of SFERETE

Laurent Chavatte has been a researcher at the French center for scientific research (CNRS) since 2005. His research focuses on the function and incorporation of selenium in mammalian selenoproteins. He graduated from the university of Paris-Diderot, Paris, France. He obtained his PhD in biochemistry and molecular biology in 2001 from the Jacques Monod institute, Paris, France. He has worked for the Cleveland Clinic Foundation, Ohio, USA, in Dr. Donna Driscoll's laboratory. In 2008, he created a young researchers (ATIP) team at the CNRS Center of molecular genetics, Gif-sur-Yvette, France. He obtained his accreditation to supervise research in 2012 from the university of Paris-Sud, France. He then joined the Laboratory of analytical, bio-inorganic and environmental chemistry (LCABIE) in Pau, France, in 2013, to develop a project in both biology and chemistry. The project aims to develop new strategies for the detection of selenoproteins related to cancer, aging, oxidative stress and selenium deficiency.

SFTA

Présentation





La SFTA, Société Française de Toxicologie Analytique, est une association régie par la loi du 1er juillet 1901. La SFTA a pour but de favoriser **toute action** contribuant au développement de l'analyse toxicologique, notamment: information, amélioration et développement des méthodologies, organisation de contrôles de qualité, organisation de manifestations scientifiques, évaluation des pratiques professionnelles, actions de formation professionnelles et publication d'une revue scientifique (ToxAC).
La SFTA est Organisme Gestionnaire du Développement Professionnel Continu /
OGDPC : N° d'enregistrement : 6679
Elle veille à la reconnaissance et à la promotion de la toxicologie analytique. Elle met en **œuvre** tous les moyens pour la reconnaissance de l'association auprès des autorités.

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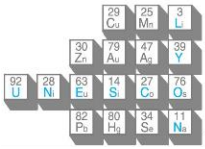

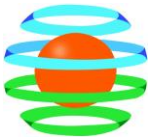

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