The contributions of the MUNA network to CUCS Naples 2022

Proceedings of the MUNA sessions, Naples, 21st-23rd April 2022

Coordinamento Universitario per la Cooperazione allo Sviluppo (Naples, 21st-23rdApril 2022)

edited by *Gilberto Sammartino*

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University of Naples Federico II
Culture of diversity
Law, science, education
7

Culture of diversity
Law, science, education

Created and edited by
Francesca Galgano Concetta Giancola Francesca Marone

This series aims to contribute to a critical understanding of social, cultural and gender discrimination, targeting primarily on the results of the most recent in-depth research regarding diversity in a transdisciplinary perspective. Particular attention will be given to the socio-economic and legal aspects – as well as their outcome – related to education and science, in order to promote within the various spheres of society, greater awareness of and respect for equal opportunities.

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MUNA Mediterranean and Middle East University Network Agreement

The present publication concerns the contiributions presented at the CUCS Naples and cordinated by the MUNA's network in the three sessions: NET-3_ORBIS, NET-2_PERSONA, NET-1_MARE NOSTRUM

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Table of contents

Second session. ***Interventions***

NET-2. *"PERSONA: FOR A NEW INCLUSIVE CITIZENSHIP" MUNA FOR SCIENCE, PEACE, EDUCATION: RETHINKING MEDITERRANEAN PROJECT*

Introduction

First session. ***Interventions***

Second session. ***Interventions***

NET-1. *MARE NOSTRUM: A SUSTAINABLE EXPLOITATION OF THE MEDITERRANEAN RESOURCES DRIVEN BY INTERNATIONAL COOPERATION AMONG MUNA PARTNERS*

Introduction

Interventions

NET-TR. *MUNA-WRAP UP SESSION*

Introduction

Poster

THE CONTRIBUTIONS OF THE MUNA NETWORK TO CUCS

21-23th APRIL

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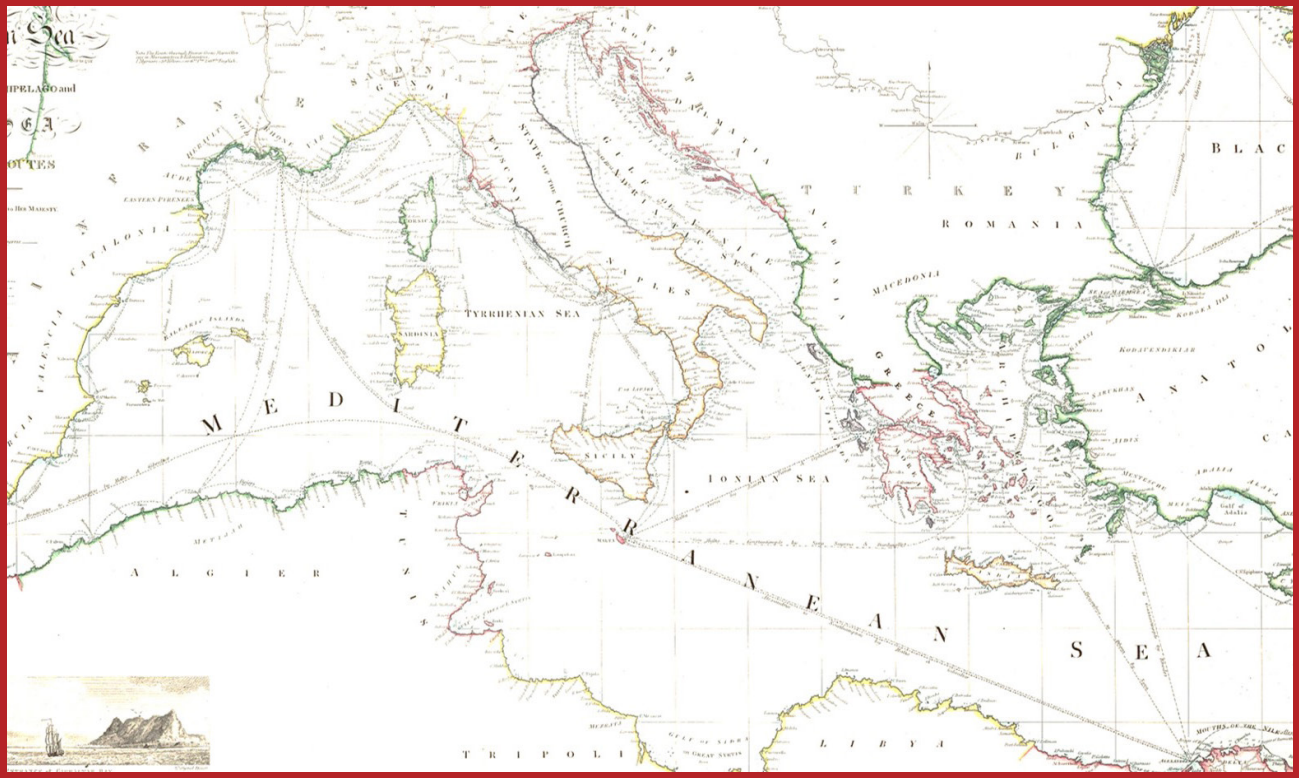


The contributions of the MUNA network to CUCS Naples 2022

MUNA_Meditteranean and Middle East University Network Agreement

G. Sammartino

Introduction

The MUNA Consortium (Mediterranean and Middle East University Network Agreement) was founded in 2015 and renewed in 2021, when 30 Universities coming from all Countries of Mediterranean area and some others from Middle East signed the Framework Agreement.

As written in the Framework Agreement, also in this MUNA space in the CUCS Conference, we propose three different main themes: MARE NOSTRUM (our Sea, the Mediterranean), PERSONA (Man) and ORBIS (the Earth), to summarize the proposals of Cooperation between MUNA Network Universities. The first session is dedicated to the field of ORBIS to share the sustainability, through the biodiversity as a key element for the development of soil in different aspects as agricolture, fauna and flora sustainable management, with impact in the field of veterinary. Neverthless, a focus is also related to the inclusion and integration in the sustainable cities during this time of pandemia and migration flows with regard to the problem of clima changes in the Mediterranean area.

The second session is focused on PERSONA, to share the experiences in the primary immunodeficiency inborn with the contributions of different Universities of different mediterranean area, examinating approaches of prevention and treatment, also thorough the proposal of a comparative study.

Culture differencies in this pandemia period and the situation of human rights in the mediterranean basin are discussed.

The last item is MARE NOSTRUM, focused on exploitation of the Mediterannean resources proposed by International Cooperations among MUNA Partners. Besides the exploitation, the themes of improving the quality of water, the safeguarding of ittic sector and the mandatory better organization of port areas are further developed.

In conclusion, a round table discusses the opportunities of the Cooperation, especially to understand which proposals can be followed in the Universities Cooperation and maybe to establish future projects.

Gilberto Sammartino, Full Professor of Oral Surgery and Implantology, head of the Unit of Oral and Reconstructive Surgery University of Naples “Federico II”, dean of the Degree Programme in Dentistry of the University of Naples "Federico II", Chief of the School of Oral Surgery, University of Naples “Federico II”, Past National Coordinator of all Italian Schools of Oral Surgery, delegate for the International activities of the University of Naples “Federico II”, past President of the Italian Society of Oral Surgery (S.I.d.C.O.), past President of the S.E.N.A.M.E implantology Association, chairman of S.E.N.A.M.E Implantology Association, I.C.O.I International Board Member, President of the I.C.O.I Italy Association, past President of ANTHEC - Academy of Non Transfusional Hemo-components, past President of intHEMA – International Non Transfusional Hemocomponents Academy, past Co-Chairman of the I.C.O.I Europe Association, author of more than 300 articles published on national and international journals, lecturer in national and international courses and conferences, co-Editor of Poseido Journal, guest editor of Case Report in Dentistry, lead Guest Editor of Special issues of Journal of Biomedical Research 2015, guest Editor of Special Issue of Journal of Biomedical Research 2016, associate editor of International Journal of Dentistry, member of the Editorial Board of different International Journal, referee of many International Scientific Journals

NET-3

ORBIS: AGENDA 2030 AND A SUSTAINABLE FUTURE

NET 3_MUNA_ORBIS

R. Capozzi

Introduction to the first part of the session

The first of the two parts of the session NET-3 ORBIS: Agenda 2030 and Sustainable Future of the Mediterranean and Middle East Universities Network Agreements (MUNA) as a contribution of the disciplines of Architecture (Area 08) concerns the city and the stinging connection of the "highest human artifice" with the theme and effects of migration in the more general framework of international cooperation and the goals of the 2030 Agenda. The first part of the NET-3 session features an initial methodological contribution by the eminent Anglo-Egyptian scholar Ashraf Salama focusing on the ever-strategic role of cities as sites of formulation and experimentation of new values, social practices, industrial development and innovative production that continue to witness various forms of struggles and endure a multitude of influences including crises resulting from both natural and human-induced hazards. The paper compares contrasting ideas of how environmental and health priorities, cities have imagined as part of their urban resilience strategies, policies and practices, are shaped and developed. Following this theoretical framework, the contributions by Renato Capozzi and Claudia Sansò deal with the increasingly stringent relationship between urban forms and the phenomenon of migration, not only of people but increasingly of forms, ways of living, practices of inclusion and sharing. If the first contribution, presenting some recent experiences, sees the city of Naples as an eponym of inclusion as an innate character of Mediterranean cities, the second one proposes a new possible way of building new hub typologies in port areas as complex units destined to host migrants, able to actively relate - through market exchange areas - with the urban dynamics, preserving the ways of living typical of the hosted cultures in accordance with the Action Plan for Integration and Inclusion 2021-2027 promoted by the European Commission.

Renato Capozzi, (Naples, 1971) architect, specialised in Urban Design and PhD in Architectural Composition at IUAV of Venice. He is associate professor (qualified as full professor) in Architectural and Urban Composition at the Department of Architecture of the University of Naples "Federico II", where he is delegated to the planning and management of exhibition activities and is a member of the board of teachers of the Doctorate in Architecture and Construction at "La Sapienza" University of Rome. His main areas of research concerns: the theoretical dimension of architectural project; the contemporary suburbs between the open city and new centralities; architecture and archaeology. He is the author of numerous (over 400) scientific publications: monographs, articles in journals, essays in books and contributions in proceedings.

NET-3

INTERVENTIONS

The contributions of the MUNA network to CUCS Naples 2022

From left to right: Complexity of structures, Emerging new buildings types, The global condition

A. M. Salama

Sustainable Cities Beyond Crisis Management

With their varied physical, economic, socio-cultural, and socio-political presence, cities have always been highly distinguished urban environments expressive of heterogeneity, diversity of activities, entertainment, excitement, and happiness among other qualities. They have been, and still are, places for the formulation of and experimentation with new values, social practices, industrial development, and innovative manufacturing. They produce, reproduce, represent, and convey much of what counts today as knowledge, culture, social norms, environmental knowledge, science, public health, governance, and politics. Characterised by these qualities and attributes, and while aspiring for resilience and a sustainable urban future, the city continues to witness various forms of struggles and endures to experience a multitude of influences that include crises which are resulting from both natural and human induced hazards. For example, across the European continent, cities host the largest share of national populations, continue to accommodate growing communities, and are accountable for the economic, infrastructural, environmental and social contexts in which they live. These cities have already endured the test of time and have withstood significant urban challenges and the associated social and environmental ramifications. This talk underscores urban challenges and health problems that emerge from crisis situations and how they were managed, while exploring how environment and health priorities, cities have envisioned as part of their urban resilience strategies, policies, and practices, are being shaped and developed.

Significant efforts have been (and are being) made to advance and enhance the urban environments in European cities, which are utilised as a key example in this presentation, and to enable the development of sustainable and healthy urban conditions to all. However, cities are encountering continuous crises which are resulting from both

natural hazards and human induced hazards. Natural hazards stem from natural phenomena that include floods, earthquakes, and heatwaves, volcano eruptions, or epidemics. Human induced hazards emanate from industrial events and may include power outbreaks, spill of toxic materials, or nuclear disastrous incidents. Both types of crises threaten the local societies and standard conditions and generate unwelcome impacts that include decline in economic activities, rise in unemployment rates, emerging public health challenges, damaged environments, interruption in transportation, and weakened infrastructure networks and services, to name a few. Crises have significant repercussions on mortality rates, spread of disease, various public health implications, and significant social impacts. The recent highly contagious coronavirus and the rapid spread of COVID-19 disease have generated local and global public health crises with unparalleled impacts on economies, societies, and public and personal health.

Fluctuating environmental conditions is a natural and perpetual process. Human living conditions are modified—and as a result, biodiversity is irreversibly transformed. In the past, this process was prolonged, enabling sequential adaptation of life forms (including humans) to re-evolve, and improve. Recently, the pace of transition has been accelerating. Recent data and the frequency of unexpected events convey that there are intensifications of phenomena related to climate change, such as changing rainfall patterns, more frequent and severe droughts, and alterations of the local climatic conditions, including heat islands with consequential negative impacts on cities, districts, and buildings. Due to the increased occurrence and concentration of extreme events related to climate change, it is essential to understand efforts, from both the recent past and the present, in responding to crises and in improving the resilience of urban areas to reduce their vulnerability to extreme events, rather than working in just a reactive manner responding to particular problems or challenges. The current focus on climate change and its impact on social and economic development is also enabling a wider recognition that natural disasters are a critical hazardous factor for the health, safety, and productivity of people in groups and individually and for the sustainable wealth of the contemporary urban society.

Proactively, cities need to prepare for such crises and learn how to prevent and recuperate from them as quickly as possible. They need to have the capacity necessary to manage these crises and develop efficient and effective responses that enable swift recovery with minimum economic, environmental, and social impacts. They need to develop effective decision making, governance, communication, and coordination mechanisms so that they are economically, environmentally, and socially resilient and sustainable. European cities are subject to the future shocks and stresses that will be

associated with climate change, energy scarcity and population growth. Their economies, food supplies, public transit systems, and the industrial production necessary to build them, are all energy intensive and fossil fuel dependent; and their existing landscapes, building fabric, and urban environments have not been designed and planned to endure in the face of, or to stand up to, the future environmental shocks and the associated economic and social impacts engendered by climate change.

Significantly however, effective responses to crises are no longer sufficient; cities need to plan for urban resilience, embark on developing healthy environments, embed sustainable strategies in all aspects of developmental activities and practices, while improving the quality of urban life for all. To increase their capacities for resilience, cities will need to adopt urban planning and building design strategies that allow them to increase their abilities to better respond and adapt to the economic, social, and physical stresses they will face as they confront continuous challenges of climate change and greater needs for urban development. Nevertheless, developing the capacity for greater urban resilience will involve cities in a complex network of economic, social, health, planning, and development decisions, that should be integrated to transform the current vastly energy-intensive urban environments into much less energy-intensive and zero carbon urban systems. In essence, urban resilience is an integral component of urban sustainability, where cities are central to achieving a range of United Nations Sustainable Development Goals – SDGs through their policy commitments and the associated actions they have undertaken and programs that will shape the future of cities.

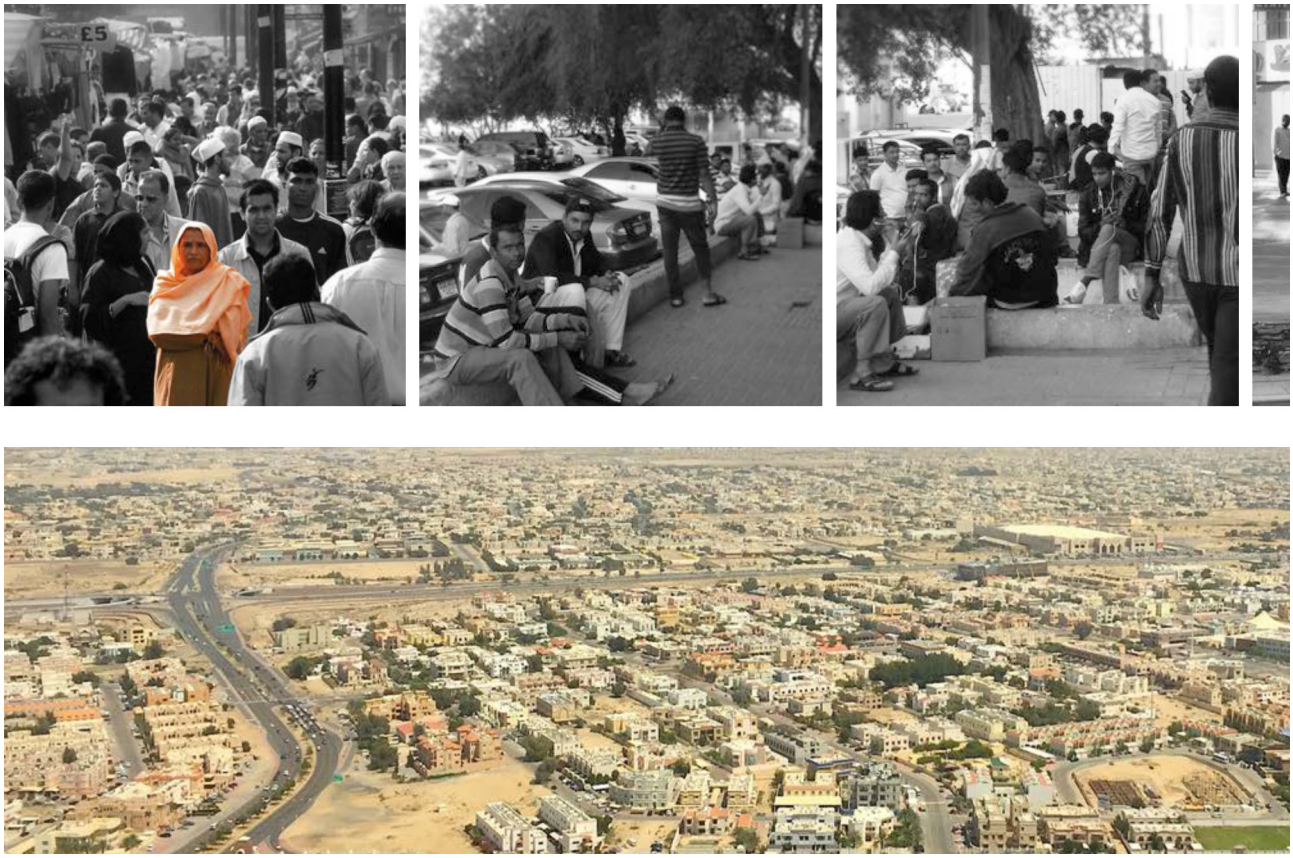
Within the preceding context, the discussion is predicated on the fact that knowledge of the approaches and efforts through which cities are implementing and planning for resilience or of how such efforts can realistically contribute to the implementation of UN-SDGs is fragmented and nonetheless limited. This suggests that there are operational and aspirational dimensions related to current efforts, and several complex questions can be raised:

- How cities have experienced crisis situations, how they have managed these situations, how they have addressed the consequences of the crises encountered and adjusted urban design, planning and preparedness, and whether they have captured the associated health perspective and social implications?
- What are the plans and actions undertaken at local scales, in coordination and with support of national governments, in anticipation of future crises and the need to become more sustainable?
- How are cities planning towards a future urban resilience and building forward better?
- Does current public knowledge offer sufficient evidence to demonstrate that quality of urban life benefits of smart cities initiatives has been delivered on the ground?

The talk is centred on responding to these ques-

tions and highlights the need for a serious discourse on sustainable, resilient, and smart cities beyond the immediate need of meeting crisis situations. An examination of cases from various cities to demonstrate various efforts and underscore challenges and areas of improvements is offered together with key lessons and directions for future knowledge capturing and further development for building better future urban environments.

Ashraf M. Salama, PhD - FRSA – FHEA – A-RIBA – AoU, is Full Professor of Architecture and Director of Research and of the Cluster of Architecture and Urbanism in the Global South, Department of Architecture, University of Strathclyde, Glasgow, UK. He has led three schools of architecture in Egypt, Qatar, and the United Kingdom, two of which he has founded. He has authored and edited 17 books on architectural pedagogy and middle eastern architecture and urbanism and more than 200 articles on the same topics. Prof Salama is the recipient of the 2017 UIA Jean Tschumi Prize for Excellence in Architectural Education and Criticism and is the founder and Chief Editor of Archnet-IJAR: International Journal of Architectural Research.



Top: Migrant Communities (Shehab/Salama, 2017)
Down: Dubai, Urban Sprawl (Salama, 2017)

Renato Capozzi, *A city that includes... Overlooking the sea*

R. Capozzi

Naples as a city of inclusion

The contribution aims at recognising in Naples and more generally in the Mediterranean cities the eponym of the idea of inclusion within the global phenomenon of migrations. Migrations not only of people, but more and more of values, cultures, material and immaterial forms which, on the whole, make a society and a national community richer and more variegated within the wider framework of Europe. In order to do so, it reviews some experiences that have been carried out in recent years within the Department of Architecture of the University of Naples "Federico II" in the direction of the construction of a shared reflection on the idea of inclusion in relation to migration, to the shapes of the city and architecture. The publication *Migration* follows the international Symposium "CAUMME III PAUMME I Migration and the Built Environment in the Mediterranean and the Middle East", held in Naples in November 2016. Renato Capozzi, Adelina Picone, Federica Visconti, curators of the conference, proposed to discuss the theme through six tracks that aimed to probe different declinations of the general theme of migrations in relation to specific aspects: anthropological, social, linguistic, design, technological, urbanistic. Two years after the CAUMME experience, the theme of migration is more topical than ever. The contributions to the 2016 conference reveal shrewd insights and intriguing visions, highlighting the specificity of the themes proposed together with inevitable concatenations. The essays collected in this volume offer a decanted reflection of the theme in all its facets and question the role that architecture can play in managing the phenomenon that most characterises our present.

The architecture that was born with the first urban civilisations interprets and represents these cultures, these values, these etymologies that are different but at the same time accumulable and comparable, and makes them transit, makes them migrate by building in different and distant places similar formal structures, similar syntaxes that

only amplify the ways of expression of the ethnic groups and cultures, allowing them to evolve internally. Therefore, not only an agglutinated and confused cross-fertilisation, but each time a re-signification that moves forward those formal, iconic and figurative structures, making them more conforming, more responsive to the needs and values of a given community in a given context in a given era. Needs, values and needs of representation that those distilled and significant forms take on the task of reifying, of manifesting with fixity.

The Mediterranean represents a vast water square capable of becoming a place where cultures, urban civilisations, languages, colours, climatic structures, religions, state structures, values, architectural and settlement principles once again differ, distinctive but also always related, mutually and reciprocally influenced and on the basis of these influences, reformulations made richer, more complex. Cultures and civilisations that are certainly not homologated but have always been opened to overlapping, to re-determination, to encounter, even to clash, but never to the globalist dilution of recent years. An economic, first of all, and then a social and consumer homologation that feeds and has fed conflicts, misunderstandings, violence, senseless religious wars, racism and chauvinism of various kinds. There is no homologating globalism, but as the Mediterranean has taught us, and can still teach us, the Mediterranean is a crossroads, an outlook, a comparison and dialogue between knowledge, cultures and peoples, but an exchange, mutual influences, migrations of men and women and with them forms, ways and cultures of living which, if resettled, will in turn change, If resettled, they will change, evolve and produce architecture, cities or even just parts of them, worthy of man and not ghettos, identification centres, ships that cannot attack and if they do, must retain their cargo of men, women, children, hopes, dreams, legitimate expectations of life and coexistence. The Mediterranean, its millenary history, the cultures and exchanges, the voyages of discovery and the conflicts that have taken place there, bears witness to this heritage and, in recent years, to its sad evolution into conflict, intolerance, blind violence and unbearable inequalities.

In the same way as *Migration*, the exhibition "Inclusive Naples", in the context of the UN-HABITAT World Day and in keeping with the spirit of the UN's 2030 Agenda, aimed to reconfirm the specific nature of the seaside cities on the Mediterranean's mare nostrum as ports of welcome and exchange between peoples and cultures, not in order to achieve a precarious crossbreeding but rather an enriching integration. The concept of 'inclusion' naturally has many facets. It is an essential principle of our existence. Inclusion means thinking about neighbours, work, education, public services, health, social structures, education, public services, health, social facilities, welfare and equity for all citizens, regardless of age, nationality, religion or disability of age, nationality, religion, ethnicity.

The exhibition "The City of Inclusion", curated

by Francesco Messina and Laura Zerella and staged at the MACRO Asilo in Rome in November 2019, becomes itinerant, thanks to an idea of one of the authors, R. Capozzi, and marks its first stop in Naples, as "Naples. City of Inclusion" in the refectory of the Convent of San Domenico Maggiore, with Guest curator Federica Visconti. For the occasion, ten more authors – Raffaele Cutillo, Ferruccio Izzo, Pasquale Miano, Efisio Pitzalis, Davide Vargas and the younger "collectives" A402studio, Aureum40°, Adriana Bernieri+Francesca Coppolino+Bruna Di Palma, Daniela Buonanno+Anna Terracciano, Gennaro Di Costanzo+Claudia Sansò – have been invited to build a "Neapolitan section" of the exhibition with their large houses for all men. As Federica Visconti writes in the introduction to the catalogue of the exhibition, she curates: «The city of inclusion - the one we would like - is [...] a city that welcomes, safeguards and cultivates differences: it is a big house, not only in the inter-scalar logic that, according to Alberti's metaphor, indissolubly links architecture and the city, but in that both - city and house - are places of dwelling and To dwell is, as Levinas writes, "a retreat to a home just as in a land of asylum [and the home (or the city)]. possessed because it has always been a place of hospitality [...]"».

Ultimately and in conclusion it can be said that:

A city that includes is above all a city in front of the Sea, a Mediterranean city, that opens up to distant horizons, a city that defines itself in its relationship with the forms of the land: a promontory as a view of the vast nature of the sea, an isthmus city...

A city that includes is predisposed to welcoming, to the landing of the foreigner, of the migrant, but it is also capable of structuring the plain, of connecting in a linear manner - by means of large *à-redent* systems - to the hinterland, to the urbanized countryside.

An inclusive city is a city made up of large courtyards open to the sea, repeated or garrisoning the depths of the sea like monasteries, with a few theories of towers signaling the coastline or the acropolis from afar.

But it is also a city made up of *dromos*, of underground parts, of passing tunnels, of cavities that emerge unexpectedly on the summit to recapture the horizon.

A city for those who pass through and those who remain, where to the west of the isthmus an open courtyard facing a two-sided pier houses a church, a mosque and a synagogue, and a building for all, also a courtyard immersed in the water.

A city that includes could be Naples…

Renato Capozzi, (Naples, 1971) architect, specialised in Urban Design and PhD in Architectural Composition at IUAV of Venice. He is associate professor (qualified as full professor) in Architectural and Urban Composition at the Department of Architecture of the University of Naples "Federico II", where he is delegated to the planning and management of exhibition activities and is a member of the board of teachers of the Doctorate in Architecture and Construction at "La Sapienza" University of Rome. His main areas of research concerns: the theoretical dimension of architectural project; the contemporary suburbs between the open city and new centralities; architecture and archaeology. He is the author of numerous (over 400) scientific publications: monographs, articles in journals, essays in books and contributions in proceedings.

Renato Capozzi, *A city that includes... Overlooking the sea*

Gentile and Giovanni Bellini, *St. Mark Preaching in Alexandria*, 1504-1507. Pinacoteca di Brera

C. Sansò

New complex urban units for hospitality of migrants as an active and productive interface with the city. A proposal for Naples

The issue investigates the spaces for reception and inclusion related to the phenomenon of migration in order to promote innovative housing solutions that promote the inclusion of those who have just received a status of international protection and consequently, within a few months, will have to leave their shelter and move to an autonomous housing dimension.

Migrating, i.e. moving to a place other than one's place of origin by choice or necessity, is a phenomenon that has always occurred and has allowed the evolution and existence of mankind. However, when migration becomes synonymous with fleeing – from wars, poverty and humanitarian crises –, i.e. occurs out of necessity, it becomes a moral and ethical task that any human being has the duty to assume.

Migratory flows, which in recent decades have become a mass exodus from Africa, the Middle East and Asia, have placed Europe at the center of this planetary phenomenon. In this sense, the Mediterranean, which has always been a crossroads, a place of comparison, dialogue and exchange between knowledge, cultures and peoples, has been and still is the backdrop to this phenomenon. However, the tragic events that have been taking place for years in this sea, therefore on the coasts of Turkey, Greece, Italy and Spain, have not yet been translated into a unitary policy of entry planning and reception. On the contrary, nationalistic closures, protectionist pushes and emergency solutions continue to increase, assigning the countries of Southern Europe the function of filter and containment.

The research, with these assumptions, intends to examine among the main countries of arrival of migrant flows Italy, France, Greece and Spain.

The choice to address this issue stems from the fact that the cities of Europe, although they have always been inhabited by a plurality of different cultures, are often 'unresolved' places from the point of view of reception and integration. The causes of these critical issues are probably to be found not

only in migration policies that are still weak, but also in inadequate attention to the spaces to be allocated to migrants, both in terms of housing and collective spaces (civil or religious buildings) that can facilitate the encounter between the cultures of the 'received' and the 'welcoming' peoples.

In order to act in the direction of integration and reception, it is necessary to increase relationships and networks between neighborhoods and cities, between local and global, attacking the mechanisms that determine social exclusion in the functioning of the housing market, work, accessibility to urban functions, education, culture, leisure, opening up to unconditional hospitality in according whit Attilio Belli. Therefore, in order to address the immigration-city pair, attention must be paid to the dissonances that the arrival of new social groups cause in the pre-existing established urban balances, but also to the possible transformations in the form of cities.

The Action Plan for Integration and Inclusion 2021-2027 promoted by the European Commission, in defining measures to build more cohesive and inclusive societies for all, places the theme of housing within a series of actions to implement the Plan.

A recent project by Renato Rizzi, at the IUAV in Venice, imagines an excavated cathedral on the island of Lampedusa as a landing place for migrants and as an encounter space before reaching the surface of the island and facing a new life.

Among the objectives of the Plan of European Commission, moreover, is the promotion of autonomous housing models (rather than collective housing) for migrants, the research presented proposes for the city of Naples a model settlement based on a 'horizontal' housing unit that contains both autonomous housing spaces and spaces for production and work, as well as collective spaces that can be connected the scale of architecture and that of the city in order to estabilish a strong relationship between migrants and local inhabitants.

A project by a research group from the University of Seville, where I did my visiting research three years ago, proposes a large horizontal unit for migrants linking Cadiz with the land of Andalusia in Spain. A complex made up of a large central spine where the collective spaces and public places are located, and transversely located patio housing.

The settlement model that we intend to propose, for Naples, as in this exemple, therefore, is based on the construction of a system of residential and collective architecture scattered throughout the urban fabric. The reception center will be an architecture capable of building continuous and intentional relations of the urban.

The typical accommodation will be a single or family residence, excluding dormitories. Each accommodation will therefore be autonomous but connected to larger collective spaces. The settlement will consist not only of spaces built for migrants, but also of open spaces that can be public spaces where migrants can meet the local population.

According to the European Commission's plan, autonomous housing for migrants with

a high probability of obtaining protection can indeed accelerate the integration process, especially if it is linked to the early provision of integration support.

In this hypothesis, Adalberto Libera's residential unit project for the Tuscolano quarter in Rome was imagined as a settlement model. This model was inserted in the port area of Naples near Piazza Mercato, one of the few open spaces in the dense fabric of the historic city... assuming the demolition of the eighteenth-century exedra, with the exception of the church, and of palazzo Ottieri, which obstructs the opening towards the sea. In this design hypothesis, elaborated with analogical assembly and collage, two ways of verifying the architectural project, Libera's horizontal unit constitutes the residential settlement for migrants, in close connection with the buildings in Piazza Mercato that constitute the public and collective spaces of the city, in this case a mosque oriented towards Mecca, in the hypothesis of an Islamic community to be hosted, and a centre for cultural exchange.

The three spaces are imagined not only for migrants but, because of their location within the historic city, also, with a public predisposition, to be visited and frequented also by the local inhabitants to encourage intercultural exchange and facilitate integration.

Claudia Sansò, PhD in Architectural and Urban Composition at the DiARC, University of Naples "Federico II". She has been visiting researcher at the IUACC_Instituto Universitario de Arquitectura y Ciencias de la Construcción of the ETSA_Escuela Técnica Superior de Arquitectura de Sevilla and research fellow at the DiARC of Naples. She has held classes on Islamic Architecture and on Collage and "Aesthetics of representationat" at the DiARC of Naples. She has participated in international conferences and edited several books including Ventuno domande a Renato Rizzi, Clean, Napoli (2020); Fernand Pouillon. Costruzione, Città, Paesaggio. Viaggio in Italia, Aión, Firenze (2019); Adecuación del Castillo del Cerrillo de los Moros. Architettura tra traccia e memoria. Linazasaro & Sanchez, Clean, Napoli (2017). She is the author of the book La moschea e l'Occidente. Tipi architettonici e forme urbane, Accademia University Press, Turin 2020 and César Portela. Estremo Atlantico, Clean, Napoli (2021). She is currently contract professor of Architectural Composition I at the DiARC of the University of Naples Federico II.

Agenda 2030 goals

G. Guerriero

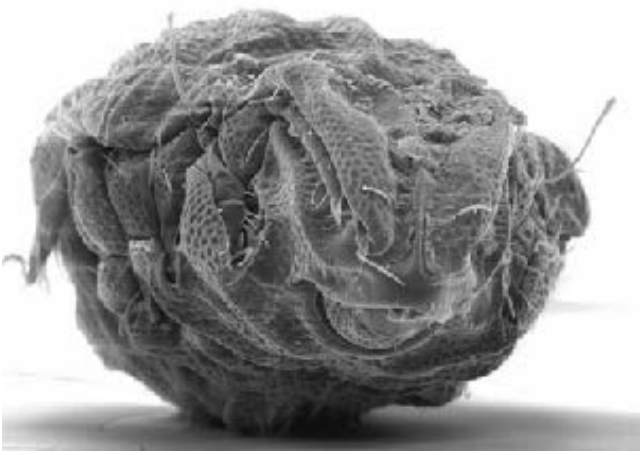
Introduction to the second part of the session

The second of the two parts of the session NET-3 ORBIS: Agenda 2030 and Sustainable Future of the Mediterranean and Middle East Universities Network Agreements (MUNA) emphasized the importance of integration between the three dimensions of sustainable development: environmental, social, and economics in international cooperation. The Agenda 2030 requires creative solutions for the protection of the planet against the slow and inexorable damage, primarily due to climate change, through conscious management of natural resources and immediate actions to mitigate climate change, environmental degradation, reduce poverty and increase food sustainability and security.

The session NET-3 received innovative contributions by experts on Soil Biodiversity, Bioindicators and Ecotoxicology, Zero Waste, Bioplastics and Nature Conservation. A series of case studies, by lectures, will explain new routes to sustainability, and future innovations in Science and Technology which could indeed provide new developments and give us new hope for the future. Further, selected contributions as oral communications will propose international initiatives for policy changes and strategies, optimum utilization of resources, and how these initiatives could solve problems and be able to help growth even without the requirement of new technological development or large investments.

Giulia Guerriero, Ph.D. is Associate Professor (qualified as Full Professor) in Comparative Anatomy and Cytology, Advisory Board Member for the Interdepartmental Center for Environmental Research and the Inter-university "Center for Studies on Bioinspired Agro-Environmental Technology" at the University of Naples "Federico II", Italy. Her research efforts have focused on the development and validation of oxidative stress biomarkers for non-invasive biomonitoring, bioconservation and bioremediation assessment; on the determination and monitoring of physiological fertility defenses; on the biological pollution and biodiversity control (ORCID: 0000-0002-5018-072X). Principal Investigator in national and international projects, she has established a consolidated network of relationships in important research institutes in Europe, Africa, Asia and in the USA. She has organized and participated in international conferences. She is currently serving as Editor in several journals. Further, she is a research proposals reviewer for the UK National Commission for UNESCO. Since 2021 she is Coordinator of the Mediterranean and Middle East Universities Network Agreement (MUNA) Board of Coordinators.

The contributions of the MUNA network to CUCS Naples 2022



Soil Biodiversity in Europe

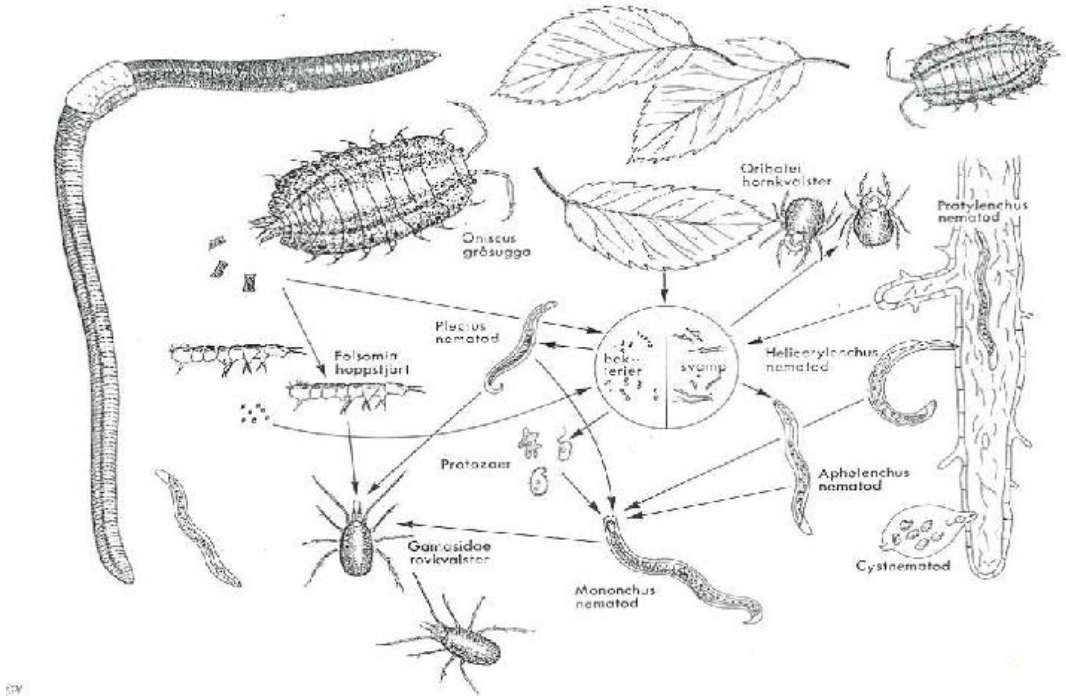
C. Jacomini

Soil Biodiversity as a key element for sustainability programs of Agenda 2030 and beyond

The future of our planet seems to be more and more at risk, as the industrial age of Anthropocene did not manage to define safety thresholds and growth limits for our development to be sustainable. This year, we reached the unbelievable amount of 8 billion human beings, the atmosphere CO2 rates are the highest, as well as global temperatures and extensive pollution, while inequity and discrimination are widespread and without control. Wars are daily raging throughout our planet, and outbreaks and epidemics are showing the defects and fragility of our artificial life, where consumerism and lack of ethics left man without moral, ideology, and clear motivation. To change this dangerous path for our planet, but also for the sake of our roots and traditions, we should take more care of what hidden treasures we have beneath our feet, the crucial part of life that is still neglected and forgotten, both by economy and society. Unknown and unseen organisms, belonging to seldom considered taxonomic units, and gathered under the common name of soil biodiversity, or soil biota, are organised in the most complex and efficient food webs on Earth. Throughout the planet, from the top of the mountains to the shores of rivers and seas, both in the cold and hot deserts, across any range of biomes up to the tropical forests and urban soils, wherever dirt and ground exist, they perform activities that first allowed plants to grow on the land, about 500 million years ago. Thereafter, soil biota evolved in a myriad of forms, survived three great mass extinctions, and will probably survive also our own extinction, since they provide ecosystems with fundamental functions, and true resilience. Soil Biodiversity works for free and works so hard, 24 hours * 365 days, and accomplishes throughout the planet so many tasks, which make our life possible, to deserve one day to be proposed as Peace. Nobel Prize winner. The microbial part of it continuously produces most of the drugs and antibiotics we use in health and sanitary issues. Moreover, their natural history and peculiar adaptations are a source of secrets that, if analysed and applied to our lives, might allow us to be actually sustainable and smart. Some communities are able to clean up soils, waters, air, food and fodder, and succeed in creating invisible barriers to prevent erosion, floods, and landslides. They stop and invert desertification processes, besides being excellent active agents of carbon sequestration, pollution degradation and ultimately providing and preserving soil health. Finally, in the last decade, a plethora of international pro-

grammes and global, regional, and local projects are addressing these useful climate change adapters and mitigators, clean-up providers and quality-of-life improvers. Their role has been recognised at all levels, from the United Nations to the local farmers, or indigenous people. And finally, large corporations, fashion design and new start-ups are taking the chance to implement what has been discovered by science on their life. Their recent study suggests strategies to recycle everything, managing and organising our society in a more sustainable way. In the meanwhile, and at the same time, they are teaching us how to monitor the progress made through the assessment and evaluation of their communities. A series of case studies on soil organisms will explain their potentials and our routes to sustainability, and future innovations in Science and Technology, aimed at Nature mimicry and at discovering all their incredible achievements, which could indeed provide new developments and give us a new hope for the future.

Carlo Jacomini, PhD in Animal Biology (Zoology), is employed in ISPRA/SNPA at the National Centre for the Laboratories' National Network. He is working on Soil Biodiversity since 1996, on Bioindicators and Ecotoxicology since 1989, and on Nature Conservation since 1983. Not a high publication record, giving first importance to implementation of Conservation Biology on field. Some of his most revolutionary proposals are under elaboration and soon will be regulated by patents that hopefully will give the right pace to Sustainability. He is actually involved in Land Degradation Neutrality and Global Soil Partnership, as well as in the EEA's EIONet as National Reference Centre on Soil Biodiversity at the International scale, in several projects on Climate Change on top-mountains' communities and peatlands (Alps, Apennines), on Pesticide effects on Biodiversity (soil biodiversity in his specific interest) in Italian Natural Protected Areas (Natura 2000 Network, Ramsar Convention Areas), on Mediterranean Forest Restoration pilot studies.



Sketch about the biodiversity on Earth

7 FERTILIZING MATRICES & 7 TREATED SOILS with associated 2 SOIL DEPTHS (0-30 cm; 30-60 cm)	7 BIOINDICATORS for the evaluation of the ecotoxicity of matrices and soils	5 ANALYSIS TIMES to evaluate toxicity over time
Urea	*Aliivibrio fischeri*	t_0: one year after the previous treatment
Defecation gypsum	*Raphidocelis subcapitata*	t_1: immediately after fertilization
Suine Slurry	*Lepidium sativum*	t_2: one month after fertilization
Compost from OFMSW	*Sinapsis alba*	t_3: after crops collection
Sewage Sludge R10	*Sorghum saccaratum*	t_4: one year after the last treatment
Sewage Sludge digestate R10	*Daphnia magna*	
Zootechnical digestate	*Caenorhabditis elegans*	

Fig.1. Experimental design of the ecotoxicologial assessment of fertilizers and soils analyzed

M. Guida, F. Carraturo, A. Siciliano, S. Meriç

Use of bio-fertilizers for a sustainable agriculture: evaluation of the soil ecotoxicity of biological amendments and the impact on the environment

Among the Sustainable Development Goals (SDG) set by the United Nations (UN) in the context of Agenda 2030, a key role is assigned to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture". Bio-fertilizers from organic waste materials (of animal and plant origin) represent a valid alternative to chemical fertilizers and may play a pivotal role in achieving the sustainable agriculture goal, contributing to the recovery of nutrients, thus exploiting circular economy. Bio-fertilizers are able to reduce organic waste and chemical fertilizers and increase the bioavailability of nutrients. Beyond the reduction of waste, bio-fertilizers additionally improve soil richness, resulting in the increased quality of the crops. Italian and International regulations on fertilizers is particularly stringent because on the matrices' potential health and hygiene risk, nonetheless the sanitation treatments able to confer safety characteristics that make the fertilizer suitable for use in the field. Moreover, the risk assessment for bio-fertilizers need to consider the evaluation of the effects on the environment and human health of the developed product, considering that available studies lack substantial information, bringing out non-standardizable performance results. In the present work, the potential toxicity of different bio-fertilizers (digestate, compost, urea, and manure) and of the soils treated with the matrices (at 3 different times from fertilization) was assessed considering a battery of bioassays consisting of 5 organisms from different trophic levels (Daphnia magna, Raphidocelis subcapitata, Alliivibrio fischeri, Lepidium sativum and Caenorhabditis elegans).

The study was conceived in such a way as to be as representative as possible of the conditions of real agronomic use of the fertilizer matrices, therefore: the on-field application methodologies of the investigated fertilizing matrices were taken into account; the evaluation was carried out

on a multiplicity of fertilizers that, by use and/or function, are comparable with each other (some fertilizers are widely used in agriculture), so as to be able to compare the results of analyzed fertilizers, derived from organic waste (i.e., sewage sludge and sewage sludge derivatives (sludge, digestate from sludge and defecation gypsum) with chemical fertilizers (urea) and organic not-treated fertilizers (livestock manure and compost).

The experimentation considered two ecotoxicological approaches: i) tests conducted on not-diluted matrices; ii) tests conducted on elutriates (liquid phase obtained from the solid matrix through the extraction of fine particles and soluble substances by washing).

Soils fertilized with the matrices under analysis were sampled at two different soil depths, 0-30 cm and 30-60 cm. The toxicity assessment was conducted on 7 different agricultural soils and 7 different fertilizers, employing 7 bioindicators at 5 analysis times. Ecotoxicological analyses were performed by sampling the soil at different time intervals, after and before fertilization.

Final results, following the analyses conducted up to t4, one year after the last treatment, will be further processed using an ecotoxicological index, according to Grenni, et al., 2018 (Grenni et al., 2018. A bioassay battery for the ecotoxicity assessment of soils conditioned with two different commercial foaming products. Ecotoxicol. Environ. Saf., 148, 1067-1077) in order to obtain an overall assessment of the biological effect related to the bioavailable fraction of contaminants which, in turn, depends on the chemicals present and the environmental conditions.

As of half-time results, EC50 (half maximal effective concentration) was calculated. Once the EC50 values were established for each fertilizer analyzed in the experiment, it was possible to determine whether each matrix hold a toxicity profile for one or more bioindicators.

The toxicity of the fertilizing matrices was evaluated with all proposed bioindicators and based on the EC50 values obtained, the sensitivity level of the tested bioindicators was as follows:

C. elegans > D. magna > A. fischeri > R. subcapitata > L. sativum/S. saccharatum/ S. alba

The germination index (or GI, with L. sativum/S. saccharatum/ S. alba) resulted the least sensitive end-point: considering seeds as bioindicators, it was not possible to calculate EC50 values, the fertilizer matrices did not show adverse effects towards the above mentioned bioindicators at a dilution 25% dilution.

Data analysis reports toxicity levels within the limits provided by the current regulations: furthermore, in the majority of fertilizing matrices, toxicity levels result lower than those of fertilizers suggested by Italian law, D. Lgs. 75/2010.

As for the toxicity results for soils fertilized with the ferilizers, the most interesting outcomes relate to the tests conducted employing Caenorhabditis

elegans (Figure 3): the soil samples showed effects below the established threshold (taking into account the standard deviation values). The results at t1 and t2 indeed showed that the number of samples with higher relative toxicity values decreased, showing that contact time plays an important role in defining toxicity. This effect confirms, as reported in literature, that the presence of an organic soil conditioner improves the physical, chemical, or biological properties of the soil.

The analysis of the data related to the test on the bioindicators Daphnia magna, Raphidocelis subcapitata, Alliivibrio fischeri showed the absence of toxicity for the samples analyzed for all the treatment times acquired so far.

In conclusion, the experimental results (related to 3 of 5 tested analysis times) exclude ecotoxicity due to the use of defecation gypsum and R10 sewage sludge digestates, as well as the use of R10 sewage sludge. Furthermore, the determination of the ecotoxicity of fertilizers on soils opens to the possibility to be proposed for future methodological applications, allowing, over time, the verification of the possible onset of ecotoxicity that could in some cases be transient due to factors not related to the presence of toxic molecules (e.g. non-optimal pH, volatile fatty acids, etc.) in the fertilizers or could be permanent in the case of ecotoxicity linked to the presence of ecotoxic molecules.

On the other hand, the determination of ecotoxicity on complex matrices, such as the fertilizers analysed in the present research (i.e., without considering their actual use and dosage in the soil, a determination made instead in the current experimentation), has no scientific basis because the results would not have any application sense considering that commonly employed fertilizers, even not derived from waste and organic waste, may appear toxic for reasons completely different from those attributable to the presence of toxic molecules in them.

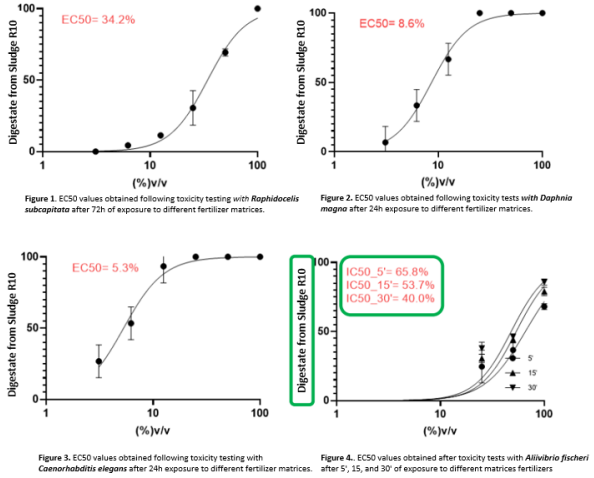


Figure 1. EC50 values obtained following toxicity testing *with* ***Raphidocelis subcapitata*** after 72h of exposure to different fertilizer matrices.

Figure 2. EC50 values obtained following toxicity tests *with* ***Daphnia magna*** after 24h exposure to different fertilizer matrices.

Figure 3. EC50 values obtained following toxicity testing with ***Caenorhabditis elegans*** after 24h exposure to different fertilizer matrices.

Figure 4. EC50 values obtained after toxicity tests with ***Aliivibrio fischeri*** after 5', 15, and 30' of exposure to different matrices fertilizers

Fig.2. EC50 values obtained following toxicity testing

Marco Guida, is full professor at the Department of Biology, University of Naples Federico II, with experience in microbiology, food and water sources hygiene, thermal mud, sediment and soil quality assessment, aquatic and terrestrial ecotoxicology. He is the Coordinator of Hygiene Laboratories: Waters, Food, Environment of the University of Naples "Federico II". He (co-) authored over 180 documents indexed in Scopus

Federica Carraturo, PhD is a researcher at the Department of Biology, University of Naples Federico II, with experience in innovative microbiology and analytical chemistry, food, pharmaceuticals, cosmetics hygiene, potable, mineral and thermal water microbiota analysis. Her activity is focused on R&D and application-oriented research projects at "Federico II" Hygiene Laboratories. She (co-) authored over 34 documents indexed in Scopus.

Antonietta Siciliano, PhD is post-doc research fellow at the Department of Biology, University of Naples Federico II, with experience in water, sediment and soil quality assessment, and aquatic and terrestrial ecotoxicology. Her activity is focused on environments and new emerging contaminants like nanomaterials and rare earth elements (REEs). She (co-) authored over 62 documents indexed in Scopus.

Sureyya Meriç, is a professor at the Çorlu Engineering Faculty, Environmental Engineering Department, of Namik Kemal University, Tekirdağ, Turkey. Since more than 20 years, she collaborates with Prof. Guida group, Department of Biology, University of Naples Federico II, for aquatic and terrestrial ecotoxicology monitoring. She (co-) authored over 108 documents indexed in Scopus.

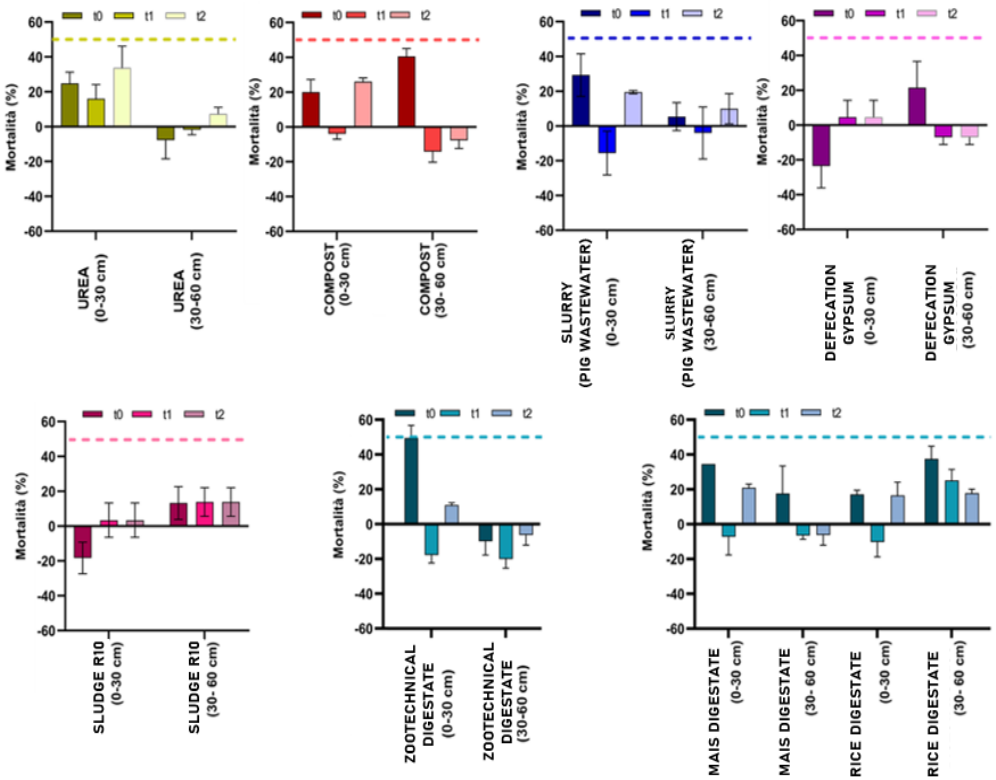


Fig.3. Results of toxicity tests with Caenorhabditis elegans after 24 h exposure to soils treated with the fertilizers at different treatment times. Responses for each treatment were compared and corrected for effects in untreated soils by applying Abbott's formula. Data were expressed as the mean of 3 replicates ± err.std. The dashed line represents the reference toxicity level.

The contributions of the MUNA network to CUCS Naples 2022

M.M. Perrotta, A. Ruggiero, N. Fucci, E. Giordano,
M. Salvemini, L. Vitagliano, G. Saccone

Genetics of sex determination and biocontrol of agricultural alien insect pests

The dipteran Tephritidaefamily includes dozens of major agricultural pest species, including the mediterranean fruitfly Ceratitis capitata (medfly), the olive fly Bactrocera oleae, bothe present in the mediterraean basin, and the oriental fruit fly Bactrocera dorsalis, which invaded the continental Africa and it has been recently intercepted in Campania region. The climate change and the intensification of trading exchanges accelerated the invasion of invasive pest insects in different areas of the planet. In recent years, the peach fruit fly Bactrocera zonata has become a widespread pest in Egypt, it has been intercepted in Israel and threatens countries in the Near East, North Africa and in Southern Europe. Genetics can open the road for novel biocontrol strategies which are species-specific and alternative to pesticides. New generation DNA sequencing technologies and development of novel bioinformatic tools madepossible to isolate novel genes involved in sex determination on the basis of their sex-linked locationand sex-specific embryonic expression. The identification of the Y-linked male determining gene of medfly, Maleness-on-the-Y (MoY), encoding a novel short protein, led to discover that it is widely conserved in other species of this family, spanning 100 millions of years of evolution. Present challenges are 1) understanding MoY molecular mechanism of action in repressing the down stream female determining transformer gene, influencing its sex-specific splicing, and 2) MoY biotech usage to harness innovative genetic control strategies for Tephritidae invasive species. Sterile Insect technique and synthetic biology approaches to the control of alien invasive harmful insect species will be also presented and discussed.

Giuseppe Saccone, is Associate Professor of Genetics, at the Department of Biology of the Federico II University of Naples, where he holds courses in Genetics and "Evolutionary Conservation Genetics", and an online Genetics course on the EDX / Federica platform (https: / /www.edx.org/bio/giuseppe-saccone). He studies the molecular evolution of genetic "pathways" that control the determination of sex in insects of economic importance (harmful to agriculture) and health (disease vectors), using genomics and transcriptomics, and several of his former students continue to pursue research of Genetics in Italy and abroad. From these fundamental studies, he seeks to develop new methods of genetic control of insect populations using biotechnological approaches, which include the use of RNA interfence, "transgenesis" and gene editing using CRISPR / Cas9. He has been a member of scientific committees of the FAO-IAEA (Food and Agriculture Organization and International Atomic Energy Agency) for two decades, which study genetic methods for the control of harmful insects and the use of radiation for their sterilization.

Table 2. Cumulative gas production, organic matter degradability and fermentation kinetics parameters of PPB silages and wheat straw.

Parameter		PPB Silage: Straw Percentages			Straw	Substrate
		0%	5%	10%		*p* Value
OMD	%	45.09 ± 1.00 ^{D}	56.10 ± 0.65 ^{B}	50.36 ± 0.65 ^{C}	60.36 ± 0.91 ^{A}	<0.001
OMCV	mL/g	132.68 ± 5.28 ^{C}	206.53 ± 3.41 ^{B}	211.93 ± 3.41 ^{B}	252.33 ± 4.82 ^{A}	<0.001
A	mL/g	120.92 ± 4.09 ^{D}	184.52 ± 2.64 ^{B}	163.57 ± 2.64 ^{C}	227.78 ± 3.73 ^{A}	<0.001
B	h	12.35 ± 0.47 ^{C}	18.59 ± 0.31 ^{B}	29.24 ± 0.43 ^{B}	19.60 ± 0.31 ^{A}	<0.001
C		1.25 ± 0.06 ^{C}	1.61 ± 0.04 ^{B}	1.53 ± 0.04 ^{B}	2.00 ± 0.06 ^{A}	<0.001
R_{max}	mL/h	7.32 ± 0.30 ^{A}	5.80 ± 0.23 ^{B}	5.38 ± 0.23 ^{B}	5.07 ± 0.33 ^{B}	<0.001
T_{max}	h	1.92 ± 0.55 ^{D}	7.91 ± 0.35 ^{B}	6.32 ± 0.35 ^{C}	16.84 ± 0.50 ^{A}	<0.001

PPB: Prickly pear by-products. OMD: Organic matter disappearance; OMVC: Cumulative volume of gas related to incubated organic matter; A: asymptotic gas production, B: is the time at which one-half of the asymptote is reached; C: switching characteristic of the curve; R_{max}: maximum fermentation rate; T_{max}: time at which R_{max} occurs. Along the row different capital superscript letters indicate difference for $p < 0.01$; different lowercase superscript letters indicate difference for $p < 0.05$.

Fig. 1.
Cumulative gas production, organic matter degradability and fermentation kinetics parameters of PPB silages and wheat straw. Source: Vastolo et al. (2019) Animals, 9 (8): 556

Observations	Feed consumption during 7–28 days of age, g	Feed conversion efficiency during 7–28 days of age	European Production Efficiency Factor during 7–28 days of age
Treatments			
Interaction between olive cake and enzyme cocktail			
Control diet	1321	1.38	294
Control diet+EC	1337	1.41	307
10% olive cake	1335	1.41	305
10% olive cake+EC	1382	1.46	301
15% olive cake	1398	1.44	322
15% olive cake+EC	1388	1.44	318
SD	151	0.103	38.4
Interaction	0.658	0.639	0.421

Fig. 2.
The effect of olive cake and enzyme concentration on feed consumption, feed conversion efficiency and European Production. Efficiency Factor of 7 to 28-day-old broilers fed a pelleted diet. Source: Al-Harthi et al. (2019) Europ Poult Sci, 83: 1-13

Y.A. Attia, S. Calabrò

Use of co-products for sustainability of animal nutrition and production

Advanced economies are causing an increase in food waste, which enhances environmental impact in terms of air and water pollution and greenhouse gas (GHG) emissions. On the other hand, developing countries suffer from a shortage of animal feed resources due to water limitations and suitable land for crop production; here, alternative feed resources, such as agriculture by-products, might be useful for livestock. Since ever, some agricultural wastes are used (e.g., straw and cereals bran) worldwide, but in the last years, their valorization is receiving great attention. In the 2030 Agenda (Sustainable Development Goal 12), the countries involved undertaking to implement actions for sustainable management and efficient use of natural resources, reduction of food losses along supply chains, management of all waste throughout its life cycle (substantially reducing its production through recycling and reuse) to minimize negative effects on human health and the environment (https://www.fao.org/sustainable-development-goals/en).

Agro-industrial co-products are produced during the manufacture, processing, use, or disposal of other products. The co-products are still processing residues which preserve and sometimes improve the nutritional composition of products derived. They include corn gluten feed, distillers' grain or soluble, and fruits and vegetable by-products. The co-products may represent a valuable source of bioactive compounds (i.e., dietary fiber, prebiotic, pigments, sugars, organic acids, flavonoids, etc.) with important benefits on human and animals' health and environmental impact with the reduction of GHG production [Vastolo et al. (2022) Ita J Anim Sci, 21 (1): 577-594]. For their characteristics, they can be used as livestock feed or a feed supplement, ensuring sustainable consumption and production patterns.

However, many aspects of co-products' nutritive value still need to be investigated (seasonality, short shelf-life, presence of anti-nutritional factors, effect on animal performance and animal products quality). These characteristics and availability, stocking,

treatment, and supplementation with enzymes are relevant to valorize their use in improving animal performance. The in vitro gas production technique (IVGPT) is a valid method to determine the nutritive value of feedstuffs because the rate and extent of degradation and rumen fermentation can be easily determined. The technique also gives a dynamic description of feedstuffs utilization and allows to obtain information regarding fermentation kinetics and characteristics (volatile fatty acids production, organic matter degradability). The IVGPT should be considered for use also in developing countries because the manual system does not require large financial resources and allows to analysis of many samples simultaneously using small amounts of material. In addition, the IVGPT is highly reproducible, and it is not time-consuming [Musco et al. (2016) Asian-Australasian J Anim Sci, 29 (1): 51-61].

This abstract aims to introduce the results obtained at the University of Napoli Federico II (Italy) and at King Abdulaziz University (Saudi Arabia) regarding the characterization and use of co-products. In particular, the nutritive value and in vitro fermentation characteristics of some agro-industrial co-products typical of the Mediterranean area (i.e., , hemp, citrus fruit, olive oil) have been studied in Italy [Vastolo et al. (2021) J Anim Physiol Anim Nutr, 105 (Suppl. 1): 1–9; Vastolo et al. (2020) Animals, 10 (9), 1716]. For example, about prickly pears fruits and juice, thanks their numerous health benefits, in Italy the consumption are progressively increased. In the manufacturing plants several by-products (PPB) are present, but despite their interesting nutritional characteristics, PPB are few usable because of their poor shelf-life related to high moisture and sugars values. Recently, [Vastolo et al. (2019) Animals, 9 (8): 556] the efficacy of ensilage to preserve PPB was verified, comparing different inclusion level (0, 5 and 10%) of wheat straw. The PPB with 5% of straw showed significantly lower pH and N-NH3 values, indicating a better preservation process. PPB with 5 % of straw showed better nutritional parameters (higher ether extract and lower structural carbohydrates) and fermentation characteristics (higher degradability, and volatile fatty acids production) when compared with the other PPB silages (table 1). The ensilage with straw represents a suitable storage technique to preserve the nutritional characteristics of prickly pears by-products.

The trials in Saudi Arabia will be presented to assess the effectiveness of pelleting and enzyme supplementation in improving the utilization of diets containing different concentrations of by-products. In general, results on poultry indicate that 5-10% can be used in broilers, laying hens, Japanese quail, and ducks, but considering the safety, economy, and amount available of the by-product, 5% can be advised. However, the best level needs to be determined based on the nature of the specific by-product (table 2). In addition, several supplements such as enzymes, yeast, and organic acids may improve the utilization of the by-product (i.e.,

olive cake, rice bran, nigella seed meal, prosopis pods meal, etc.) in terms of animal health and performance, eggs quality and this depends on its nature and anti-nutritional limitations [Al-Harthi et al. (2019) Europ Poult Sci, 83: 1-13; Attia et al. (2008) J Poultry Science, 45:110-115; Attia Y.A. (2003) Egypt Poultry Sci J, 23:739-759].

In conclusion, co-products and by-products of vegetable organs and agro-industry are available resources for ruminants and poultry feeding in the era of the COVID-19 crisis and the recent war between Russia and Ukraine, which affected food/feed chain supply in different parts of the world that depends in imported food/feed to meet the hunger. The use of by-products and co-products are dependent on animal spices, type of products, and method of improving it (Hafez and Attia (2020) Front Vet Sci, doi: 10.3389/fvets.2020.00516).

Youssef A. Attia, is a professor of Poultry Nutrition at KAU. His publication included 250 scientific articles in a peer-reviewed journal, 11 books in poultry production. He has supervised many Master's and Ph.D. students. In addition, he has been recognized as reviewer and editorial board members and among World's Top 2% Scientists List of Stanford University 2020 and 2021.

Serena Calabrò, research on in vitro feed evaluation within national and international project. PhD and ungraduated students' supervisor. Erasmus exchange promoter. Coordinator of bachelor's degree in Animal Production. Guest editor of Animals Special Issue 'A Sustainable Approach to Non-Conventional Feeding Resources and Rearing Strategies'. Co-editor of Un mondo di Bufale online magazine.

Table showing the development of edible plastics from oilseed cakes

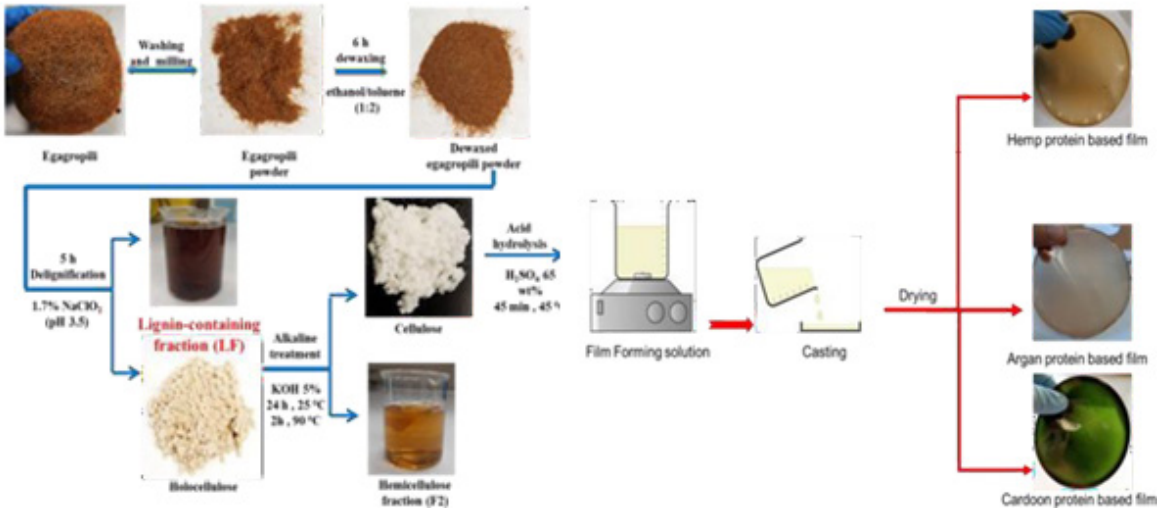
S.F. Mirpoor, C.V.L. Giosafatto

Renewable sources for active packaging products

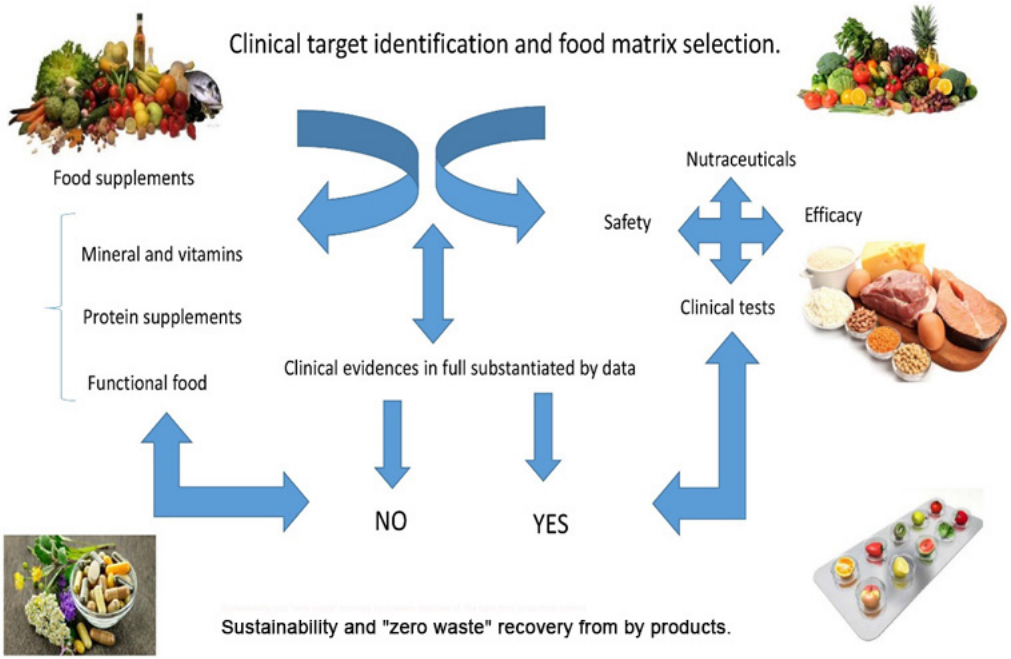
The use of petroleum-based plastics in different fields, such as food and pharmaceutical sectors, has increased significantly in the last 50 years, being the durability of the plastic materials, as well as their outstanding features, the main reason of their success. However, their worldwide applications led to huge waste-disposal problems and, as a consequence, to a dramatic environmental pollution. These issues have encouraged innovation and research activities in the field of biodegradable plastics, offering alternatives for conventional plastics. One potential option to pursue would be to explore agri-food wastes and by-products for bioplastic production. Numerous different seeds are utilized for edible and non-edible oil extraction and seed by-products following oil extraction. These by-products are known as seed oil cakes (SOCs) and represent roughly 50% of the original seed weight. Since SOCs are rich in fibers, proteins and secondary metabolites, they are considered as promising candidates to be raw material consumed in a biorefinery for the production of bioplastics. In this scenario the present work provides insights into the production and characterization of bioplastics obtained by using the proteins extracted from hemp (Cannabis sativa), cardoon (Cynara cardunculus) and argan (Arganiaspinosa L.) SOCs. Moreover, different additives have been added to the film matrix for improving biological and technological attitude of the derived materials. SOCs were demonstrated to be effective for preparing eco-friendly bioplastics being renewable and sustainable, thus, leading to a timely, valuable and innovative milestone at least for some specific sectors of food packaging industry.

Seyedeh Fatemeh Mirpoor, PhD student at the university of Naples, Federico II. During my PhD I focused on the valorisation of waste coming from oil industry by-products to protein-based bioplastics for food packaging and successfully published 6 papers during my PhD. Holder of master degree in food science and technology.

Concetta Valeria Lucia Giosafatto, PhD in Biotechnology. Professor at University "Federico II". (ORCID 0000-001-8762-2205). Main Fields of interest: Protein digestion, Bioplastics production and characterization, active packaging. Scopus: author of 53 documents, h-index 23; cit. 1200. Google scholar: author of 68 documents, h-index 30; cit. 1704.



From left to right: Table showing the nanocrystalline cellulose (NC) obtained from egagropili, Table showing the biodegradable protein films drying process



Sustainability and "zero waste" rcovery from by products

P. Daliu, A. Santini

Sustainability and "zero waste" recovery from waste matrices of the agri-food production system

The by-products/wastes from agro-food represent nowadays an issue since they cannot be disposed as such for their impact on the environment, and they need to be treated as a waste. Nonetheless, they are a source of bioactive healthy useful compounds which can be recovered and become the starting material for other products in the view of sustainability and circular economy, addressing the global goal of "zero waste" in the environment. It is to be considered as a preliminary consideration that the "zero waste" impact end point can be achieved only with an international cooperative effort in a global and shared vision. Nowadays, the investigation of the main components and related bioactivities of wastes is being continuously explored throughout an integrated and multidisciplinary approach towards the exploitation of emerging fields of application which may allow to create economic, environmental, and social value in the design of an eco-friendly approach of the waste matrices of the agro-food chain. The FAO reported that about 30% of fruits consisting for example of fruit pomace, seed, oil, and cakes are wasted after processing. Fruit biowastes are considered a rich source of antioxidants, phenolics, pharmacologically active metabolites, dietary fibers, pigments, vitamins, and minerals, etc., which potentially have a desired impact as constituent of food supplements but not only, and contribute to the prevention/support of health conditions and to the decrease mortality (especially from some serious and chronic diseases), cardio-vascular system issues, oxidative stress, metabolism problems, and microbial infection. The exploitation of value-added products from biomass leads to consider fruit and vege-

tal wastes as a renewable resource in an integrated process framework that allows the extraction of all the substances of interest in a circular economy and also in a biorefinery perspective, in synergy with the use of innovative technologies such as nanotechnologies. The application of nanotechnologies to nutraceuticals and pharmaceuticals fields offers a novel potential improvement in use opening the way to food and pharmaceutical industrial application. Moreover, the area of application is increasing from food and health related applications to other fields: developing edible films, bio-materials, carbon dots, microbial media, biochar and biosorbents, hydrogen production, water purification, and boiler fuel. Recently, industrial sustainable platforms for the recovery and exploitation of fruit waste have been implemented, and the raw material can be transformed into a new commercial product even as such, after drying and micronization treatments. In this latter case, the powder obtained can be used as a functional ingredient to be added to food and/or feed or for food supplements and nutraceuticals formulation assessment (e.g. peel flour, dilatory fiber, jelly, bakery products, etc.). Biorefinery extraction and purification processes allow also for obtaining new products and semi-finished products from fruit waste such as bio-materials (dyes for foods and textiles, bio-polymers, agronomic products, biochar), biochemicals (polyphenols and phenols, polysaccharides, pectins, proteins, enzymes, organic acids, vitamins, fatty acids, essential oils), and bioenergy products such as exhausted vegetal residues after extraction, coke, ethanol or methanol, bio-oils. The overall end points are the sustainability and the recovery with the goal of zero waste impact on the environment assuring sustainability and recycle of all components no more treated and considered as a waste to dispose, and which can be instead a relevant resource if properly treated and reconsidered in the light of sustainable low impact circular economy.

Patricia Daliu, was born in Tirana (Albania) on 24.07.1991. She graduated with a gold medal in Pharmacy at the Albanian University of Tirana, and got her PhD in "Pharmaceutical Sciences" at the University of Napoli Federico II. She has a Specialization in microbiology and food safety from the Department of Preventive Medicine Nutrition and Food Science Area, Faculty of Pharmacy, University of Valencia (Spain). Author of 7 scientific publications, 1 book (Alternative Medicine and Phytotherapy) and participated to many national and international conferences. Currently she is Lecturer at the Department of Pharmacy of the Albanian University and Scientific Coordinator of the Italian cooperation programs in the field of medicine.

Antonello Santini, has a degree in Industrial Chemistry, and holds a PhD in Chemical Sciences, both by the University of Napoli Federico II. Currently he is Professor of Food Chemistry and Analysis of Food and Nutraceuticals (Department of Pharmacy) and Professor of Food Chemistry (Department of Agriculture) at the University of Napoli Federico II. His research activity at the Department of Pharmacy of the University of Napoli Federico II is, among the others, focused on nutraceutical, assessment and development, recovery and sustainable reuse of bioactives from by products, recovery, secondary metabolites, sustainability, contaminants, safety, nanocompounds, analysis of food. He is responsible of the Virtual Laboratory of Food Research and Education (LVA, www.lva.unina.it) and of the NLL platform (NetLearningLaboratory, www.nll.unina.it), now both under restoring. His teaching activities included also: Chemistry Laboratory NLL (FAD e-learning), Didactics of Chemistry, Science teaching resources on the Internet, and courses developed for the Federica online FAD platform (University of Napoli Federico II). He is responsible of many General Cultural Agreements and Erasmus Agreements wth many Countries within the cooperation and internationalization framework.

St. Catherine's Monastery, Egypt

A.A. Moustafa

Impact of climate change on fauna and flora in South Sinai Mountain, Egypt

Climate change has become one of the issues, which has been at the global level due to the possible consequences of serious changes that can threat the future of the land. The recorded increase in mean annual temperature is already affecting many ecosystems and scientific studies predict that future changes will be of much greater amplitude. Climate change affects different ecosystems in different ways, depending on the original characteristics of the system, geographical location and on the presence of certain factors that may regulate the extent of the changes. Degraded ecosystems are generally believed to be less resilient to climate change than intact and healthy ecosystems. Climate change affects flora and fauna ecosystems in south Sinai Mountains. South Sinai, an arid to extremely arid region, is characterized by an ecological uniqueness, due to its diversity in landforms, geologic structures, and climate that resulted in a diversity in vegetation types, which is characterized mainly by the sparseness and dominance of shrubs and subshrubs and the paucity of trees and a variation in soil properties. Three-hundred and twenty three species were identified in Saint Catherine Protectorate. The mountainous area of south Sinai harbors 26 endemic species. Of the species in Saint Catherine's Protectorate, 10 are extremely endangered, 53 are endangered, and 37 species are vulnerable. Nearly half of the endemic species found in Saint Catherine's are vulnerable, rare, endangered, or extremely endangered are subjected to great disturbance due to the severe impact of the human activities. The continuous over-grazing, over-collection (cutting and uprooting for fuel and medicinal uses), tourism and urbanization resulted in disappearance of pastoral plants, paucity of trees and shrubs as well as disappearance of many rare and endemic species. According to the IUCN definitions of threatened species (IUCN, 1978), threatened medicinal plants species were classified as rare, vulnerable, endangered and

extremely endangered based on the local distribution within the protectorate's boundaries, and human impact and. Furthermore it is thought 10 endemic and over 100 other species have been lost from the Protectorate in recent years, as a result of unmanaged human activity. This provides a strong case for additional conservation action in the Protectorate focusing on medicinal plants. Climate change effect on fauna ecosystem can divided into climatic impact on terrestrial Systems, climatic impact on marine systems and climatic impacts on freshwater systems. Climate change induced shifts in plant species distributions are changing the characteristics of biomes (ecosystems with the same dominant plant life-forms), altering structure and ecosystem functioning. For example, increased tree growth is occurring in forests at or near latitudinal and altitudinal tree lines, and trees are moving into adjacent tundra.

Location of South Sinai

Sinai Peninsula is a triangular area covering about 61,100 km2 (about 6% of Egypt's area). Its southern part has mountains as a geological extension of the hills of the Red Sea. The southern side of the Peninsula has a sharp escarpment that subsides after a narrow coastal shelf into the Red Sea and the Gulf of Aqaba. Geographically, Sinai Peninsula is separated from the rest of Egypt by the Suez Canal and Gulf of Suez. The elevation of Sinai's southern rim is about 1000 m (Figure 1).

Climate of South Sinai

South Sinai is characterized by having a great diversity in landforms, geological structures, and climate, with a great variety in soil properties. South Sinai is characterized by an arid to extremely arid climate with long hot rainless summer and mild winter. Precipitation occurs mostly in winter. The climate is influenced by the Mediterranean and by the orographic impact of the high elevation of the mountains in southern Sinai. The tropical influence is prominent along the Gulf of Suez and the Gulf of Aqaba. Due to the wide range of altitude, South Sinai is characterized by a wide range of variation in air temperature and considered as the coolest area in Sinai and Egypt as a whole due to its high elevation (Figure 2). During the period from 1979 to 1992, the lowest monthly mean minimum temperature was recorded in January and February (1.4oC), while the highest mean maximum temperature in June and July 30.8 & 31.8oC, respectively.

Most of the precipitation in St. Catherine occurs during autumn, winter, and spring. Considerable precipitation occurs as a result of convective rains which are very local in extent and irregular in occurrence. The number of convective rains per season is unpredictable. Precipitation may occur as snow on the high peaks of southern Sinai Mountains, and winter snow lasting two to four weeks has been observed on the northern slopes of Mountain Catherine. More than one snowfall may occur during some years while during others it may be absent. Precipitation which falls as rain in the valleys of southern Sinai may occur as hail on the high peaks. Water derived from melting snow or hail is

more likely to infiltrate the desert soil because of Study Area 35 its low rate of percolation. The study area receives approximately 50 mm of precipitation, partly as snow (Photo 1).

Vegetation and threats in South Sinai

Vegetation types are mainly characterized by dominance of shrubs, sub-shrubs, and the paucity of trees. Floristically, Sinai includes about 900 species and 250-300 associations. The southern part of Sinai (including Saint Catherine Mountain) represents a great pool of endemism. Three hundred and twenty-three species were identified in Saint Catherine Protectorate including 26 endemic species. Ten species in Saint Catherine Protectorate are extremely endangered, fifty-four are endangered, and twenty-seven species are vulnerable. Half of the endemic species found in Saint Catherine Protectorate are vulnerable, rare, endangered, or extremely endangered and are subjected to great disturbance as a result of human activities where Bedouins find their source of nutrition in many medicinal plants. Bedouin activities and their utilization of medicinal plants were recorded in the study area (Moustafa, et.al, 2001, Moustafa et.al, 2014). Also, continuous over-grazing, over-collection through cutting and uprooting for fuel and medicinal uses, urbanization and tourism were observed and recorded in disappearance of many rare and endemic species. The IUCN definitions of threatened species (IUCN, 1978) classified threatened medicinal plant species into rare, vulnerable, endangered, and extremely endangered. Important endemic plant species may be subjected to loss from Saint Catherine due to climate change in form of drought and unmanaged human activities which provide a great need for conservation plans and actions in order to protect valuable medicinal plants.

Two main categories of threats to medicinal plants and habitat are recognized in Saint Catherine protectorate, the former is natural threats including aridity and floods due the climate change. The second is human-induced impact. The sparse vegetation and aridity conditions in Sinai aggravate any threat. The drought effect is the main and first threat which aggravates any other threats. A lot of disturbances due to human impact are recorded all over the Sinai, including: feral donkeys, plant over collection, overgrazing, collection for scientific research, tourist intrusions, urbanization, and expansion for settlement and quarries.

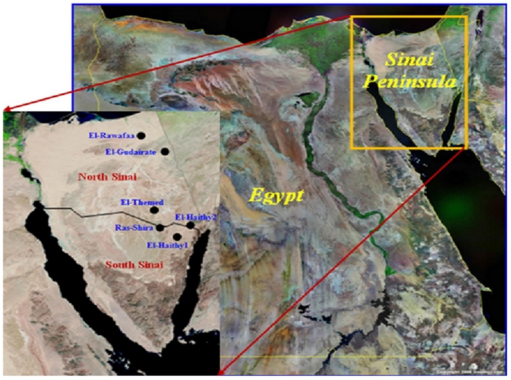


Fig. 1.
Location map of the study area (Saint Catherine Protectorate) in the southern part of Sinai.

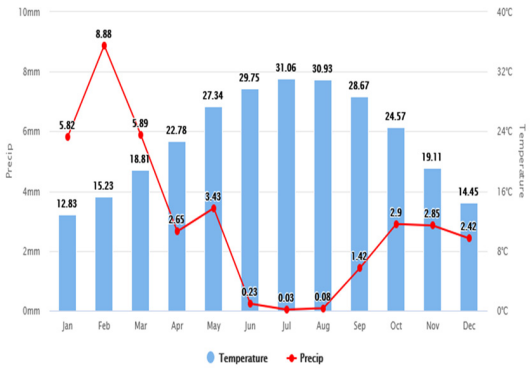


Fig. 2.
Mean annual of temperature and precipitation in Saint Catherine area

Abdelraouf A Moustafa, Professor of Plant ecology in Suez canal Uni., MSc 1986, PhD. In cooperation with Harvard University (USA) in 1991. Member of IUCN, Chairman of Botany department (2003-2009), member of environmental council affairs 2012, founder of Egyptian society for environmental science, Chief Editor of CATRINA journal, and former Dean of faculty of computer and informatics. Research interest: conservation of medicinal plants

Fig. 3.
Snow covering Saint Catherine Mountains during winter season of 2013

NET-2

PERSONA: FOR A NEW INCLUSIVE CITIZENSHIP
MUNA FOR SCIENCE, PEACE, EDUCATION: RETHINKING MEDITERRANEAN PROJECT

Culture of differences

C. Pignata, F. Galgano, C.V.L. Giosafatto

Introduction

One of the most important goals of international cooperation among Universities is certainly to put the main focus on culture of differences for Students during their education, and that is: promoting diversity; gender equality; gender mainstreaming; preventing violence against women, children, migrants, people at risk; supporting the rights of minority groups and children, especially for research and medical care for the well-being of our future generations. Universities network aims to implement actions, policies, events intended to ensure well-being within its academic communities thanks to a common fight towards any form of discrimination and intolerance. Diversity, social inclusion, wellbeing, fight against discrimination, women empowerment are all included among the agenda 2030 goals of the United Nations.

The session NET2, entitled "Persona" which means in Latin simply and genderless,Man, is open to connect young Researchers, PhDs., Scholars within a transdisciplinary framework.



Claudio Pignata, full Professor of Pediatrics, Federico II University of Naples. President of the Italian Society of Pediatric Research. National Coordinator of the Primary Immunodeficiency Network (IPINet). Coordinator for Federico II University of the international agreement with Tunis El Manar University for the cooperation in the field of Health applied to genetic disorders. Major current interests are in the field of congenital disorders of immunity.

Francesca Galgano, is Full Professor of European Juridical Science. History Methods Techniques, Law Dept., Federico II University, Naples, Italy; since 2015 elected member of the "Comitato Unico di Garanzia per le Pari opportunità, la valorizzazione del benessere di chi lavora e contro le discriminazioni" (Equal opportunities committee), Federico II University, Naples, Italy; coordinator of the international agreement with Univ. Tunis El Manar; member of the Internationality Committee, Law Dept., Federico II University; in the scientific board of M.U.N.A. and in the Internal Advisory Board of Aurora Unina-European Universities Alliance.

Concetta Valeria Lucia Giosafatto, PhD in Biotechnology. Professor at University "Federico II". (ORCID 0000-001-8762-2205). Main Fields of interest: Protein digestion, Bioplastics production and characterization, active packaging. Scopus: author of 53 documents, h-index 23; cit. 1200. Google scholar: author of 68 documents, h-index 30; cit. 1704.

NET-2

INTERVENTIONS

The contributions of the MUNA network to CUCS Naples 2022

I. Ben-Mustapha, N. Mekki, A. Tezeghdenti, A. Rais, S. Al-Hissi, L. Al Baik, M. Ouederni, F. Mellouli, M. Bejaoui, H. Al-Mousa, A. Hawwari, M.R. Barbouche

The Tunisian experience of Severe Combined Immunodeficiency

Severe combined immunodeficiency (SCID) is the most severe form of Inborn Errors of Immunity (IEI), characterized by complete absence of T cell-mediated immunity, resulting in a broad-spectrum susceptibility to multiple pathogens. There is considerable genetic heterogeneity, as 17 different conditions all resulting in a SCID have been fully characterized.

SCID accounts approximately for 10% of all diagnosed Tunisian patients with IEI. One hundred and thirty-three patients were diagnosed between 1993 and 2021, including 56 T-B+ SCID patients, 44 T-B- SCID patients and 33 patients with Omenn syndrome.

Genetic screening of the following candidate genes (RAG1, RAG2, ARTEMIS, ADA, IL2RG, JAK3 and IL7RA) were performed in only 23 patients and allowed the identification of IL2RG deficiency in 8 patients, IL7RA deficiency in 3 patients, RAG 2 deficiency in 3 patients, PNP deficiency in one patient and RAG1 deficiency in 8 patients.

Despite the high rate of consanguinity in Tunisia favoring autosomal recessive forms, X-linked inheritance remains well represented among Tunisian SCID patients. The use of NGS will be critical, in the North-African context, to rapidly deliver a molecular diagnosis in order to offer an early diagnosis and an appropriate curative and preventive approach.

The contributions of the MUNA network to CUCS Naples 2022

B. Belaid, L.L. Mahammed, R. Djidjik

Diagnosis and treatment of Inborn Errors of Immunity: Clinical, immunological, and molecular characteristics of typical and atypical Severe combined immunodeficiency -a single-center experience over a period of 13years (2008–2021)

Background: Severe Combined Immune Deficiency (SCID) is an inherited defect in lymphocyte development and function that results in life-threatening opportunistic infections in early infancy. The age of presentation is variable but occurs typically between 3 and 6 months when the protective effect of maternally transmitted immunoglobulin has diminished, although atypical and late presentations are well described. Data on SCID from developing countries are scarce.

Objective: To describe clinical, laboratory features, and molecular features of SCID and its variants diagnosed at single center in Algiers, Algeria.

Methods: we conducted a 13-year retro-prospective single center study. We collated clinical, laboratory, and molecular details of 169 patients with clinical and immunological profile suggestive of typical or atypical SCID based on 2018 ESID working definition for SCID and classified according to IUIS criteria.

Results: We obtained data on 177 children; 89 were categorized as SCID (57 T-B-NK+, 14 T-B+NK-, 7 T-B+NK+, 11 T-B-NK-), 25 as Omenn syndrome, and 63 as atypical SCID (55 TlowBlowNK+; 5 TlowB+NK+; 3IKBKB). Male-female ratio was 104:73. Median age of onset of clinical symptoms and diagnosis was 3 months (1-5) and 5,5 months (3-11,25), respectively. Molecular diagnosis was obtained in 32 patients. Only 2 children received hematopoietic stem cell transplantation (HSCT). Mortality was recorded in 118 children (66%).

Conclusion: We emphasize that the number of diagnosed patients with SCID reported in this study does not reflect the actual numbers of these disorders in Algeria, because most of the patients with severe forms die in their early life before their diagnosis can be made. Early diagnosis and treatment (HSCT) of these conditions are critical to minimizing mortality and improving quality of life.

The contributions of the MUNA network to CUCS Naples 2022

I. Benhsaien, F. Ailal, J. El Bakkouri, L. Jeddane, H. Ouair, B. Admou, M. Bouskraoui, MM. Hbibi, M. Hida, N. Amenzoui, Z. Jouhadi, N. Elhafidi, N. Rada, N. Benajiba, R. Abilkacim, A. Badou, AA. Bousfiha

Clinical and immunological features of 96 Moroccan children with Severe Combined Immunodeficiency phenotype: Two decades' experience

Severe combined immunodeficiency (SCID) is a heterogeneous group of primary immuno deficiency diseases (PIDs) characterized by a lack of autologous T lymphocytes. This severe PID is rare, but has a higher prevalence in populations with high rates of consanguinity. The epidemiological, clinical, and immunological features of SCIDs in Moroccan patients have never been reported. The aim of this study was to provide a clinical and immunological description of SCID in Morocco and to assess changes in the care of SCID patients over time. This cross-sectional retrospective study included 99 Moroccan patients referred to the national PID reference center at Casablanca Children's Hospital for SCID over two decades, from 1998 to 2020. The case definition for this study was: age < 2 years, with a clinical phenotype suggestive of SCID, and lymphopenia, with very low numbers of autologous T cells, according to the IUIS Inborn Errors ofImmunity classification. Our sample included 50 male patients, and 66% of the patients were born to consanguineous parents. The median age at onset and diagnosis were 3.3 and 6.5 months, respectively. The clinical manifestations commonly observed in these patients were recurrent respiratory tract infection (82%), chronic diarrhea (69%), oral candidiasis (61%) and failure to thrive (65%). The distribution of SCID phenotypes was as follows: T–B–NK+ in 44.5%, T–B–NK– in 32%, T–B+NK– in 18.5%, and T–B+NK+ in 5%. An Omenn syndrome phenotype was observed in 15 patients. SCID was fatal in 84% in the patients in our cohort, due to the difficulties involved in obtaining urgent access to hematopoietic stem cell transplantation, which, nevertheless, saved 16% of the patients. The autosomal recessive forms of the clinical and immunological phenotypes of SCID, including the T-B-NK+ phenotype in particular, were more frequent than in Western countries. A marked improvement in the early detection of SCID cases over the last decade was noted. Despite recent progress in SCID diagnosis, additional efforts are required for genetic confirmation and particularly for HSCT.

The contributions of the MUNA network to CUCS Naples 2022

A. Elmarsafy, S. Meshaal, R. Elhawary, D. A. Elaziz, R. Alkady, A. Eldash, A. Erfan, S. Lotfy, N. Galal, J. Boutros

Egyptian Experience with Severe Combined Immunodeficiency: 10-year experience

SCID is the commonest encountered PID category among Egyptian children, comprising 30.2% of all diagnosed PID cases in our cohort. Two hundred-thirty SCID patients were diagnosed between 2011 and 2021. Ninety-six (42%) were females and 134 (58%) were males. One hundred-forty patients were diagnosed with T-B-SCID, seventy-nine with T-B+SCID and eleven with Omenn Syndrome.

Forty-three patients had RAG1/RAG2 deficiency, nine had ADA deficiency, thirteen patients had JAK3 deficiency, eight had IL2RG deficiency, four had IL-7RA deficiency and DCLERIC was identified in 4 patients. In three patients with T-B-NK+ phenotype with microcephaly, NHEJ1 variant was detected in 2 siblings and LIG4 in one patient. CD247, CD3E and LAT were identified in one patient each.

In addition, 22 patients were diagnosed as MHC-II deficiency using FCM. Those patients presented with variable clinical and immunological phenotypes. Unlike the European society for Immunodeficiency (ESID) criteria for diagnosis of MHC-II deficiency, most of them had lymphopenia with low T and B cells counts. Nine samples for patients diagnosed with MHCII deficiency were confirmed by whole exome sequencing and revealed variants in RFXANK in 5 patients from 4 families, RFX5 in 3 patients and CIITA in 1 patient.

Among some patients with isolated CD4 lymphopenia and variable serum immunoglobulin levels with markedly reduced recent thymic emigrants (CD4+CD45RO+CD31+), genetic testing revealed RAG1 mutations in 2 atypical patients, DOCK2 mutations in 3 and CARD11 pathogenic variants in another 2 patients. PNP variants were identified in 5 patients from 3 different families having neurological impairment associated with progressive decrease in T cell counts. Other genetic variants were identified for CID patients in Zap70, CD40L and ARPC1Bin 1 patient each.

Prenatal diagnosis was offered for the detection of affected fetuses in families with known mutations in RAG1 in 16 pregnancies, RAG2 in 6 pregnancies and ADA in one pregnancy.

Fourteen SCID/CID were treated with hematopoietic stem cell transplantation (HSCT), with a favorable outcome in 9 patients (8 from matched related siblings) and the loss of five patients including two following a haploidentical HSCT. One ADA-SCID patient was successfully treated with gene therapy.

The contributions of the MUNA network to CUCS Naples 2022

A. NaserEddin

Severe combined immunodeficiency in Palestine

Primary immunodeficiency diseases (PIDs) are rare life-threatening inborn disorders of the human immune system, characterized by defects of the immune system predisposing individuals to variety of manifestations, including recurrent infections, autoimmunity, malignancy and unusual vaccine complications. Early recognition of clinical, immunological, and genetic features in patients with PID especially SCID may lead to timely therapeutic intervention with allogeneic stem cell transplantation (SCT).

In the Palestinian population a high rate of consanguinity, up to 40%, favors a high prevalence of recessive form of rare genetic diseases including PIDs. In Palestine, we are talking about population of around 5 million in the west bank and Gaza strip, during the last decade we diagnosed many cases of SCID and profound combined immunodeficiency (pCID) including new disease-causing genes, all of this with collaboration with other countries, and still we have many new patients and patients without definite diagnosis "leaky SCID", and we estimate that the incidence rate of SCID is much higher than the international incidence rate with autosomal recessive SCID being more common including RAG1 and 2 and JAK3.

The diagnosis of these forms of immunodeficiency requires a close collaboration of experienced clinicians, laboratory immunologists and geneticists in order to diagnose known forms of pCID and SCID and discover new causes. This collaboration will also aid inphysician and nurse education, geneticcounseling, increased awareness of the risks of consanguineous marriage, and the implementation of neonatal screening for the identification of infants with SCID and this will contribute and help indecreasing the incidence of PID especially SCID in the Palestinian population and preventing vaccine complications especially BCG vaccine which are given to all newborns at age of one week.

The discovery of new genetic defects underlying combined immunodeficiency will benefit the affected patient and his family, because access to accurate diagnosis will allow informed medical advice regarding further treatment strategies and genetic counselling.

The contributions of the MUNA network to CUCS Naples 2022

G. Giardino, E. Cirillo, C. Pignata

Proposal of a comparative study on Severe Combined Immunodeficiencies among Countries of the Mediterranean area

Inborn errors of immunity (IEI) are rare congenital disorders affecting the development and/or the function of the immune system. The most severe form is SCID (severe combined immunodeficiency) characterized by early onset life threatening infections that usually cause death in the 1st year of life if not promptly recognized and treated. SCID may be due to alterations of different genes and may be transmitted in 2 different modalities, namely autosomal recessive and X-linked. The autosomal recessive modality is more common in population where there is a higher consanguinity rate. Recent studies suggest that the incidence of SCID is largely underestimated and that many patients die before receiving the diagnosis. We recently evaluated clinical, immunological and molecular features of SCID patients followed up at centers of the Italian Network for Primary Immunodeficiency (IPINet) since1986. Interestingly 22.5% of the population were foreigners and were coming from Countries with higher consanguinity rate. The prevalence of SCID in our cohort was significantly higher in the last decade of observation compared to the first 2 decades. However, the estimated prevalence in the last decade of observation was 1:100000 born alive and it was significantly lower compared to the incidence of SCID evaluated through the newborn screening program in the United States. We also observed a different distribution of cases in different Italian Regions with a higher number of cases in regions with specialized centers, suggesting that the presence of a specialized center may improve the diagnostic process and reduce the underestimation. In several cases, we observed a significant diagnostic delay, and this was associated with a worsening of the clinical conditions. In conclusion our data showed that immunological expertise and newborn may reduce the underestimation of the diagnosis and diagnostic delay, improving the management of SCID. The comparison of our experience with that of other Mediterranean countries may help identifying problems that hinder good medical care for IEI paving the way to develop efforts to improve the diagnosis and the management of IEI in the Mediterranean area.

Claudio Pignata, full Professor of Pediatrics, Federico II University of Naples. President of the Italian Society of Pediatric Research. National Coordinator of the Primary Immunodeficiency Network (IPINet). Coordinator for Federico II University of the international agreement with Tunis El Manar University for the cooperation in the field of Health applied to genetic disorders. Major current interests are in the field of congenital disorders of immunity.

Al Idrisi map

F. Galgano

Culture of differences, human rights in the Mediterranean basin

The net 2 MUNA session for CUCS 2022, entitled Persona, intends to focus on the scientific, socio-economic and legal framework of the culture of differences, in order to foster knowledge, awareness and respect for equal opportunities in a transdisciplinary perspective.

MUNA is an alliance among the Universities of Nations belonging to the Mediterranean basin that share a strong historical identity despite their cultural diversity. In the first Summer School which took place in September 2021 in Naples we expressly chose the famous map of the Arab geographer Al-Idrisi to put on our poster, dating back to the mid-twelfth century, which was widely used as a reference, translated, copied and cited during the Middle Ages. The map, oriented in the upside-down Arab way, i.e., with the South at the top and the North at the bottom, shows the Mediterranean in its centrality as the cradle of three civilizations, the Byzantine East, the Christian West and the Islamic world, which coexisted in a harmonious multicultural synchronicity reflected in the royal court of Palermo, in Sicily. Al-Idrisi transmits Greek knowledge integrated into Arab culture to the court of a Christian king: a truly exceptional case of cultural syncretism in a period in which Arab culture was able to convey Western science and the wealth of knowledge of Persia, India and China by producing in fact great astronomers, cartographers and geographers, as well as tireless travellers.

The choice of this precise map is motivated by the desire to show the Mediterranean as the cradle of a common history, a 'square' where people and ideas could circulate freely and where strategic communication for goods flourished. An alliance among different universities aims to empower the new generations and share research: in fact MUNA in international cooperation chooses to base its activities on common values such as equality, respect, dignity, freedom, human rights, fight against all forms of discrimination (against age, disability,

gender, race, religion and sexual orientation), values that are the basis of community strategies for social inclusion and employment.

In university research, too, the importance of intersectionality makes it possible to improve diversity and equality. Promoting equal opportunities for students from minority backgrounds can certainly build a stronger sense of identity among universities that are genuinely accessible to students and young scholars who demonstrate talent, research skills as well as creative and original teaching.

Today universities are no longer places reserved for elites: their 'third' mission (together with teaching and research) puts these ancient institutions in contact with the territory, with society, with stakeholders, enhancing their importance for people and cities in a very close relationship, with the role as agents of cultural progress. The academic communities must be felt as a whole, building inclusiveness also on an international scale.

Francesca Galgano, is Full Professor of European Juridical Science. History Methods Techniques, Law Dept., Federico II University, Naples, Italy; since 2015 elected member of the "Comitato Unico di Garanzia per le Pari opportunità, la valorizzazione del benessere di chi lavora e contro le discriminazioni" (Equal opportunities committee), Federico II University, Naples, Italy; coordinator of the international agreement with Univ. Tunis El Manar; member of the Internationality Committee, Law Dept., Federico II University; in the scientific board of M.U.N.A. and in the Internal Advisory Board of Aurora Unina-European Universities Alliance.

NET 2_MUNA_PERSONA

The contributions of the MUNA network to CUCS Naples 2022

M. Abdalrazeq

Palestinian Women in Education and Science

Science is crucial for the elevation of any society and for its development. Both men and women should work side by side to achieve this progress and development. Through the last decades, women took a major role in scientific life even though in many societies and countries women's life in science was full of difficulties and limitations. In Palestine, you can find millions of little stories, none less inspiring than the other, in which many Palestinian women showed intelligence skills and the ability to learn and teach science in a stressfulenvironment [1], those women were strong enough to fight against the occupation from seventy years ago until now and also against the bad traditions to change society thoughts, thus, they were able to gain their rights in life and science. Women brought up under occupation are known to have immense strength. Some had to hold their lifeless sons or brothers in their arms, some were brought up in refugee camps and all struggled to sleep at night with explosions shaking their walls. Certainly, women have made great progress in recent years and achieved a better standard of education: female literacy rose from just 35 % in 1990 to nearly 50 % in 2000. Over the same period, however, male literacy improved, from 63.5 % to 71 %. In the academic year 2010/2011, girls accounted for around half of all students enrolled at Palestinian schools, making up 49.5 % of the primary school population and 54.2 % of secondary school students [2]. Last year's statistics show an even stronger female presence in higher education, where 57.2 % of students were young women. Among graduates, too, women form a clear majority–around 60 % in the academic year 2008/2009 [2].

Finally, as Palestinian women we believe that science is the way to improve ourselves and our whole life, we still need more communications and international collaborations to improve the quality of research and education that we need, and that's what we are looking for.

Manar Abdalrazeq, is a young researcher at the Division of Biochemistry, and Genetics, at An-Najah National University, Palestine. She was enrolled on a Ph.D. course in Biotechnology at the Department of Chemical Sciences of University Federico II, Italy. Manar does research in Biotechnology, particularly preparing and developing biodegradable material "bioplastics" made from proteins and polysaccharides, she is a junior member of Italian Society of Biochemistry and Molecular Biology (SIB). Manar was the first Palestinian researcher who got a "Green Talent" award, she has been honored with the German Federal Ministry of Education and Research (BMBF) in 2019 for her interests in green and sustainable research.

The contributions of the MUNA network to CUCS Naples 2022

S. Orselli

Linguistic education of Syrian refugees in Turkey:the role of "Amal for Education" on the border between two identities

This research is the result of an experience carried out in the city of Kilis, Turkey, by the non-profit organisation "Amal for Education" in the field of language education of Syrian school-age refugees. It was carried out as part of the degree course in Linguistic Sciences and Intercultural Communication at the University for Foreigners of Siena for the purpose of preparing a master's thesis. Turkey has been characterised during many centuries by long and varied migrations across its borders, and today is the country with the highest number of refugees and displaced persons in the world. Out of the total of 4 million registered refugees, 91% are of Syrian origin. Since the outbreak of the civil war in Syria in 2011, Turkey has adopted an 'open door' policy towards people fleeing the war, with no restrictions on the number of entries until the final closure of its borders in 2015, due to the intensification of the conflict and the growing threats to Turkish border towns. Today there are 3.7 million Syrian refugees in Turkey and the reception policies adopted by the country have been (and continue to be) crucial, although not always timely, in responding to the humanitarian emergency. At the beginning, reception policies were intended to host Syrian refugees for a short time, as the most widespread opinion was that the conflict in Syria would be resolved soon. However, the continuation of the Syrian difficult situation meant that the emergency turned to ordinariness, as regards especially Turkish authorities, and the main consequence was the readjustment of the aforementioned reception policies to include Syrians in Turkish society in all respects. The education of Syrian refugees in Turkey is one of the pivotal points within the reception policies that the Turkish government has adopted and modified during the years of the emergency. The turning point was in 2016 with the gradual closure of the Temporary Education Centres (TECs),

present both inside and outside the refugee camps, which until then had provided millions of school-age Syrians with the opportunity to receive an Arabic language education without interrupting the learning process due to war. With the gradual inclusion of Syrians into the Turkish school system, however, the Arabic component of the education has been excluded in favour of an exclusive use of Turkish, depriving Syrian children of the opportunity to continue learning in their own language. This is the context for the field work of the non-profit association "Amal for Education", which has been working in Kilis since 2013 on language education for Syrian refugees in Turkey. The educational idea behind the association's activities is based on the recovery of linguistic skills. In particular, the affective, identity and cultural link with Arabic language immediately provided children with the key to access to all forms of civil participation, as well as the security of daily stability for the children and their families. Starting from the idea of recreating an environment as close as possible to the country and the culture of origin, the aims of the association are mainly to create a bilingual community, by preserving the Arabic language, including the Turkish one into the educational background, and giving psychological support for integration of Syrian people into social life in Turkey. The fieldwork was characterised by constant adaptations to the many changes in the refugee situation. The integration plan put in place by Turkish authorities presents structural difficulties, which emerge, for instance, in school curricula. They are characterised by a strong sense of nationalism and a general underestimation of linguistic, cultural and identity diversity. The denial of linguistic and cultural identity is a source of conflict and claims. In many cases, this denial slows down or prevents the process of Syrian acceptance of integration, which is experienced as a cancellation of identity and language in favour of the dominant local community. At the same time, in case of a return to Syria, exclusive education in Turkish will prevent an entire generation from accessing professions and roles that require the management of Arabic language in all its components (speaking, understanding, reading and writing). In addition to this there is the Turkish government's failure to build a path with Syrian families that would reduce mistrust towards the Turkish community and gradually make Syrian indefinite stay in the country constructive. "Amal for Education" places language education for refugees at the heart of its philosophy, demonstrating that it is the trump card for the preservation of Syrian linguistic and cultural identity, on the one hand, and the inclusion and integration into the newTurkish identity, on the other hand.

NET-1

MARE NOSTRUM: A SUSTAINABLE EXPLOITATION OF THE MEDITERRANEAN RESOURCES DRIVEN BY INTERNATIONAL COOPERATION AMONG MUNA PARTNERS

7th CUCS Conference | Naples, 21st - 23rd April 2022
UNIVERSITY COOPERATION IN THE NEW CHALLENGES FOR SUSTAINABLE DEVELOPMENT
Capacity-building, Science Diplomacy and Open Science between Global North and Global South within the new world context

Session Title: NET-1 | MUNA | MARE NOSTRUM

Un approccio sostenibile all'utilizzo delle risorse del Mar Mediterraneo, guidato dalla cooperazione internazionale nella rete MUNA

A sustainable exploitation of the Mediterranean resources driven by international cooperation among MUNA partners

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The contributions of the MUNA network to CUCS Naples 2022

NET 1_MUNA_MARE NOSTRUM

V. Costantino

Introduction

The Mediterranean and Middle East universities Network Agreement (MUNA) session aims to present successful Blue Economy examples driven by the international Cooperation. Since the 21st century, the concept of the Blue Economy has become increasingly popular, including all fields related to marine economy: environmental problems, medicine, drug discovery, marine transportations, tourism, clean energies, infrastructures, communication, novel technologies, human resources, migration as enrichment of cultures, and cultural inclusion.

The session called "Mare Nostrum: The Blue Growth in The Mediterranean Sea" has collected innovative contributions in the field of the BlueEconomy. Illustrative case studies, either presented by top scientists either by young researchers shows the potential of this big topic and how the international cooperation enhances the number of projects and results obtained among the countries in the MUNA agreement.

Interdisciplinary and intersectoral studies are very important to highlight the main challenges of the Blue Economy: the integration of involved disciplines to maintain healthy seas and human's wellness.

Valeria Costantino, she heads the research group, The Blue Chemistry Lab, in the Department of Pharmacy at the University of Naples Federico II, Naples, Italy. The lab focuses its activity on exploring the unique biodiversity of natural products from marine sponges and cyanobacteria as lead compounds for pharmacological applications. She loves everything that is Chemistry and Nature at the same time.

NET-1

INTERVENTIONS

The contributions of the MUNA network to CUCS Naples 2022

R. Antidormi

The EU Green Deal: boosting international cooperation and capacity building in the Mediterranean basin

The European Green Deal (EGD) is the Union's sustainable growth agenda to deliver on its sustainablity commitments. It enshrines environmental ambitions and supports the transition of the EU to a fair, inclusive and prosperous society that responds to the challenges posed by climate change and environmental degradation, biodiversity loss and at the same time is improving the quality of life of current and future generations. To ensure the EU becomes the world's first climate-neutral and de-polluted continent, with a future-ready circular economy by 2050, climate change, biodiversity, health and food security need to be tackled together. The EU is delivering on the EGD's commitment through a robust implementation of concrete elements such as the Zero Pollution Action Plan (ZPAP) and the Biodiversity Strategy so conserving Europe's natural environment, including our oceans and seas. The ZPAP for air, water and soil adopted on 12 May 2021 presents a comprehensive 'roadmap' towards a toxic-free environment. The plan sets clear reduction targets including in relation of pollution to waters and oceans and facilitate remediation.

As indicated in the 2020 State of the environment report, we are now facing challenges like never before. It is high time to act. Biodiversity loss, unsustainable use of resources, climate change impacts and environmental risks are the biggest concerns for our society. Environment is most precious when it is pollution free.

EU legislation has delivered important outcomes to preserve state of the marine environment. Still, the marine environment suffers from continuing pressures from overfishing, climate change, nutrients and pollution, habitats' deterioration and invasive alien species. In order to achieve Good Environmental Status of EU marine waters as required by the Marine Strategy Framework Directive (MSFD), the pressures on the marine envi-

ronment from human activities at sea and on land need to be significantly reduced. In the list of the ZPAP's deliverables, the revision of the MSFD offers an opportunity to improve the integration of environmental issues in sectoral policies. Other linked major legislative developments are the review of the Nature Restoration law, of the Urban Waste Water Directive, of the Bathing Water Directive. They will assess whether the current rules are still fit for purpose to protect public health and improve water quality and natural biodiversity at large. In doing so, it will also help stimulating the economic growth of tourism dependent communities.

The EU will continue to promote and implement ambitious environment, climate and energy policies across the macro-regions and the world. The global challenges of climate change and environmental degradation, air and water pollution plastic and circular economy, require a robust global response. The EU puts as well emphasis on supporting its immediate neighbours. The EU's international cooperation and partnership policy continues to help channel both public and private funds to achieve the transition and the EU and its Member States remain the world's leading donors of development assistance and provide, for instance, over 40% of the world's public climate finance.

One striking example is EU, regional and global action on plastic pollution especially in the Mediterranean Sea. In its 2020 report the International Union for the Conservation of Nature finds that "the Mediterranean, widely regarded as one of the most threatened environments in the world, is subject to a now ubiquitous, man-made disaster: plastic pollution" on the basis of analysis and modelling of latest available data and efficiency of existing and possible new measures.

A key north-south cooperation framework in the Mare Nostrum is a Regional Sea Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention). The EU and all coastal states (except the Palestinian Authority) are Parties to this Convention and jointly act on all aspects of sustainable development. In this context, the Mediterranean Action Plan (MAP) is the first-ever and comprehensive Regional Seas Programme under UNEP's umbrella for the protection of marine and coastal environment. The Barcelona Convention contributes to the implementation of a number of EU policies, in particular the Marine Strategy Framework Directive. Landmark decisions taken 22nd Conference of Parties (Antalya, December 2021) are:

(1) Medium- Term Strategy 2022-27 presenting the vision for a clean and healthy Mediterranean Sea with expected outcomes with respect to the key regional and global challenges the marine environment is facing such as marine pollution, biodiversity, resource management, and climate change.

(2) The Strategy's budget funded by the contracting parties. The EC alone currently contributes a total of 11,4 % of the operating budget while the EU states collectively provide over 85 % of the

resources needed for the MAP system which is by far the largest the Union makes to any Multilateral Environmental Agreement.

(3) The designation of Mediterranean Sea's Emission Control Area for ships pollution to protect the health and the environment of Mediterranean citizens. The regional designation is to be approved in 2022 by the International Maritime Organisation.

Support to implement the area in 2025 (legal framework, enforcement capacity building, infrastructure) is planned and crucial.

The contributions of the MUNA network to CUCS Naples 2022

S. Dotto

Sustainability in policy cooperation and projects in the Mediterranean region

The EU Green Deal is meant to contribute achieving Sustainable Development goals, that are global objectives. Therefore, the EU shares the objectives and the methods of the Green Deal with its partner countries. The EU and its southern neighbors share the Mediterranean Sea, the cradle of common history, and that contains large economic and natural resources, including a rich biodiversity, potential for renewable energy and gas.

Climate change and environmental degradation from human activities are severely affecting the Mediterranean Sea and the Region. Therefore, cooperation between the two shores is indispensable to achieve common objectives. Climatic and environmental challenges come with opportunities for investments, and sustainable economic development is possible.

Cooperation takes place through policy dialogue, technical assistance and investments. As regards policy dialogue, the EU makes use of multilateral and bilateral diplomatic and policy-making channels to share its agenda and tools and involve its partners. It can count on the presence in UN fora, and on its network of diplomatic representations worldwide.

EU and partner countries cooperate through projects of capacity building, and support to investments through contract services, contribution to investment through grants, support to demonstration and pilot projects and involvement in EU research and innovation networks. Cooperation priorities follow the principle of policy first that are illustrated through Communications to the Council and the European Parliament. Among these, is the Renewed partnership with the Southern Neighbourhood - A new agenda for the Mediterranean, adopted in February 2021.

Cost of inaction on environmental and climate action is immense. Still, EU public funds would not be sufficient to address the challenges and fill the investment gap. Therefore, the EU had designed the European Fund for Sustainable Development, a financial instrument that allow leveraging large resources from the International financial institutions and the private sector. Moreover, in order to promote green finance, the EU has adopted a taxonomy regime that clarifies which investments contribute to achieving climate and environmental objectives.

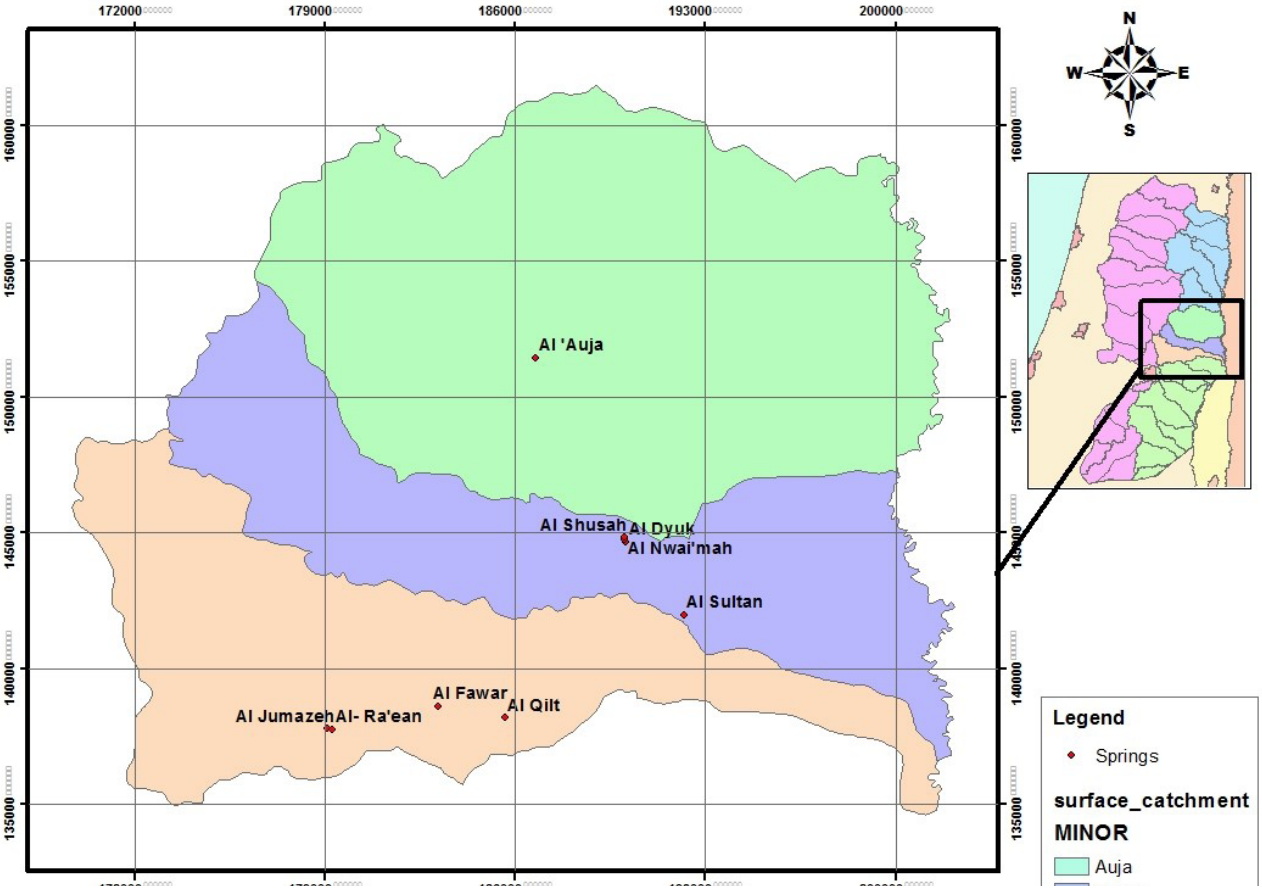


Fig. 1. The location map of the study area were the spring water was sampled

M. Ghanem

Spring water qualitative aspects in the central Jordan valley / eastern catchments -Palestine

1. Introduction

The hydrochemical parameters are the leading indicators of water quality for the springs. Springs water has been the primary drinking source in rural Palestinian communities throughout the previous decades (Ahmad and Ghanem, 2021). The quality of spring water is controlled by naturalistic activities such as geology, water-rock interaction, and water residence time in the aquifer. Springs played a significant role in localizing the majority of the Palestinian villages according to their water needs (World Bank, 2018). The southern part of the Jordan Valley (Jericho-Auja area) is considered to be an essential outlet of the underground water and comprises the springs of Auja, Nwai'mah, Dyuk, Ein Sultan and Qilt (Figure 1). These springs sometimes differ significantly in their hydrological, physical and chemical characteristics/indicators. The groundwater of the study area generally flows towards the Jordan Valley. These springs constitute around 40% of the total annual spring discharge in the West bank. There are four main spring systems in the Jericho district emerging from the eastern groundwater basin underlying the Jericho area; Al-Qilt, Ein Al-Sultan, Al Dyuk and Al-Auja Spring System. The main aquifer systems in the Jericho region are Lower Albian, Upper Cenomanian-Turonian, Tertiary and Quaternary (Figure 2). The emerging spring's formations consist of limestone to dolomitic rocks.

2. Materials and Methods

The sampling campaigns was carried out in July-2021; 9 samples were collected. The water samples were collected in one-liter polyethylene bottles and refrigerated in the laboratory at 2°C. A Sharewood 4010 flame photometer was used to determine calcium, sodium and potassium. A HP 8453 Diode Array Spectrophotometer was used to determine nitrate and sulfate concentrations. A Metrohm 716 titrator used to determine chloride and bicarbonate concentrations. The spring water samples were analyzed at the Birzeit University labs in Ramallah.

3. Results and discussions

The water spring samples were analyzed for their hydrochemical parameters of Ca2+, Mg2+, Na+, K+, Cl^-, $SO42^-$, $NO3^-$ and $HCO3^-$, as major ions, and pH, DO and EC, in order to understand the hydrochemical characteristics of the water springs as well as to understand their variability trends in the east-west directions. The physical parameters of EC and TDS values are ranging between 679 to 508 and 321 to 249 mg/L respectively (Fig. 3). Their values proofs their suitability for drinking purposes. The pH concentration values are ranging between 6.9 to 7.8 and their temperature values are ranging within 21 and 23.3 degree centigrade (Fig. 4). There is a variability in DO from 2.6 in Fawwar spring to 9.1 mg/L in Al Dyuk cluster springs (Fig. 4).

The major cations and anions concentration of the analyzed springs are illustrated in Figures 5 and 6. The average concentration of Ca 2+and Mg 2+ are 46.3 and 29.6 mg/L, respectively which reflects the carbonate nature of these springs. The average concentration of Na+ is 24 mg/L and the least values are found in the Qilt spring system. The average values of K+ is 3 mg/L and the springs values are of slight variance which reflects the same source of origin of these springs. The average values of Cl- is 65 mg/L and the values are ranging between 30 to 111 mg/L, while the average value of HCO3- is 219 and ranging between 183 – 278 mg/L. This will reflect the calcic origin of these springs. The SO42- values are ranging between 13 and 76.2 mg/L with an average of 24.5 mg/L. The low contents of NO3- reflects the no pollution processes with human activities with an average of 21.5 mg/L. All springs analyzed concentrations are lying within the WHO standards for drinking purposes (WHO, 2017).

Piper diagrams were plotted for all the water samples analyzed in terms of major ions using AquaChem 5.1 software. It is clear from the graph that most of the samples fall into the normal earth alkaline water group with prevailing bicarbonate and sulfate or chloride (Fig. 7).

The microbiological parameters of Total and Fecal coliforms were analyzed for the springs samples and show that all springs water is not polluted from human activities and they are fit for drinking purposes.

4. Conclusion

The spring's water type is found to be Ca-HCO3 in all springs reflecting its limestone origin with the exceptional of Al Nwai'mah spring system, which is found to be Mg-HCO3 reflecting its dolomitic origin. The total hardness were calculated to be 358.9, 336.6, 349 and 340 mg/L for Al Dyuk, Sultan, Al Nwai'mah and Auja spring systems. All of them are classified as very hard from Hardness scale of classifications (McGowan, 2000). Accordingly, all samples collected from different springs are considered to be of fresh water type. Calcium concentration in the most of the springs are in the range that reflects limestone aquifer origin. It is noticeable that high concentrations of Mg2+ usually accompany high concentrations of Ca2+, which may indicate dolomitization, especially for the Al Nwai'mah springs. The low Mg2+ concentrations reflect the carbonate

origin. All sampled springs are within the WHO range standards. The HCO3 concentration results in the sampled springs reflect the Ca-HCO3 water type. The nitrate results of the water samples are within the range of the WHO limits.

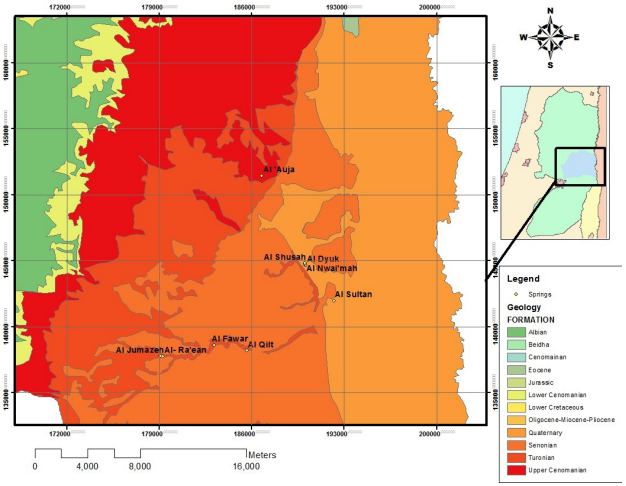


Fig. 2.
The geological map of the study area

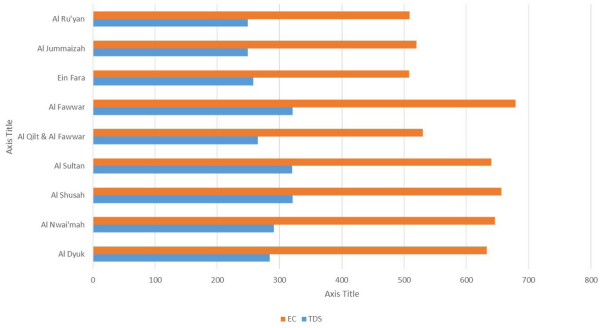


Fig. 3.
The EC in micro Siemens per cm versus TDS in mg/L

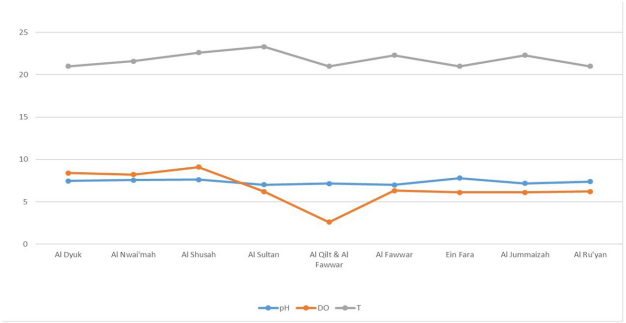


Fig. 4.
The variability of the physical parameters of pH, DO (mg/L) and T (0C)

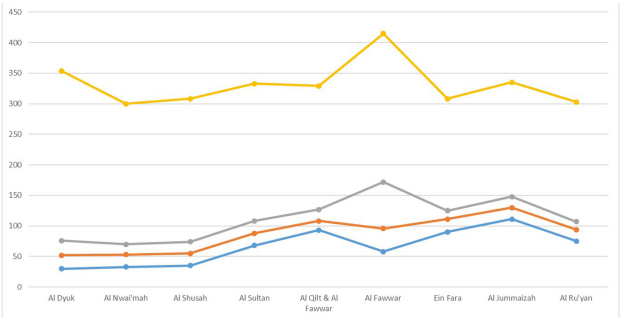


Fig. 5.
The anions concentrations of the analyzed springs in mg/L

Marwan Ghanem, is an associate Prof. at Geography Department at Birzeit University in Palestine. He has a Ph.D. in Hydrogeology and Hydrochemistry from TU Bergekademie Freiberg in Germany in 1999. He has 57-refereed publications and he participated in 60 international conferences. His experience is in academic and research activities.

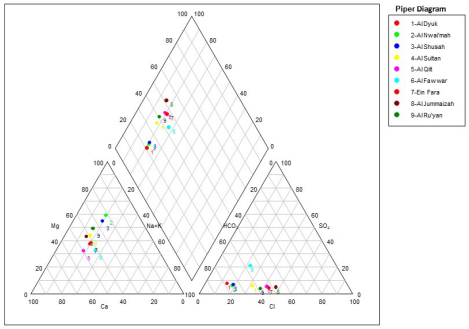


Fig. 7.
Piper diagram of the springs analized

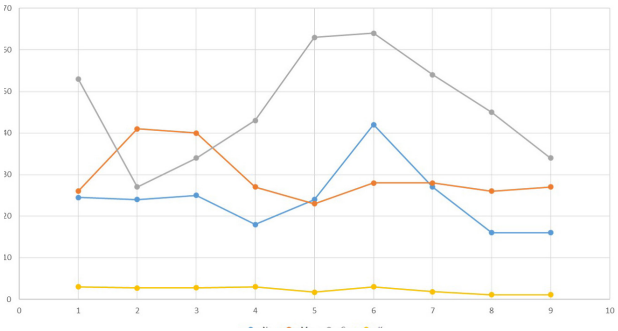
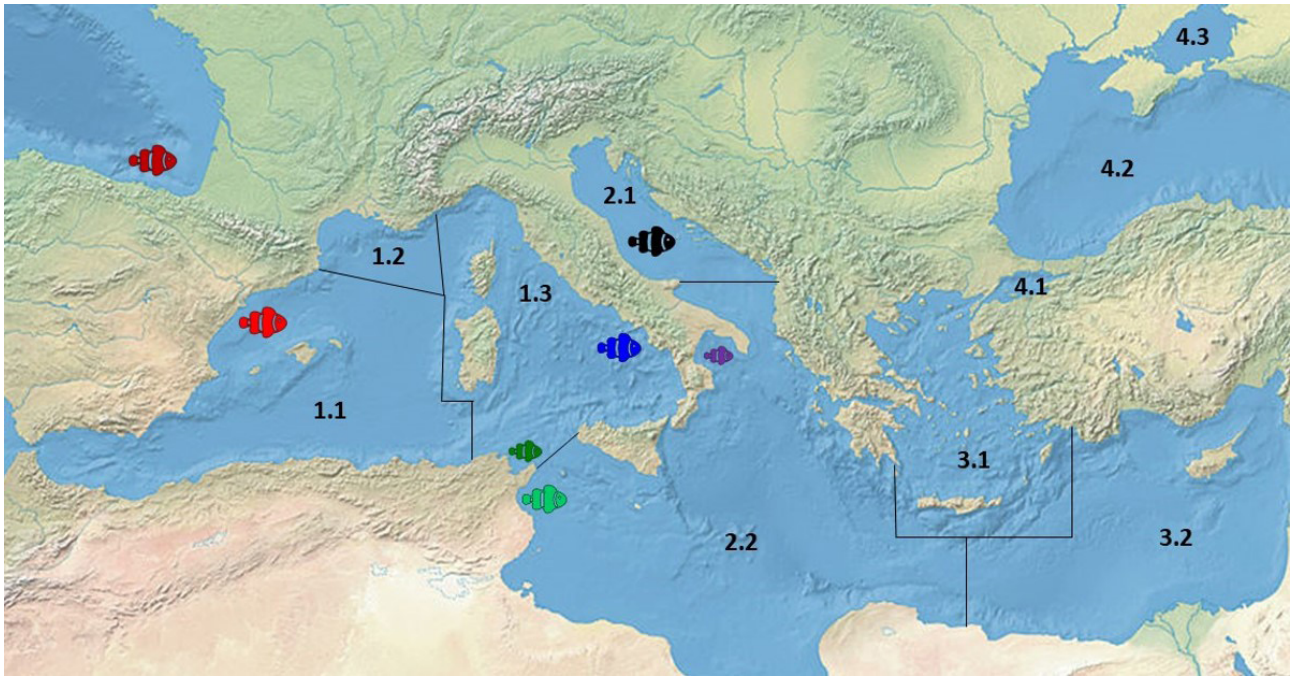


Fig. 6.
The cations concentrations of the analyzed springs in mg/L



Anchovies in SUREFISH Project, Mediterranean Sea FAO Fishing Area 37

N. Dalal, L. Ruggiero, A.G. Caporale, P. Adamo

NIR spectroscopy to combat Fish Fraud

Mediterranean Sea accounts for one third of all fish eaten in the more than 20 Mediterranean countries while the rest 2/3rd is imported. Europe imports almost 75% of its seafood with number predicted to rise in the coming years. Food fraud is defined as "food which is deliberately placed on the market for financial gain, with the intention of deceiving the consumer". Seafood frauds threaten the local fishing industry with severe economic consequences while damaging the reputation of local/national markets and decreasing consumer trust. Seafood frauds involve originmis labeling where geographical origin of illegally harvested fish is concealed and species substitution which involves replacement of low-value species for a more expensive one for economic gain. Sellingfrozen/glazed fish as fresh is also a common practice used to fetch higher price. The global seafood chain is extremely complex web of stakeholders with no actual way to tell where the seafood was exactly fished at. Further processing of fish (cleaning, removing skin, fins, and tail) to make ready-to-eat products makes species detection even harder when morphological features are not visible. An INTERPOL–Europol investigation conducted in 2015 demonstrated that fish traded internationally was the third highest risk category of foods with the potential for fraud, while in 2013 the European Commission classified fish in the second-highest category for fraud. Owing to the complex global scenario, traceability of seafood becomes even more important to protect consumer's rights and ensure safety in food systems.

The near-infrared (NIR) region of the electromagnetic spectrum is located between 700–2500 nm(12,500–4000 cm–1). NIRs is a molecular/vibrational spectroscopy technique used to study the interactions of electromagnetic waves with a sample. Molecules absorb near-infrared radiation ofdefined energy at specific wavelength which results in peaks

representing chemical bonds present in the samples. The NIR spectra is product of overtone, vibration and combination bands arising from C—H, O—H and N—H bonds present in the sample. Apart from this, it is a cost-effective, non-destructive, and rapid technique which can be translated from laboratory scale to field scale with ease. The chemical composition of fish is a function of its surroundings. It depends on its place in the foodweb, food source, water temperatures and weather conditions. The chemical composition of same species growing in two different regions can vary differently due to varied food sources and this change can be detected. Near-infrared spectroscopy (NIRs) can thus provide useful information about chemical composition of the fish and aid the creation of accurate chemometric-based traceability and freshness models. Our initial findings suggest that Principal component analysis (PCA) of the NIRspectra was able to distinguish between fresh/un-fresh, fresh/frozen fish with high accuracy. PCA followed by Linear discriminant analysis (LDA) was also able to distinguish with high accuracy between fish fished from coast of Italy, Spain, and Tunisia, all a part of Mediterranean Sea. Our early findings and literature review suggest that NIR scan be applied to construct a LDA based traceability model to prove geographical provenance of fish.

In this context, SUREFISH*PRIMA (https://surefish.eu/) project aims at deploying innovative solutions to achieve unequivocal traceability of Mediterranean fish products, preventing possible frauds. It gathers 13 partners from Italy, Spain, Tunisia, Egypt, Lebanon and 4 pilot sites fishing/growing and processing the following fish species: anchovy (Engraulis encrasicolus), sardine (Sardina pilchardus), bluefin tuna (Thunnus thynnus), tilapia (Tilapiaspp.) and red mullet (Mullus surmuletus). In the framework of WP3, we will develop and harmonize multi-element, isotope and NIR based analytical methodologies to trace the provenance of these Mediterranean fish species. Basically, we will analyze fresh or thawed fish meat and additional samples such as fish bones and otoliths, aquaculture feeds and sea or fresh waters. The findings will be gathered in a database useful for comparison with data from literature and other FAO fishing areas.

*SUREFISH PRIMA project: Fostering Mediterranean fish ensuring traceability and authenticity.https://surefish.eu/PRIMA Call 2019 Section 1-Agro-food Value Chain 2019, Topic 1.3.1.

The contributions of the MUNA network to CUCS Naples 2022

M. Hmoudah, V. Russo, M. Di Serio

Promising Applications of Metal Organic Frameworks (MOFs) in WastewaterTreatment through Adsorption and Photo degradation

Metal organic frameworks (MOFs) are porous compounds that represent the 2D and 3D levels in reticular chemistry. Metal ions and organic linking molecules are connected to create these infinite clusters that are widely studied nowadays in the literature. The captivating features of these nanostructures such as high porosity, designability, stability, and scalability will open the door wide for these compounds as futuristic commercial competitive materials. Furthermore, the interest in such materials continues to grow dramatically over the last decade due to the extraordinary features they exhibit in terms of infinite structures and facile synthesis approaches. These compounds have been investigated for numerous revolutionizing applications in wastewater treatment, gas purification, water harvesting, light harvesting and energy conversion, separation processes, drug delivery, and catalysis. Within these applications, MOFs can play a significant role in wastewater treatment due to their flexibility, unique properties and the tunability of their features. The scope of this talk is to provide a comprehensive description on the promising adsorptive and photocatalytic application of MOFs for the removal of organic emerging contaminants from wastewater. Up to now, prospect of wide-scale implementation of MOFs in wastewater treatment needs further investigation in terms of scaled up MOFs characteristics, regeneration, and environmental consideration. However, this kind of research will be of tremendous impact in Palestine due to the current stressed political situation, as these compounds can be useful to treat wastewater affordably and effectively.

The contributions of the MUNA network to CUCS Naples 2022

V. Marzano, M. Paradiso

Policies for sustainability in freight and logistics: how to improve implementation in port areas

The international and European institutional commitments push towards the ecological transition of the marine industry and port areas. Ports, interconnection nodes for the movement of goods, people, carriers are actually also geo-economic areas of multimodal localization of transport, industrial sites and services with significant tertiary activities in addition to logistics. The sustainability of ports therefore implies a vision of the entire local and external maritime cluster to promote effective governance with a territorial management model that pragmatically assesses the costs of sustainability. This paper, based on multi-stakeholder analyses at different geographical and sectoral scales, proposes reflections for policy making on the cost of sustainability and for the improvement of EU and national sustainability policies. Indeed, the effects of port and logistical decisions reverberate rapidly in the liquid marine space at the Mediterranean and European scale and lead to scientific and entrepreneurial cooperation.

The contributions of the MUNA network to CUCS Naples 2022

A. Castaldi, L. Le Moyec, M. Triba, J. Petitbois, A. Blond, G. Le Pennec, M.L. Bourguet-Kondracki

Deciphering the molecular mechanism of diatoms' adhesion

Biofouling is a phenomenon inherent to all submerged structures: hulls, aquaculture equipment, marine energy installations, which requires costly preventive and curative measures. Societal, environmental, and regulatory pressures are leading to a significant restriction in the use of compounds present in fouling formulations, due to their environmental toxicity. Then, one strategy to combat fouling relies on the surface properties of materials and/or coatings (low energy, roughness), which is to reduce the interaction forces between organisms and surfaces. Another one could be to better understand the molecular mechanism of diatoms' settlement on surfaces to guide the development of novel surfaces.

Diatoms are, with bacteria, the early and major players in surface colonization, forming a tenacious and resilient biofilm. However, so far, diatoms have not been studied extensively, and the knowledge of the process involved in their adhesion remains under-explored. Therefore, we propose a multidisciplinary research project using two modern, innovative and complementary approaches such as genetics, with transcriptomic analyses and metabolomics, with the study of molecular networks.

In a preliminary attempt, we applied proton NMR metabolomics to the diatom Phaeodactylum tricornutum, with adherent cultures upon glass and polystyrene and two planktonic cultures. The preliminary results showed different metabolomic profiles between adherent and non-adherent cultures of P. tricornutum, leading to promising perspectives in elucidation of antifouling targets. Then, we will enlarge our study to the diatoms Cylindrotheca closterium and Amphora coffaeformis sp. an adhesive and a hyper-adhesive species with polydimethylsiloxane as additional substrate.

This study in progress will determine whether diatoms (Phaeodactylum tricornutum, Amphora coffaeformis and Cylindrotheca closterium) modify their metabolic pathways in order to adapt their molecular adhesion mechanism to the substrate encountered (glass, polystyrene and polydimethylsiloxane).

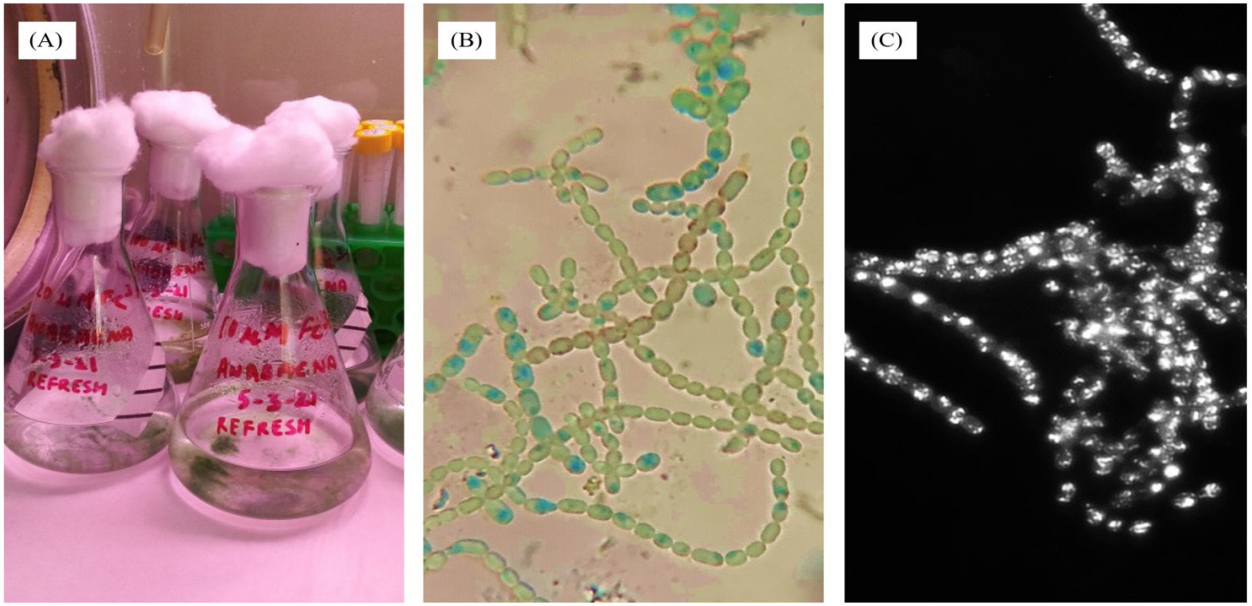


Fig. 1. (a) Cultures of Anabaena flos-aquae UTEX 1444. Microscopic observation of 0 μM Fe3+ (#1) culture with (b) optical microscope and (c) fluorescence microscope (RFP filter).

K. Kundu, R. Teta, G. Esposito, M. Stornaiuolo, V. Costantino

A multidisciplinary approach to the study of siderophores from cyanobacteria

Despite being predominantly known for their toxin-producing blooms, cyanobacteria also represent a class of not-yet fully explored sources of novel lead compounds for drug discoveries, which in turn has inspired the development of synthetic analogues with improved bioactivity and pharmacokinetics such as the dolastatins, cryptophycins, curacins, etc. Siderophores are versatile molecules secreted by cyanobacteria to maintain the organism's Iron homeostasis, in response to Iron starvation conditions and to facilitate Iron uptake in conjunction with specific transport systems. These molecules are routinely used in clinical trials to treat Iron overload diseases. Siderophore conjugated antibiotics are now tested in several research investigations to overcome bacterial resistance and improve anti-infective therapy. Few recent studies showed the atheroprotective effect of siderophores in humans providing a need to develop siderophore-rich food additives or a functional food to increase the siderophore uptake in people prone to cardiovascular diseases.

We used a multidisciplinary approach in the study of siderophores from cyanobacteria by exploring their biosynthetic capability through the cultivation of a reference strain of Anabaena flos-aquae UTEX 1444 in different Iron conditions to stimulate the production of siderophores and analyzed the extracts through the combined use of LC-HRMS and molecular networking. Among all the Anabaena flos-aquae UTEX 1444 cultures #1-6 [0 μM Fe3+ (#1), 5 μM Fe3+ (#2), 10 μM Fe3+ (#3), 20 μM Fe3+ (#4), 60 μM Fe3+ (#5), and 100 μM Fe3+ (#6)] extracted with the various solvents (methanol, chloroform and butanol) and analyzed by LC-HRMS using an LTQ Orbitrap instrument and pre-processed using the MZmine program 2.53

revealed that the most significant extract for each culture was the butanol one (the representative of each entire metabolome of Anabaena).

Further, the molecular networking analyses of MS/MS data have been successfully used to reveal that #1-6 butanol extracts contains 165 features, grouped into 10 clusters (In the network, each node is represented as a pie chart showing the amount of the compound in the source cultures containing different iron concentrations). One of the ten clusters was composed of 23 nodes, 13 of which were derived solely from the Fe (III) depleted culture however, these nodes didn't match any known compounds in GNPS' library. The first node of the series is Schizokinen, followed by lipophile synechobactin A; synechobactin C16; new synechobactin C 16:1 The HRMS/MS analysis and fragmentation pattern of synechobactin A, C16 and the new synechobactin C16:1 was reported as a useful diagnostic way to detect them in any extract. Together with five known synechobactins, six new variants have been identified, showing unusual modifications occurring on the acyl chain (unsaturation, hydroxylation) and in the hydroxamate-citrate backbone.

To our best knowledge, this is the first report unveiling the biosynthetic capability of UTEX 1444 to produce a large array of synechobactins. It is interesting to note that UTEX 1444 produced 11 variants, besides Schizokinen, showing the ability to incorporate a variety of saturated and unsaturated fatty acids, likely as a biosynthetic-final step. Considering the potential high impact of siderophore's production as ferric ion scavenger as well as toxic metal chelators, and then, the large array of applications in many different fields, from ecological research to drug discovery, our future studies will be focused on this aspect, to make UTEX 1444 a suitable model-organisms for scale-up production of siderophores.





Karishma Kundu, she is a PhD Researcher and Scholar in the Department of Pharmacy at the University of Naples Federico II, Naples, Italy. She formerly Post-Graduated on Food Chemistry from Loyola College, Chennai, India, and she is a Food Technology graduate from the University of Delhi, New-Delhi, India. She's an avid traveler who appreciates different cultures and traditions, enthusiast in Science and Arts, and loves to blend all and follow her dreams.

Roberta Teta, she is a Researcher since 2017 at the University of Naples Federico II, Naples, Italy. In 2010 she carried out post-doctoral research at the Kekulè Institute for Organic Chemistry and Biochemistry, University of Bonn, Germany. In 2014 and 2016 she has been hosted as visiting researcher at Scripps Institute of Oceanography – University of California, San Diego. Her research is focused on drug discovery, about the study of biologically active natural compounds from marine organisms and microorganisms, their biosynthesis, and their environmental impact.

Germana Esposito, she is a Post-Doc researcher in the field of Organic Chemistry since 2017 at the University of Naples Federico II, Naples, Italy. Her research activity focus on marine sponges and their symbionts microorganisms (cyanobacteria) to find new natural products that can be used as potential drugs. A major focus her work is the use of Molecular Networking as a potent dereplication strategy to reveal the presence of new metabolites in the organic extracts of marine organisms.

Mariano Stornaiuolo, he heads the research group, Molecular Biology Laboratory, in the Department of Pharmacy at the University of Naples Federico II, Naples, Italy. The lab works on the development for new and innovative biological platforms aimed at the identification of pharmacological drugs. He is mainly interested in new inhibitors of cancer cell proliferation as well as in the molecular mechanisms underpinning the activity of these drugs.

Valeria Costantino, she heads the research group, The Blue Chemistry Lab, in the Department of Pharmacy at the University of Naples Federico II, Naples, Italy. The lab focuses its activity on exploring the unique biodiversity of natural products from marine sponges and cyanobacteria as lead compounds for pharmacological applications. She loves everything that is Chemistry and Nature at the same time.

NET-TR

MUNA - WRAP UP SESSION

CHAIR: Prof. G. Sammartino, General Coordinator of the Mediterranean and Middle East University Network Agreement (MUNA)

CO-CHAIRS: S. Calabrò, R. Capozzi, V. Costantino, F. Galgano, G. Guerriero, A. Santini

The contributions of the MUNA network to CUCS Naples 2022

G. Sammartino, S. Calabrò, R. Capozzi, V. Costantino, F. Galgano,
G. Guerriero A. Santini

Introduction

The MUNA-WRAP UP SESSION NET-TR with its multidisciplinary approach has been very interesting, and offering several ideas for future research. In this session thirty abstracts have been presented as posters, half of which produced by international groups, nine by Italian groups and six as co-operation studies. A rich participation of researchers, almost 120, was observed, most of them (60%) from MUNA countries (e.g., Algeria, Jordan, Morocco, Tunisia, etc.). The Italian posters were diversified as well, belonging to different Research Institutions of Napoli (e.g., University Federico II, University Parthenope, CNR, IZS Mezzogiorno), and others Italian Universities (e.g., Bari, Messina, Molise, Roma).

When examining the proposed posters, many topics were addressed: ranging from architecture to environment and health. The keywords most used were sustainability, integration, and cooperation, all included in the 2030 Agenda goals. For architecture topics, the subjects involved sustainable city models, digital technologies for urban management, integrated administration of water resources in rural areas. Many posters proposed solution to valorize feed, food, and by-products, with particular attention to animal and human health, and soil protection. The necessity to pay attention to water management, as important resource for human, was also focused: prevent the depletion of fisheries resources, increase interest in production fish of economic and ecologic importance, improving fish, bivalve mollusk and Mytilus quality. The reduction of water pollution was in deep treated considering a safe development of new materials, an eco-friendly approach for biomonitoring, the estrogenic contamination of aquatic environment and the need to limit the lake and ocean pollution. Many investigations proposed the necessity to study bioactive molecules to reduce the resistance to broad-spectrum antibiotics. Human medicine studies regarded the diagnostic potential of cancer stem cell and the health determinants of schistosomiasis persistence.

Many authors look forward co-operation among MUNA countries for many aims to develop in Mediterranean areas: to study medicinal plants to discover novel and effective bioactive molecules for multiple applications, to identify integrated approaches to soil quality assessment, to use eco-cyto-toxicological studies for reducing pharmaceuticals and to intervene in the Neglected Tropical Diseases (NTDs). An important form of co-operation in times of emergency and beyond, will be an innovative training of sustainable development and improving lifelong learning opportunities, use interdisciplinary teaching to improve high school students' involvement through digital resources for science education, laboratory experiences, comparison and sharing expertise to increase their participation and bring the communication to a much higher level.

Gilberto Sammartino, Full Professor of Oral Surgery and Implantology, head of the Unit of Oral and Reconstructive Surgery University of Naples "Federico II", dean of the Degree Programme in Dentistry of the University of Naples "Federico II", Chief of the School of Oral Surgery, University of Naples "Federico II", Past National Coordinator of all Italian Schools of Oral Surgery, delegate for the International activities of the University of Naples "Federico II", past President of the Italian Society of Oral Surgery (S.I.d.C.O.), past President of the S.E.N.A.M.E implantology Association, chairman of S.E.N.A.M.E Implantology Association, I.C.O.I International Board Member, President of the I.C.O.I Italy Association, past President of ANTHEC - Academy of Non Transfusional Hemo-components, past President of intHEMA – International Non Transfusional Hemocomponents Academy, past Co-Chairman of the I.C.O.I Europe Association, author of more than 300 articles published on national and international journals, lecturer in national and international courses and conferences, co-Editor of Poseido Journal, guest editor of Case Report in Dentistry, lead Guest Editor of Special issues of Journal of Biomedical Research 2015, guest Editor of Special Issue of Journal of Biomedical Research 2016, associate editor of International Journal of Dentistry, member of the Editorial Board of different International Journal, referee of many International Scientific Journals

Serena Calabrò, research on in vitro feed evaluation within national and international project. PhD and ungraduated students' supervisor. Erasmus exchange promoter. Coordinator of bachelor's degree in Animal Production. Guest editor of Animals Special Issue 'A Sustainable Approach to Non-Conventional Feeding Resources and Rearing Strategies'. Co-editor of Un mondo di Bufale online magazine.

Renato Capozzi, (Naples, 1971) architect, specialised in Urban Design and PhD in Architectural Composition at IUAV of Venice. He is associate professor (qualified as full professor) in Architectural and Urban Composition at the Department of Architecture of the University of Naples "Federico II", where he is delegated to the planning and management of exhibition activities and is a member of the board of teachers of the Doctorate in Architecture and Construction at "La Sapienza" University of Rome. His main areas of research concerns: the theoretical dimension of architectural project; the contemporary suburbs between the open city and new centralities; architecture and archaeology. He is the author of numerous (over 400) scientific publications: monographs, articles in journals, essays in books and contributions in proceedings.




Valeria Costantino, she heads the research group, The Blue Chemistry Lab, in the Department of Pharmacy at the University of Naples Federico II, Naples, Italy. The lab focuses its activity on exploring the unique biodiversity of natural products from marine sponges and cyanobacteria as lead compounds for pharmacological applications. She loves everything that is Chemistry and Nature at the same time.

Francesca Galgano, is Full Professor of European Juridical Science. History Methods Techniques, Law Dept., Federico II University, Naples, Italy; since 2015 elected member of the "Comitato Unico di Garanzia per le Pari opportunità, la valorizzazione del benessere di chi lavora e contro le discriminazioni" (Equal opportunities committee), Federico II University, Naples, Italy; coordinator of the international agreement with Univ. Tunis El Manar; member of the Internationality Committee, Law Dept., Federico II University; in the scientific board of M.U.N.A. and in the Internal Advisory Board of Aurora Unina-European Universities Alliance.

Giulia Guerriero, Ph.D. is Associate Professor (qualified as Full Professor) in Comparative Anatomy and Cytology, Advisory Board Member for the Interdepartmental Center for Environmental Research and the Inter-university "Center for Studies on Bioinspired Agro-Environmental Technology" at the University of Naples "Federico II", Italy. Her research efforts have focused on the development and validation of oxidative stress biomarkers for non-invasive biomonitoring, bioconservation and bioremediation assessment; on the determination and monitoring of physiological fertility defenses; on the biological pollution and biodiversity control (ORCID: 0000-0002-5018-072X). Principal Investigator in national and international projects, she has established a consolidated network of relationships in important research institutes in Europe, Africa, Asia and in the USA. She has organized and participated in international conferences. She is currently serving as Editor in several journals. Further, she is a research proposals reviewer for the UK National Commission for UNESCO. Since 2021 she is Coordinator of the Mediterranean and Middle East Universities Network Agreement (MUNA) Board of Coordinators.

Antonello Santini, has a degree in Industrial Chemistry, and holds a PhD in Chemical Sciences, both by the University of Napoli Federico II. Currently he is Professor of Food Chemistry and Analysis of Food and Nutraceuticals (Department of Pharmacy) and Professor of Food Chemistry (Department of Agriculture) at the University of Napoli Federico II. His research activity at the Department of Pharmacy of the University of Napoli Federico II is, among the others, focused on nutraceutical, assessment and development, recovery and sustainable reuse of bioactives from by products, recovery, secondary metabolites, sustainability, contaminants, safety, nanocompounds, analysis of food. He is responsible of the Virtual Laboratory of Food Research and Education (LVA, www.lva.unina.it) and of the NLL platform (NetLearningLaboratory, www.nll.unina.it), now both under restoring. His teaching activities included also: Chemistry Laboratory NLL (FAD e-learning), Didactics of Chemistry, Science teaching resources on the Internet, and courses developed for the Federica online FAD platform (University of Napoli Federico II). He is responsible of many General Cultural Agreements and Erasmus Agreements wth many Countries within the cooperation and internationalization framework.

NET-TR

POSTER

7th CUCS Conference | Naples, 21st - 23rd April 2022
UNIVERSITY COOPERATION IN THE NEW CHALLENGES FOR SUSTAINABLE DEVELOPMENT
Capacity-building, Science Diplomacy and Open Science between Global North and Global South within the new world context

Session Title: NET-3 | MUNA | ORBIS
Agenda 2030 and a Sustainable Future

On borders. An operational proposal for a sustainable city

Ermelinda Di Chiara
She graduated in architecture with honours and recommendation for publication in the course Arc5UE at the University of Naples Federico II with professors Federica Visconti, Renato Capozzi and co-supervisor Uwe Schröder. She is currently PhD candidate at DRACo_Doctorate in Architecture and Construction (curriculum Urban Morphology) of the Sapienza University of Rome.

Nicola Campanile
He graduated in architecture with honours and recommendation for publication in the course Arc5UE at the University of Naples Federico II with professor Renato Capozzi. He is currently PhD candidate at DICAR_Department of Science of Civil Engineering and Architecture of the Polytechnic of Bari.

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The demands of the 2030 Agenda's targets have as their primary goal the resolution of the trade-off between the efficiency of city life and the healthiness offered by rural conditions. Although the problematic relationship between city and nature has emerged with particular topicality as a result of the health emergency, it has its roots in the distant past. An example of this is the provocative thesis of the "culture of congestion" proposed by Rem Koolhaas in 1978 in reference to the urban experience lived by man in most of the world's metropolises. Even the American sociologist Richard Sennett has recently argued for the need to embrace new forms of urban life that produce openness. He stated that new "physical forms of density" can be achieved through the re-drawing the "borders" of the city. In the field of urban studies the term "border" refers to that *finitezza* of relations between urban parts that Giuseppe Samonà mentions when he states that cities must have a limit and the need for urban studies to return to deal with these boundaries. The theoretical field to which the contribution intends to refer is therefore the "city in parts", a city that has acquired new dimensions compared to the past and that, for this reason, can no longer be traced to a single *forma urbis* but rather to different recognisable parts that have been added to over time.

The theoretical premises are translated into operational terms by re-drawing of "borders" of the different parts that make up the city, applying the natural element as a means of distinguishing and enhancing the different morphologies that define the city. Palermo can be considered a clear *exemplum* of the construction of the city by parts: its urban form appears to be the result, over the centuries, of a continuous juxtaposition of parts of the city. In the morphological evolution of Palermo, we can recognise a succession of city types identified through a number of "urban borders" with a thickness that straddle two historically and morphologically distinct built parts. This peculiarity also emerges from the analysis of urban spatiality, used in terms of historical evolution, thanks to the tool of the *Rotblauplan* (red-blue plan) which proposes, on the large scale investigated here, a reading of the city as built ("interior spaces" represented in red) which contrasts with the natural exterior ("exterior spaces" represented in blue). The "exterior spaces", which can be assimilated to that condition of natural openness referred to in the targets of the 2030 Agenda, are absent in cities such as Palermo, which have been structured over the centuries through the formation of dense and compact fabrics that are still clearly distinguishable today. The recognisability of the different urban systems is due to the faint trace that can be identified at the borders of the city: each border identifies a certain region of space, and this in turn accommodates a certain type of fabric. The border, through its perimeter, identifies not only the city it surrounds, but also the one it excludes. In ancient *Panormos*, the Kemonia and Papireto streams marked the natural boundaries of the peninsula on which the ancient city was built. In the Middle Ages, these boundaries still defined the separation between the founding settlement and the first expansion beyond the river boundaries, on the two opposite bends. The course of the two ancient rivers is still imprinted in the shape of the city that has been shaped on those sites since the canalisation of the rivers at the end of the 1500s.

Our proposal, who represents a verification of theoretical positions, aims to re-establish the sense of the parts in the city of Palermo as it emerged from the morphological-spatial reading. Through the rewriting of the city's borders, the sinuous thorn of building that imposes itself on the traces of the ancient streams is replaced by a void of nature, a pause between the meshes of the built-up area to signify the different moments, and the different ways, of construction of the parts of the city that overlook it. The goals of Agenda 2030 thus become a pretext for understanding how the definition of green and accessible spaces can be both a structural and transformative condition for making the "city by parts" intelligible and for adopting a model of inclusiveness and sustainability in line with the challenges that the world poses to all those who study the city and its phenomena.

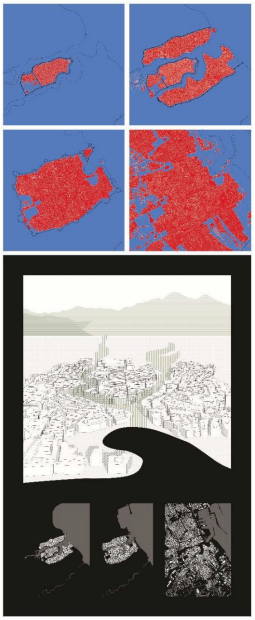

Image captions
Fig. 1. *From left to right.* Red-blue plan that shows the historical evolution of the city of Palermo in the 700 B.C., 1040, 1700, 2022.
Fig. 2. Palermo and its borders: a model of sustainable city. Perspective (*on top*) and morphological diagrams (*down*).

E. Di Chiara, N. Campanile, O. Lubrano

On borders. An operational proposal for a sustainable city

The paper intends to serve as a theoretical-operational proposal in the field of urban morphology and the study of city phenomena, starting from the demands of goal 11 of the 2030 Agenda for Sustainable Development. In particular, the 10 targets set by the 2030 Agenda are instrumental in resolving the trade-off between the efficiency of city life and the healthiness offered by rural conditions.

Although the problematic relationship between city and nature has emerged with particular topicality as a result of the health emergency, it has its roots in the distant past. An example of this is the provocative thesis of the "culture of congestion" proposed by Rem Koolhaas in 1978 in reference to the urban experience lived by man in most of the world's metropolises, a precursor to the crisis that the proximity condition linked to metropolitan life reached with the outbreak of the epidemiological situation. The problems of the city that have emerged from the state of emergency of the last two years should be read with reference to the ever-present, and never resolved, relationship between the forms of the built and the forms of the natural open space.

In response to these and other solicitations (for example, the UN's World Urbanization Prospects report in the 2014), a part of contemporary architectural and urban culture seems to be challenging the trend towards urbanisation. In Italy, Stefano Boeri and Massimiliano Fuksas, in the light of the Covid-19 pandemic, propose a scenario centred on the "flight from the big metropolises" in favour of resettlement in small historic and rural villages, whose actual advantages, however, should not be discussed so much as their feasibility in economic, social, environmental and above all urban-architectural terms. Indeed, it is clear that this strategy sidesteps the main critical issues that are well highlighted in the 2030 Agenda: for example, reducing the negative environmental impact of cities, particularly in terms of air quality and the provision of large, inclusive and accessible green spaces, so that they become, as Sennett affirmed, "healthy and habitable".

Even a staunch defender of the "closed system" of the city, and thus of densification, such as the American sociologist Richard Sennett, as a result of the discomfort caused by the conflict between the occluded spaces of cities and the new needs for distance, has recently argued for the need to embrace new forms of urban life that produce openness. In the essay Città aperte, Sennett's proposal can be operationally interpreted as the possibility of inverting the paradigm of city construction, moving from a "closed system" to an "open system" in which it is possible to

reconcile the city in terms of healthiness and habitability through the grafting of pieces of nature: this relationship between the built and the natural element imposes a re-thinking of the "architecture of density", at the basis of the logic of compact cities.

New "physical forms of density", capable of stimulating economic activity, coping with climate change and allowing individuals to socialise, can be achieved by re-drawing the "borders" of the city. In this sense, it recalls the distinction offered by the biologist Stephen Jay Gould who in natural ecologies distinguishes two types of boundaries: limits and borders. The "limit" indicates where things end; the "borders" significantly represents those spaces where different components interact. If sociologists understand the "borders" as the place where relations between individuals manifest themselves, by translation in the field of urban studies the term refers to that finitezza of relations between urban parts that Giuseppe Samonà mentions when he states that cities must have a limit and the need for urban studies to return to deal with these boundaries. The theoretical field to which the contribution intends to refer is therefore the "city by parts", where by this locution is meant, recalling the long tradition of Italian urban studies and in particular those advanced by Carlo Aymonino, a city that has acquired new dimensions compared to the past and that, for this reason, can no longer be traced to a single forma urbis but rather to different recognisable parts that have been added to over time.

On the basis of these theoretical premises, the contribution focuses on the transformation of the city through the re-drawing of "borders" of its various parts, applying the natural element as a means of distinguishing and enhancing the different morphologies that make up, according to Claude Lévi-Strauss' well-known definition, "the human thing par excellence". The case study concerns the city of Palermo. Panormus, a city consolidated in the late Middle Ages and then transformed in the following epochs, is today an exemplum not only of an urban heritage of high historical and cultural value, but also of an Italian metropolis, which has been structured over the centuries mostly through the formation of dense and compact fabrics that are still clearly distinguishable. The goals of Agenda 2030 thus become a pretext for understanding how the definition of green and accessible spaces can be both a structural and transformative condition for making the "city by parts" intelligible and for adopting a model of inclusiveness and sustainability in line with the challenges that the world poses to all those who study the city and its phenomena.

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Agenda 2030 and a Sustainable Future

Sustainable urban regeneration using the application of City Information Modelling in the Al Baqa'a refugee camp, Jordan

Project Team (Jordan, UK & Italy)
https://citymodelforbaqaa.wordpress.com/

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Arch. Victoria Andrea Cotella, Doctoral Researcher, University of Naples, victoriaandrea.cotella@unina.it

Fig 1. Overall floor plan from the complexity of the Baqa'a Camp. In red the area of work.
Fig 2. Floor plan of the working area, indicating with colours the different survey techniques to be developed.
Fig 3. and 4. Images of the interior streets of the camp.

Public infrastructure (mosque, health center, cemetery, 2 schools)
Asphalt street. TLS + GPR
Concrete. Not in the survey
Concrete. Manual survey

About this project

City Information Modelling (CIM) is a new approach which merges existing digital technologies for urban management and building management, i.e., digital technologies known as **Geographic Information Systems** (GIS) and digital technologies known as **Building Information Modelling** (BIM). Thus, CIM becomes an enabler to achieve horizontal (with the network), vertical (with the manufacturing) and end-to-end (engineering the product lifecycle) integration of systems and relates to Industry 4.0 revolution. Currently, either planners manage cities with GIS, or construction industry uses BIM for managing buildings, but very little systemic connection exists between GIS and BIM databases. This creates lack of opportunity for sustainable and for systemic innovation. In fact, a CIM open web platform would allow residents to report issues by residential unit and directly feed into the CIM database.

The main aim of this project is to apply City Information Modelling (CIM) to achieve sustainable management of integrated issues in urban management. i.e. a new approach which merges existing technologies to make the most out of digital technologies for urban management. CIM_SUR will allow creating a prototype to monitor the existing built environment and residents' conditions and support the development of alternative sustainable scenarios. This will feed into the goals of **Agenda 2030**, by supporting achievement of UN targets on **water resource management, clean energy, and healthcare accessibility and innovation**. In addition, CIM_SUR feeds into the **ODA** (Official Development Assistance) programme goals in terms of assistance in upgrading efficiency of energy systems, reducing pollution and water supply. CIM_SUR is based on building a prototype platform and developing a demonstrator based on an area in Amman, Jordan.

Al Baqa,a Refugee Camp, Jordan

The city of Amman, the Jordanian capital has over 4 million inhabitants and hosts around 400,000 refugees. This is creating an important challenge and putting a strain on the municipal services. The municipality is planning to introduce smart solutions to improve the quality and sustainability of its services. Investments will work to ease the high burden of traffic congestion in the city and to apply the latest advances in information technology for Amman's residents.

The project targets a high population area –**Al Baqa' area**, which is officially a Palestinian refugee's camp since 1948, now consolidated into an informal city and challenged by rapid population increase. Al Baqa' area is suffering from shortage of resources, services and demanding on socio-economic impact on the neighbourhood. The camp has an a high density of population while in Jordan the density of population is 64 persons in one kilometer square, the density of Al Baqa' area is around 200.000 persons in one and half kilometer square, that influences on environment in terms of pollution, shortage of services, sewage efficiency and waste management.

Applying Digital Technologies in Al Baqa'a

In this regards, the project concept leads ODA by monitoring infrastructure in Al Baqa' and establishing a model through remote technology –CIM -for observing and documentation **insufficient water and energy services, waste management,** and construction requirements which are on the list of ODA programme for Jordan.

The scale of the challenge we are tackling through our project is potentially worldwide, since we are aiming at producing a prototype demonstrating the potential of CIM to develop and implement more sustainable urban management and strategies, by enabling community engagement and integrated systemic transformations.

This demonstrator will enable cross-analysis of interrelated issues on heavy metal pollution and CO2 levels in the air, water and soil (impacting on agriculture and food production). This will be made by creating an **open web data platform**, thus allowing gathering data simultaneously on multiple variables and from end-users through active community engagement.

Finally, the prototype itself will target 220,000 residents of the Al-Balqa neighbourhood, hence it will directly contribute to improve the conditions of this community, which is deprived and living in a highly polluted environment. In so doing, it will contribute to a different approach to **tackle urban management in informal cities**.

R. Aburamadam, C. Trillo, C. Ncube Makore, A.Moustaka, C. Udeaja,
G. Kwasi, A.J. Nashwan, N. Jawarneh, V.A. Cotella

Sustainable urban regeneration using the application of City Information Modelling in the Al Baqa'a refugee camp, Jordan

City Information Modelling (CIM) is a new approach which merges existing digital technologies for urban management and building management, i.e., digital technologies known as Geographic Information Systems (GIS) and digital technologies known as Building Information Modelling (BIM). Thus, CIM becomes an enabler to achieve horizontal (with the network), vertical (with the manufacturing) and end-to-end (engineering the product lifecycle) integration of systems and relates to Industry 4.0 revolution. Currently, either planners manage cities with GIS, or construction industry uses BIM for managing buildings, but very little systemic connection exists between GIS and BIM databases. This creates lack of opportunity for sustainable and for systemic innovation. In fact, a CIM open web platform would allow residents to report issues by residential unit and directly feed into the CIM database.

The main aim of this project is to apply City Information Modelling (CIM) to achieve sustainable management of integrated issues in urban management. i.e. a new approach which merges existing technologies to make the most out of digital technologies for urban management. CIM_SUR will allow creating a prototype to monitor existing built environment, residents' conditions and supporting development of alternative sustainable scenarios. This will feed into the goals of Agenda 2030, by supporting achievement of UN targets on water resource management, clean energy, and healthcare accessibility and innovation. In addition, CIM_SUR feeds into the ODA (Official Development Assistance) programme goals in terms of assistance in upgrading efficiency of energy systems, reducing pollution and water supply. CIM_SUR is based on building a prototype platform and developing a demonstrator based on an area in Amman, Jordan.

The city of Amman, the Jordanian capital has over 4 million inhabitants and hosts around 400,000 refugees. This is creating an important challenge and putting a strain on the municipal services. The municipality is planning to introduce smart solutions to improve the quality and sustainability of its services. Investments will work to ease the high burden of traffic congestion in the city and to apply the latest advances in information technology for Amman's residents.

The project targets a high population area –Al Baqa' area, which is officially a Palestinian refugee's camp since 1948, now consolidated into an informal city and challenged by rapid population increase. Al Baqa' area is suffering from shortage of resources, services and demanding on socio-economic impact on the neighbourhood. The camp has an a high density of population while in Jordan the density of population is 64 persons in one kilometer square, the density of Al Baqa' area

is around 200.000 persons in one and half kilometer square, that influences on environment in terms of pollution, shortage of services, sewage efficiency and waste management.

In this regards, the project concept leads ODA by monitoring infrastructure in Al Baqa' and establishing a model through remote technology –CIM -for observing and documentation insufficient water and energy services, waste management, and construction requirements which are on the list of ODA programme for Jordan.

The scale of the challenge we are tackling through our project is potentially worldwide, since we are aiming at producing a prototype demonstrating the potential of CIM to develop and implement more sustainable urban management and strategies, by enabling community engagement and integrated systemic transformations.

This demonstrator will enable cross-analysis of interrelated issues on heavy metal pollution and CO2 levels in the air, water and soil (impacting on agriculture and food production). This will be made by creating an open web data platform, thus allowing gathering data simultaneously on multiple variables and from end-users through active community engagement.

Finally, the prototype itself will target 220,000 residents of the Al-Balqa neighbourhood, hence it will directly contribute to improve the conditions of this community, which is deprived and living in a highly polluted environment. In so doing, it will contribute to a different approach to tackle urban management in informal cities.

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MUNA Mediterranean and Middle East University Network Agreement

Session Title: NET-3 | MUNA | ORBIS
Agenda 2030 and a Sustainable Future

VEGAN FOOD PIGMENTS: NOT A SAFE SOLUTION

Chiara Fogliano
Third-year Ph.D. student in Biology. Interest in the effects of emerging environmental pollutants and developmental toxicity.

Claudio Agnisola
Professor in Physiology of marine organisms. Interest in physiological responses to environmental stress

Carmen Arena
Professor of Ecology. Interest in the impact of contaminants on the environment and photosynthetic organisms

Bice Avallone
Professor of Cytology and Histology. Interest in pathological effects due to toxic substances, pollutants, or genetic mutations

Chiara M Motta
Professor of Cytology and Developmental Biology. Interest in the effects of emerging pollutants in aquatic environments

INTRO. Food market globalization has led to the massive use of food additives since products need to be safe and longer-lasting on shelves. They also need to be aesthetically attractive, the main reason for food dyes development. Initially, artificial dyes responded well to the production demand, but later it became clear that they have several side effects. Red E124, for example, was shown to cause hyperactivity in children (1), while yellow tartrazine E102 can be carcinogenic (2). Evidence of toxicity in animals and plants rapidly supported those in humans (3).

Health concerns prompted the substitution with new synthetic products and, for red, with an insect dye, cochineal red E120. The real step forward is the recent commercialization of vegan pigments extracted from fruits and vegetables. These products: i. are appreciated by vegetarians and vegans; ii. are sustainable, as they are often obtained from waste materials; and, last but not least, iii. add antioxidant properties to the food.

The spread of these products suggests that, in the future, vegan dyes and their metabolites will substitute artificial dyes as wastewater contaminants. However, very little attention has been devoted to determining their effects on natural flora and fauna.

AIMS. The present work investigates the effects of 3 vegan dyes with the nauplii of *Artemia salina*, a zooplanktonic crustacean, and the seedlings of *Cucumis sativus*, a horticultural species potentially exposed to watering with contaminated water. The dyes tested were blue, red, and yellow vegan preparations sold in markets for domestic use, and their effects were compared with those of the corresponding synthetic dyes: patent blue E131, yellow tartrazine E102, and Ponceau red E124. Acute treatments (5 days) were carried out under static conditions, at 1.2 g/L, a concentration 2-fold higher than the maximal registered so far in a river (4).

MATERIAL AND METHODS. Dyes were dissolved in mineral water that was used as such to water seeds and added with marine salt (3.6%) for *Artemia*. The effects were evaluated by the conventional endpoints used in toxicity testing with these two models (5, 6). In particular, for *Cucumis*, germination rate and root and shoot length at 5 days post-germination and for *Artemia*, hatching and mortality rate and growth at 5 days post-hatching. Developmental stages in *A. salina* were also checked at 3 and 5 days post-hatching. Data were analyzed with ANOVA followed by Bonferroni's test; probability was $p<0.05$ (*), $p<0.01$ (**), and $p<0.001$ (***).

RESULTS. In *Cucumis sativus*, the germination rate is significantly reduced by E124 and vegan red and blue (fig. A). Roots (fig. B) are longer after exposure to E102 and shorter after exposure to E131 and the 3 vegan dyes, while shoots are longer after exposure to E102 and shorter after exposure to vegan red and blue.

In *Artemia salina*, the hatching rate at 48 hours (fig. D) increases after exposure to E124 and vegan blue and yellow while mortality (fig. E) remains unchanged (though tending to be lower after exposure to vegan dyes). Vegan dyes also induce significant anticipations in growth, with an increased % of nauplii in late stages (+) at both 3 (fig. F) and 5 (fig. G) days post-hatching. At 5 days, growth is anticipated also by E102 and retarded (-) by E131. E124 has apparently no effects on naupliar growth.

CONCLUSIONS. Data demonstrate that both models are affected by vegan dyes exposure and that these effects may be even more severe than those exerted by synthetic ones. Vegan dyes, therefore, do not appear to be a safe substitution, and attention should be dedicated to this emerging environmental problem. The lesson derived is that the real sustainability of any intervention must be verified on a large scale and at multiple levels.

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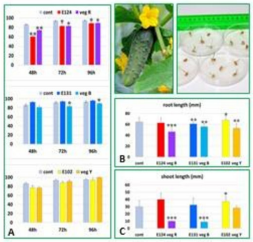
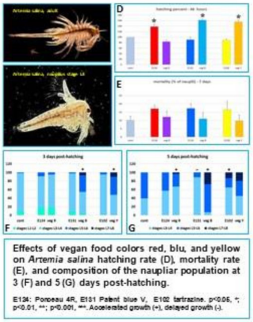


Effects of vegan food colors red, blu, and yellow on *Cucumis sativus* germination rate (A), root length (B) and shoot length (C) at 5 days post-germination.

E124: Ponceau 4R, E131 Patent blue V, E102 tartrazine. $p<0.05$, *; $p<0.01$, **; $p<0.001$, ***.



Effects of vegan food colors red, blu, and yellow on *Artemia salina* hatching rate (D), mortality rate (E), and composition of the naupliar population at 3 (F) and 5 (G) days post-hatching.

E124: Ponceau 4R, E131 Patent blue V, E102 tartrazine. $p<0.05$, *; $p<0.01$, **; $p<0.001$, ***. Accelerated growth (+), delayed growth (-).

C. Fogliano, C. Agnisola, C. Arena, B. Avallone, C.M Motta

Vegan food pigments: not a safe solution

INTRO. Food market globalization has led to the massive use of food additives since products need to be safe and longer-lasting on shelves. They also need to be aesthetically attractive, the main reason for food dyes development. Initially, artificial dyes responded well to the production demand, but later it became clear that they have several side effects. Red E124, for example, was shown to cause hyperactivity in children (1), while yellow tartrazine E102 can be carcinogenic (2). Evidence of toxicity in animals and plants rapidly supported those in humans (3).

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Trout as biosentinel species in ORBIS cooperation for the monitoring of organochlorine contamination

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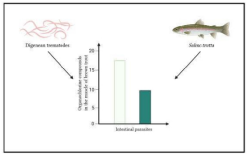
Degree in Pharmacy, University of Naples Federico II, 2020. PhD student in Veterinary Sciences, University of Naples "Federico II", since 2020. Scientific interest in veterinary pharmacology and toxicology with a focus on cellular and molecular mechanisms of toxicity induced by emerging environmental pollutants.

Maria Carmela Ferrante
Veterinary Medicine degree, 1993. Associate Professor of Veterinary Toxicology, University of Naples since 2018. Teaching responsabilities in graduate-postgraduate courses in the Veterinary Medicine and Pharmacy Schools. Authored of papers in the field of environmental toxicology, cellular and molecular mechanisms of toxicity of chemical pollutants, food toxicology and risk assessment.

The strong worldwide increase of production and use of electrical and electronic equipment in the recent decades has determined a rapid increase of e-waste in low-income countries such as the African ones, where second-hand electronic goods are largely used. However, e-waste handling and disposal exposes people to highly toxic mixtures of persistent contaminants, among which polychlorinated biphenyls (PCBs) and dioxins (1). Moreover, in some African countries organochlorine compounds used as pesticides (mainly DDT and other products belonging to the same class) are still employed for agricultural purposes and for the control of malaria (2), exacerbating environmental concerns. PCBs and organochlorine pesticides (OCPs) are persistent lipophilic organochlorine compounds (OCs) characterized by high fat solubility and resistance to chemical and biological degradation that make them prone to accumulate in biota and to magnify in the food chain. Being released from a variety of sources, large proportions of OCs reside in aquatic ecosystems that constitute a reservoir of such contaminants making them available to enter aquatic food chains. OCs are still detected in abiotic and mainly biotic matrices of the ecosystems as well as in human samples, although they have been banned by the Stockholm Convention on Persistent Organic Pollutants in 2001. Long term exposure to OCs induces toxic effects among which damages to the nervous, endocrine, reproductive and immune systems (3). They might induce a modulatory effect on the immune system modifying the organisms' response to microbial and parasites contaminants. Based on the tight correlation between environmental stressors and the incidence of specific diseases, the evaluation of bioaccumulation of pollutants such as OCs in sentinel species is an important tool for the assessment of human health risks. This issue is even more relevant in African area where contamination levels are relatively high, and humans are frequently co-exposed to other contaminants of microbial or parasitological nature. The brown trout (*Salmo trutta* and *Oncorhynchus mykiss* species) is a predatory species common in freshwaters and coastal marine fish faunas, endemic in Africa as well as in Europe, at the top of aquatic trophic food web in lake ecosystem. Trout may be considered a sentinel species, commonly exposed to OCs and intestinal helminths among which trematodes (4). Moreover, trout is intensely farmed and often caught for human consumption. It follows that trout chemical and parasite contamination could be cause of concern for human health.

Very recently, we measured the concentration levels of several PCBs and OCPs in the muscle of wild brown trouts from a protected area of Southern Italy. We also counted the number of intestinal parasites in the same specimens. Our results showed the presence of both a background PCBs and OCPs levels and digenean trematodes infection in fish. A statistically significant negative relationship between parasites number and OCs concentrations was also observed suggesting that OCs can affect parasite survival. At the same, with another analysis we also provided evidence on a positive correlation between intestinal strongyles infection and OCs concentration measured in donkey milk, thus supporting the hypothesis of an immunosuppressive role of OCs (5). It can be inferred the existence of a correlation between OCs and parasites whose direction mainly depends on parasites taxon. Overall, our investigations indicate the relevance of using the trout as biomonitor species for OCs contamination in aquatic ecosystems as well as intestinal parasites infection degree. The biomonitoring of PCBs and other OCs in areas where e-waste sites are located is recommended to validate the growing evidence of the negative environmental impact and potential human health concerns arising from uncontrolled informal e-waste recycling and disposal. In addition to organize infrastructure and procedures to safely recycle and dispose of e-waste in African countries there is a need for a regulatory framework including specific legislation to control residue levels of OCs in food items to ensure food safety for African people. At the same time, it should be carried out the monitoring of parasites which can be transmitted to human beings through consumption of intermediate host species. Therefore, health education to African people on intestinal parasites transmission and prevention, and regular deworming should be advocated. Action to be taken would be aimed at mitigating environmental degradation, increasing food security, and protecting African people from health problems and related economic problems as proposed by ORBIS objectives.



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A. Monnolo, M.T. Clausi, F. Del Piano, M.C. Ferrante

Trout as biosentinel species in ORBIS cooperation for the monitoring of organochlorine contamination

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Xenopus laevis: model for cooperating to ecotoxicology studies

Rosa Carotenuto is Associate Professor in Comparative Anatomy and Cytology. She graduated in Biology at the University of Naples "Federico II" in 1988. In 1994 obtained the PhD at the University of Naples "Federico II". From 1999 to 2022 is researcher and since 2022 Associate Professor at the University of Naples where she teaches Histology and Citology and Developmental Biology and Philogenesis for the bachelor degree in Biological Sciences. She is reviewer for peer-reviewed journals in the biological and ecotoxicological fields. She is author of 48 articles in international journals. In her research, she studied for many years the biological role of cytoskeleton in oocytes polarization and molecules involved in fertilization. Then she studied the role of p27/eif6 in *Xenopus laevis* development. Today she studies the activity of nanoparticles and pollutants on *Xenopus laevis* development

Maria Michela Pallotta is graduated in developmental Biology from the University of Naples Federico II and she obtained a PhD in Biology in 2017. He currently works at the Institute of Genetic and Biomedical Research of the National Research Council (Cnr-Irgb) of Pisa, studying the role of cohesine in the development of Cornelia de Lange syndrome

1. The advantages of the *Xenopus* model

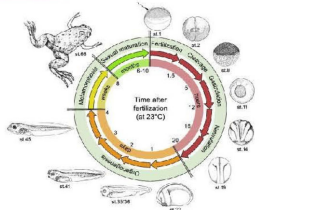
Xenopus laevis, became very popular in the 1950s because it was used in pregnancy tests. The introduction of *Xenopus* in developmental biology laboratories was rather fortuitous, but in the 1930s it quickly replaced the amphibians used until then for this type of study, thanks to its characteristics. Indeed, it offers numerous advantages as: 1) can be easily bred in captivity with protocols simple and at low cost 2) its development can be easily followed because it occurs outside the mother's body 3) organs morphogenesis is directly observed 4) its genome has been completely sequenced and it has a high percentage of homology with that of humans 5) the easy of manipulating gene expression and genetic engineering by simple microinjection of constructs into the egg or in early embryo 6) the availability of genetic and genomic data to study genes 7) the possibility to use techniques for modifying gene expression, like morpholino, and utilize genome editing techniques like the CRISPR/Cas9 system. Moreover, as many fundamental processes at the cellular and molecular level are highly conserved across vertebrates, *Xenopus laevis* can be considered a valuable organism to study the mechanisms of human disease, in particular cancer. In fact, the use of the *Xenopus* model system has provided diverse contributions to cancer research. The wide-ranging application of *Xenopus* to the field of oncology is built on the striking parallels between tumour pathogenesis and early embryo development. Currently *Xenopus* is widely used as a model organism for studies related to Nanotechnologies and Ecotoxicology.

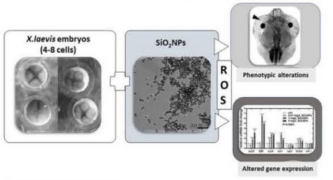
2. Nanoscience and *Xenopus* developmental studies

Xenopus is considered a good model with regard to the effects deriving from the use of nanomaterials. To date, there are not many published works concerning the correlation between nanomaterials and expression of gene involved in the early embryonic development. In this scenario, Tussellino and coworker (2015) showed that after the treatment with polystyrene nanoparticles, the expression of some genes involved in early embryonic development are altered. In particular, the expression of *bra*, *myod1*, and *sox9* and concluded that these NPs modified the normal migration of the prospective axial and paraxial mesoderm and of the neural crest, the fourth germ layer. Also the SiO_2NPs produced several abnormalities in developing embryos, in particular, at level of the dorsal pigmentation, of the cartilages of the head and of branchial arches as consequence of ROS production and altered expression of embryonic genes (Carotenuto et al., 2022).

3. *Xenopus* and Ecotoxicology

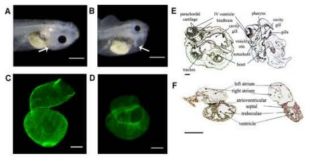
Thanks to their toxicity, pesticides could have serious impacts on human health as well as aquatic ecosystems, they exert differential toxic effects on embryogenesis, neurotransmitter release, and sexual differentiation. The development of accurate and sensitive assessment of pesticide toxicity is required to ensure public health. Several distinct chemical classes of pesticides have been investigated in *Xenopus*, such as chlorpyrifos, atrazine, and triadimefon. In particular, organophosphate pesticides, chlorpyrifos, which acts as a class of acetylcholinesterase inhibitors and used widely in agriculture to reduce insect populations has been studied by Tussellino et al. (2016). Exposure to different chlorpyrifos concentrations (10, 15 and 20 mg/L) has been observed to produce a dose-related increase in tadpole teratogenic alterations, resulting in reduced growth rate, locomotor activity, heart rate, survival ability and altered melanocyte distribution.





	Untreated	0.02% Acetone	CPF 10 mg/L	CPF 15 mg/L	CPF 20 mg/L
Gut e (%)	2 (1.67)	1 (1.20)	36 (45.06)*	63 (81.82)*	71 (97.26)*
Edema multiple e (%)	0	1 (1.20)	41 (51.25)*	59 (76.62)*	73 (100)*
Head e (%)	0	1 (1.20)	41 (51.25)*	59 (76.62)*	73 (100)*
Tail e (%)	0	0	26 (32.50)*	54 (70.13)*	71 (97.26)*
Fins e (%)	0	0	7 (8.75)*	49 (63.64)*	71 (97.26)*

Percentages based on number of malformations/number of the living embryos. Chi square test: a = $P < 0.05$; b = $P < 0.001$.



R. Carotenuto, M.M. Pallotta

Xenopus laevis: model for cooperating to ecotoxicology studies

Ecotoxicology has emerged as a discipline that aims to identify and predict the effects caused by anthropogenic pollutants defined as emerging on ecosystems. Worrisome are engineered nanoparticles and microplastics found in many consumer products but also chemicals and drugs found in both marine and freshwater aquatic ecosystems. Although the in vitro study is supported by the authorities, continuing evidence indicates that in vivo testing is of extreme relevance in bioscience. X. laevis is a very relevant model for both environmental and biomedical studies (Carotenuto et al., 2016, 2020, 2021, 2022). It allows studies on gametogenesis and embryogenesis as well as on the juvenile and adult stages. Furthermore, compared to alternative models of invertebrates and vertebrates, it shows greater genetic homology and pathways that can be superimposed on mammals, including humans, so the data obtained can be easily translated (Takagi et al., 2013; Session et al., 2016; Tandon et al., 2017). The literature strongly suggests that Xenopus has all the characteristics required of a model organism for studies on bio-interactions and adverse effects of pollutants, also in the perspective of a safe development of new materials (Libralato et al., 2017).

The use of this amphibian in the laboratory, offers some advantages: 1) eggs can be obtained almost all along the year by injecting females with gonadotropic hormones and in vitro fertilization is easy to perform; 2) the ease of manipulating of gametes, embryos and adult; 3) the direct visualization of organs morphogenesis; 4) the relative ease of manipulating of gene expression and genetic engineering (Takagi et al., 2013; De Marco et al., 2017) 5) the genome have been completely sequenced (Session et al., 2016) and has a high percentage of homology with that of humans; 6) the availability of Xenopus genetic and genomic data to study genes, gene families and gene networks, including ESTs (expressed sequence tags) (Sczyrba et al., 2005), 7) UniGene clusters continually update genomic sequences for the use of technologies as RNA-Seq (Amin et al., 2014) and quantitative proteomics (Sun et al., 2014). Furthermore, the National Xenopus Resource (NXR), the European Xenopus Resource Centre (EXRC), and other stock centers, have an increasing resource of transgenic lines; 8) the possibility to use techniques for modifying gene expression (morpholino) (Takagi et al., 2013; De Marco et al., 2017), and genome editing techniques like the CRISPR/Cas9 system (Naert et al., 2020). The possibilities offered by X.laevis are an excellent link to undertake cooperation in the study of one of the most challenging environmental aspects, the activity of pollutants on biota including humans.

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Session Title: NET-3 | MUNA | ORBIS
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CO-OPERATION FOR EXPLORATION OF ENDOLICHENIC AND ENDOPHYTIC FUNGI FOR APPLICATION IN AGRICULTURE AND MEDICINE

Anindita Sarma is M.Sc , M.Phil from Department of Botany, Gauhati University. Currently s he is under going Ph.D and her research interest is endophytic fungi associated with wild relative of economically important crop plants.

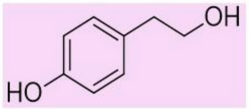
Kumananda Tayung is a Professor in the Department of Botany, University of Gauhati Assam, India. His research interest is exploration of fungal endophytes and their bioactive metabolites for applications in medicine and agriculture.

Alessio Cimmino is a Professor in the Department Chemical Sciences, University of Naples, Federico-II, Italy. His research interest is purification and structure elucidation of bioactive metabolites from microbial origin.

Endophytic fungi are microbes that colonize inner healthy plant tissues without causing any disease symptoms to its host. They have been isolated from every plant species investigated so far. The functional roles of endophytes are manifold. They are known to confer considerable benefits to the host by producing substances that stimulate plant growth, enhanced resistance to biotic and abiotic stress. Besides they produce secondary metabolites that inhibit both phytopathogens and clinically significant human pathogens. Till recently, 5000+ bioactive metabolites have been isolated from endophytic microbes. Therefore, endophytes are recognized as repository of bioactive metabolites and have been commonly term as "chemical synthesizers" inside the host. Endolichenic fungi are cryptic, associative microfungi that reside within healthy lichen tissues and are ecologically diverse. Just like endophytic fungi, endolichenic fungi are also rich source of bioactive metabolites. Most of the compounds derived from endolichenic fungi possess various biological activities like anticancer, antiviral, antibacterial, antifungal, and anti-Alzheimer's activities. Many scientists believe that plants growing in lush tropical rainforests, where competition for light and nutrients is severe, are most likely to host the greatest number of bioactive endophytes than temperate parts of the worlds. Thus, considering the myriad of medicinal plants and lichen species particularly in biodiversity rich regions, study of endophytic microbes from lichens and medicinal plants might lead to the discovery of new and effective molecules with wide application in medicine and agriculture.

In this endeavor, we have reported few bioactive metabolites from endophytic and endolichenic fungi in collaboration with Department of Chemical Sciences, University of Naples, Federico-II, Italy. Further co-operation in exploration of endophytic microbes inhabiting medicinal plants and lichen species of North East India may result in to discovery of novel and effective bioactive molecules for multiple applications.

Keywords: Endophytic microbes, Medicinal Plants, Lichen species, Bioactive metabolites.



S.Padhi, D. Kumar Jha, A. Sarma, M. Masi, A. Cimmino, K. Tayung

Co-operation for exploration of endolichenic and endophytic fungi for application in agriculture and medicine

Endophytes fungi are microbes that colonize inner healthy plant tissues without causing any disease symptoms to its host. They have been isolated from every plant species investigated so far. The functional roles of endophytes are manifold. They are known to confer considerable benefits to the host by producing substances that stimulate plant growth, enhanced resistance to biotic and abiotic stress. Besides they produce secondary metabolites that inhibit both phytopathogens and clinically significant human pathogens. Till recently, 5000+ bioactive metabolites have been isolated from endophytic microbes. Therefore, endophytes are recognized as repository of bioactive metabolites and have been commonly term as "chemical synthesizers" inside the host. Endolichenic fungi are cryptic, associative microfungi that reside within healthy lichen tissues and are ecologically diverse. Just like endophytic fungi, endolichenic fungi are also rich source of bioactive metabolites. Most of the compounds derived from endolichenic fungi possess various biological activities like anticancer, antiviral, antibacterial, antifungal, and anti-Alzheimer's activities. Many scientists believe that plants growing in lush tropical rainforests, where competition for light and nutrients is severe, are most likely to host the greatest number of bioactive endophytes than temperate parts of the worlds. Thus, considering the myriad of medicinal plants and lichen species particularly in biodiversity rich regions, study of endophytic microbes from lichens and medicinal plants might lead to the discovery of new and effective molecules with wide application in medicine and agriculture.

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LATHYRUS SATIVUS (GRASS PEA): MORPHOLOGICAL CHARACTERIZATION AND IN VITRO DIGESTION

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CVL Giosafatto, PhD in Biotechnology. Professor at University "Federico II". (ORCID 0000-0001-8762-2205) Main Fields of interest: Protein digestion, Bioplastics production and characterization, active packaging.. Scopus: Author of 53 documents, h -index 23; Cit. 1200. Google Scholar: Author of 68 documents, h-index 30; Cit1704.

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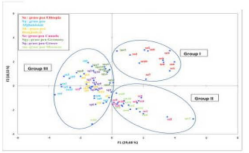
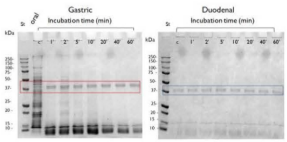
Lathyrus sativus is an orphan crops. It is defined as the most potential genetic resources for feeding future breeding programs to face the ongoing major world challenges and climate changes. Morphological characterization constitute a fundamental step in the strategies of conservation and improvement of plant genetic resources. The in vitro digestibility of proteins became progressively pertinent as novel dietary protein sources to being explored. Seven accessions of Lathyrus sativus originating from seven countries: Canada, Greece, Germany, Morocco, Ethiopia, and Bangladesh were germinated in green house to study the morphological traits in which twelve quantitative traits were treated. Then the obtained seeds were grounded to flour to study the in vitro protein digestion and their content. A step of extraction and determination of protein content in Grass pea flour was made using The Kjeldahl method. Three physiological conditions of an adult model were simulated to study the in vitro digestion of grass pea flour: the oral phase was simulated using the simulated salivary fluid (SSF, 0.15M of NaCl, 3 mM of urea, pH6.9) and the salivary amylase to digest the starch. The gastric phase was studied using the simulated gastric fluid (SGF, 0.15 M of NaCl, pH2.5) and pepsin. The duodenal phase were performed using the simulated duodenal fluid (SDF, 0.15 M of NaCl at pH 6.5), pancreatin and bile salts. The obtained results of morphological study showed an important intra- and inter-population diversities in the studied L. sativus accessions using various quantitative traits. Analysis of variance (ANOVA) test revealed statistically significant differences between genotypes for all morphological traits based on the effect of geographic origin at $p < 0.01$. These results revealed an important inter-population variability for the different studied quantitative traits. Based on geographic origin, the Tukey test subdivided our populations into 2 groups for the pods number, the length of primary branch, the leaf length, and pod width. It subdivided them into 3 groups for the leaf area, the plant height, pod length, days to first mature pod, days to first flowering and maturation period, and into 4 groups for the nodes number. The projection of genotypes in the Principal Component Analysis (PCA) showed the accumulation of a large number of genotypes from different geographic origins in the same cluster which indicate that studied genotypes are not distributed according to their origin. Whereas, in PCA the individuals of grass pea Ethiopia were collected in distinct group (group I), which indicate that these samples were very closed between themselves and diversified regarding the other accessions. Using the Kjeldahl method, the protein content of the seven grass pea varieties ranged between 23% and 25%. The SDS-PAGE profiles of digestibility of all grass pea varieties showed that the most of proteins are digested after 60 min incubation at the gastric phase, except the ~45 kDa protein which is even in the duodenal phase was not completely digested. For example, the SDS-PAGE profile of digestibility of grass pea Afghanistan (Figure 2) exhibited clear digestion of all proteins for both phases except the ~45 kDa protein. The density of digestibility of this protein was different from one variety to another. In fact, grass pea Ethiopia, Germany, Bangladesh, and Morocco were more digested than grass pea, Canada, Afghanistan, and Greece in the gastric phase. On the other hand, Grass pea Afghanistan and Germany were more digested than the rest of the samples in the duodenal phase. In conclusion The phylogenetic relationships obtained among the seven varieties of grass pea were completely disconnected from their cultivation origin. The in vitro digestibility was similar showed among all the investigated samples even though different digestion kinetics were found, indicating that this kind of investigation could be used as a method to distinguish different crop varieties.





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S. Lassoued, C.V.L. Giosafatto, L. Mariniello, N. Trifi

Lathyrus sativus (grass pea): morphological characterization and in vitro digestion

Grass pea is one of the most cultivated species in the genus Lathyrus, widely cultivated in poor countries. It is considered as pasture crop, green fodder, animal feed, and human food. Seven varieties of Lathyrus sativus were used to study their morphological characterization and the in vitro digestion in order to detect accessions useful for future breeding strategies. Using various quantitative and qualitative morphological traits, an important intra- and interpopulation diversities was found. The variance analysis (ANOVA) based on populations effect showed a significant heterogeneity between genotypes for all morphological traits at $p<0.01$. Additionally, the high correlation results had confirmed this diversity which could be explained by the large distribution area of the studied accessions and the natural selection of the species. The clustering pattern by Principal Component Analysis (PCA) and by Hierarchical Cluster Analysis (HCA) showed the accumulation of a large number of genotypes from different geographic origins in the same cluster which indicate that the studied genotypes are not distributed according to their origin. Whereas, the individuals of grass pea Ethiopia were collected in distinct group which indicate that these samples were very closed between themselves and diversified regarding the other accessions. The in vitro digestion of grass pea flour showed that the most of proteins were digested after 60 min of incubation except the B-lathyrin protein. In fact, the densitometry analysis of B-lathyrin protein band showed that grass pea Ethiopia, Germany, Bangladesh, and Morocco were more digested than grass pea, Canada, Afghanistan, and Greece in gastric phase and Grass pea Afghanistan and Germany were more digested than the rest of the samples in the duodenal phase. Different digestion kinetics were found, indicating that this kind of investigation could be used as a method to distinguish different crop varieties.

This work was possible thanks to a cooperation between the University of Naples Federico II and University of Tunis EL Manar that, by exchanges of PhD students between the two institutions, aims to pursue research on international mobility programs under the aegis of sustainable development.

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International Cooperation Italy-Tunisia: Ecocytotoxicological studies to enhance management actions for reducing pharmaceuticals in the Mediterranean area

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Researcher at Messina University, Italy. His research activities mainly include the ecocytotoxicological assessment of contaminants of emerging concern (CEC: microplastics, nanoparticles, drugs) in various aquatic organisms (bivalves and fish) and cell lines, using multi-biomarker approaches (enzymatic, histological, molecular and metabolomic) for the enrichment of knowledge on biological defense pathways triggered by pollutants.

Sabrine Attia[2]
PhD student in biological sciences and biotechnology at the University of Monastir, Tunisia. Her research work focuses on the evaluation of the toxic effects of pharmaceutical residues and complex mixture of contaminants, namely hospital effluents, on aquatic organisms.

Mariachiara Gallo[1]
PhD-student at the University of Messina (Italy) with research activities in ecocytotoxicology for biomonitoring of aquatic ecosystems and evaluation of biological effects induced by a variety of environmental pollutants (pharmaceuticals, microplastics and novel bio-recalcitrants), through application of histological, immunohistochemical and enzymatic investigations on aquatic invertebrates and known vertebrates.

Hedi Ben Mansour[3]
Full professor at Monastir University – Tunisia. He is a director of the Research Unit of Analysis and Process Applied to the Environment AFAD- UR-17ES32. Currently Prof Ben Mansour is engaging in studying the investigation of causes and the consequences of water pollution by micro pollutants (pesticides, pharmaceutical residues, textile dyes, endocrine disruptors).

Tatiana Cappello[1]
Senior Researcher at Messina University, Italy, her research focuses on ecocytotoxicology and biomonitoring of aquatic environment to elucidate effects of metals, POPs, PAHs, pharmaceuticals and emerging contaminants, as microplastics and nanoparticles, on invertebrates and fish, by in-MP metabolomics and conventional tools (histology, immunohistochemistry, enzymology) for comprehensive insights into biodefence mechanisms under stress conditions.

Introduction

Contamination of coastal marine areas by micropollutants (concentration range ng/L-µg/L), mainly pharmaceutically active compounds (**PhACs**), represents a relevant concern for the whole Mediterranean region. For instance, in Madhia (Tunisia), as many as 40 pharmaceutical active compounds were detected in urban hospital wastewater and coastal seawater (Afsa et al., 2020 doi.org/10.1007/s11356-019-06866-5). Amongst the various PhACs, salicylic acid (SA), the main metabolite of acetyl salicylic acid, proved to be highly persistent and frequently detected in the various aquatic matrices investigated.Thus, SA persistence, probably related to the incomplete effectiveness of wastewater management systems versus PhAC, requires further study concerning its biological impact on non-target aquatic organisms.

Aim of the study

- Evaluate the temporal progression of SA biological effects on non-target organisms (**mussels**)
- Support the design of new guidelines for **urban wastewater treatment**.

Material and Methods

Experimental plan:Specimens of *Mytilus galloprovincialis* exposed to five environmental concentrations of SA (C1: 0.05 µg/L; C2: 0.5 µg/L; C3: 5 µg/L; C4: 50 µg/L; C5: 100 µg/L) + Control (FSW) for 12 days under laboratory conditions ;sampling at different time-points (T0; T3: 3 days; T5: 5 days; T12: 12 days). All the analysis were conducted on the gills

Histological analyses:Hematoxylin & Eosin (H/E) staining to verify the occurrence of branchial morphological impairment (**Fig.1**)

Biochemical analyses (spectrophotometry) Assessment of oxidative stress (glutathione-S-transferase GST; Catalase CAT; superoxide dismutase SOD; lipid peroxidation LPO) and neurotoxicity (acetylcholinesterase AChE). (**Fig.2**)

Results

Fig.1. Histological analysis, occurrence of haemocyte infiltration(↑) provoked by SA (SB= 20µm)

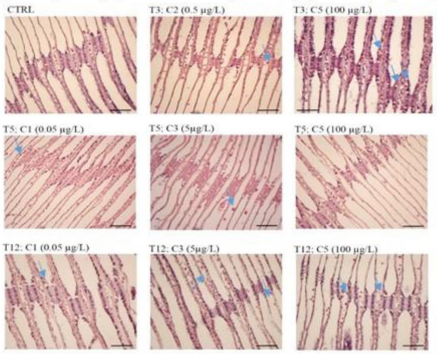
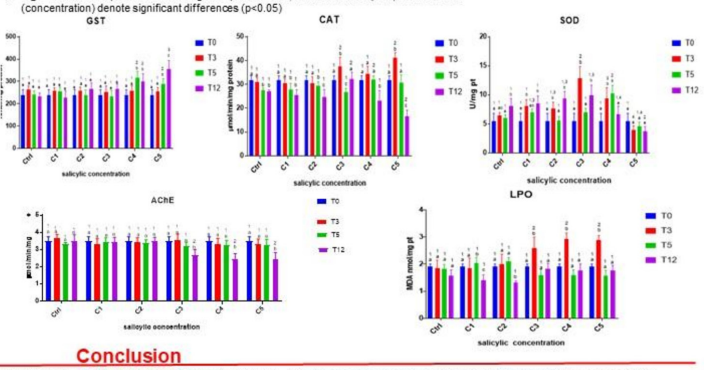


Fig.2 Biochemical profiles of mussel gills exposed to SA; different letters (time) and numbers (concentration) denote significant differences ($p<0.05$)



Conclusion

The temporal progression of pro-oxidant effect , neurotoxicity and haemocyte infiltration, triggered by SA, allowed delineating the real environmental impact of the PhAC and guiding the implementation of new recovery strategies.

G. De Marco, S. Afsa, M. Galati, H. ben Mansour, T. Cappello

International Cooperation Italy-Tunisia: Ecocytotoxicological studies to enhance management actions for reducing pharmaceuticals in the Mediterranean area

Nowadays, the Mediterranean area is characterized by increasing contamination of pharmaceutical residues, released into the environment by effluents of municipal and hospital wastewater treatment plants. In this scenario, the coastal site of Mahdia, located in the central-east part of Tunisia along the coasts of the Mediterranean Sea, is an area with high productive activities. The local economy is mostly centered on farming and fishing, while tourism ensures a consistent affluence of people throughout the year. Furthermore, in the same area is present a hospital, which provides a wide range of specialist health services. Considering that increased drug input into wastewater is correlated with higher human activities, the occurrence of several pharmaceutical residues was examined in specific points (i.e. hospital wastewater effluent, wastewater treatment plant and coastal areas) of Mahdia to better elucidate the critical steps of the wastewater management. Among the various detected pharmaceutical compounds, different concentrations of salicylic acid (SA), the active form of the aspirin, were revealed in all sampling locations. Therefore, given the persistence of SA from wastewater to coastal zone, studies regarding the biological impact of this drug on endemic non-target organisms in the Mediterranean area can be helpful to address future actions for mitigation of marine pharmaceutical contamination. In light of this, an international cooperation Italy-Tunisia was therefore instituted. Within this partnership, the biological effects induced by real environmental concentration of pharmaceutical residues on non-target aquatic organisms, such as mussels, could be useful to define novel and more effective guidelines for wastewater treatment strategies. Starting from the levels detected in seawater collected at Madhia, five concentrations of SA (C1: 0.05 µg/L; C2: 0.5 µg/L; C3: 5 µg/L; C4: 50 µg/L; C5: 100 µg/L) were adopted for a sub-chronic exposure (12 days) under laboratory conditions using mussel Mytilus galloprovincialis, a very common species along the coasts of the Mediterranean Sea and widely employed as bioindicator in several ecocytotoxicological studies. To evaluate the time-dependent biological responses over the entire experiment, sampling of mussels was conducted at several time-points (T3: 3 days; T5: 5 days; T12: 12 days). All the analyses were performed on the gills, since they are in direct contact with the external environment and with the contaminants potentially dissolved in the water, and therefore able to elaborate "early" biological responses being the first organ of exposure. A histological approach, based on Hematoxylin & Eosin (H/E) staining, was applied to identify the occurrence of branchial morphological alterations. Spectrophotometric methods were applied for different biochem-

ical analysis. The lipid peroxidation (LPO), the enzymatic activity of catalase (CAT), superoxide dismutase (SOD) and glutathione-S-transferase (GST) were assessed to characterize the antioxidant and detoxyfing response induced by SA, whereas the analysis of acetylcholinesterase (AChE) activity was utilized as a biomarker of neurotoxicity. Based on the histological analysis, no tissue impairments were detected on gills, but a moderate haemocyte infiltration was notable, probably associated with a defensive response against SA. The evaluation of antioxidant and detoxifying action revealed different activity trends in relation to the sampling times. GST showed an increased activity at T5 and T12, while CAT and SOD activity exhibited a rise at T3 and T5, and then a drop as revealed at T12. LPO, except for a raise at T3, did not show significant alterations. The results of these biochemical assays elucidated the progression of pro-oxidant effects induced by this pharmaceutical compound during a sub-chronic exposure in mussels. The inhibition of acetylcholinesterase (AChE) activity, observed at T12, highlighted an impairment of the cholinergic system triggered by the SA exposure. All these findings presented in this study as an international cooperation between Italy and Tunisia offer a relevant support for a more deeply understanding of the effects of pharmaceutical residues on non-target aquatic species in marine environments. Overall, these data could be helpful to ameliorate and define novel and more efficient actions for wastewater treatment plants, with the aim to reduce pharmaceutical pollution in the Mediterranean area.

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TITLE : MODELING APPROACH TO SIMULATE THE IMPACT OF AN AQUIFER RECHARGE MANAGEMENT IN RURAL AREA IN THE EL TARF REGION (NORTH-EAST ALGERIA).

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INTRODUCTION

Life on earth would not exist without water, a unique resource that nothing can replace. The general objective of this study is to quantify the effects of the constraints induced by the pumping wells and to simulate the impact of an aquifer recharge management program in rural area by adding an agricultural pond to this synthetic case.

STUDY AREA

The study region situated in the north east of Algeria has a cold and rainy Mediterranean climate in winter with a dry and hot summer. The measurements of the hydraulic head are made during the hydrological year 2020.The groundwater flow is directed in general from West to East. The development of agriculture in this region relies mainly on groundwater, it is the most important source of water for rural communities.

Carte. Geographical location and zoom on the study area.

1. Hydrologically , The Conceptual model is part of the Bouteldja plain. Gaud 1976 show that this plain is made up gravels, pebbles and sands of sandstone origins from the numidian formations.

2. For data processing, we chose the cartographic software qgis 2.18.21 Las palmas and We implemented the numerical groundwater flow model using the FREEWAT software (Rossetto et al. 2015; De Filippis 2018)

3. The modelling area is defined by a grid of 15 rows by 21 columns and the model vertical discretization consists of permeable sandy layer representing the main hydro-stratigraphic unit,confined and homogeneous, with a thickness of 70 m.

RESULTS

The simulation covers the year 2020 as a representative year with 4 stress periods of 30 days length each ; it's performed in steady state.

•The withdrawal term due to the presence of the three wells (WELLS - OUT) equals the overall inflow through the western boundary (CONSTANT HEAD - IN) is approximately 7.50 $x10^{-2}$ m^3/s (6480 m^3/day).

•In addition, artificial recharge of aquifer systems is done by an agriculture pond for aquifer recharge; This term is worth 4.32 $x10^{-3}$ m^3/s =373 m^3/day.

•Another model configuration, with the wells and agriculture recharge activated. The flow at the western boundary is estimated to be about 7.06$x10^{-2}$ m^3/s which is less than that observed during pumping only; this justifies the overexploitation of these irrigation wells.

CONCLUSION

• Interpretation of the pumping test data, showed that the overall contribution across the western boundary (CONSTANT HEAD - IN) is less than the well extraction term (WELLS - OUT) due to excess pumping.

• Both RECHARGE - IN and WELLS - OUT terms are involved in the groundwater balance after three months; they are worth 4.32 $x10^{-3}$ m^3/s (373.248 m^3/day) and 7.50 $x10^{-2}$ m^3/s (6480 m^3/day), respectively.

Table. Model groundwater balance after three months of simulation.

	IN	OUT
Constant head	384076	11194
Well	-	395280
Rch	22394	-

•our work provides us a useful test example of a conceptual and methodological model for an integrated management of water resources in rural area.

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Modeling approach to simulate the impact of an aquifer recharge management in rural area in the El Tarf region (North-East Algeria)

The study region situated in the north east of Algeria has a cold and rainy Mediterranean climate in winter with a dry and hot summer. The general objective of this study is to quantify the effects of the constraints induced by the three pumping wells and to simulate the impact of an aquifer recharge management program in rural area by adding an agricultural pond to this synthetic case. According to the potentiometric map, the groundwater flow direction is from West to East. During model building, a single layer numerical model was developed using the MODFLOW-2005 code and FREEWAT modeling tool. Some GIS functionalities were run on the model in steady state during the water year 2020 and two MODFLOW packages were activated MODFLOW Well (WEL) and MODFLOW Recharge (RCH) to simulate the withdrawal and recharge of the groundwater system successively. Interpretation of the pumping test data showed that the overall contribution across the western boundary is less than the well extraction term due to excess pumping. The analyses of the simulation of the groundwater supply and recharge balance after the implementation of the agricultural pond either without or with pumping show the decrease of the hydraulic load where the wells are located, thus the rate of exploitation of these resources can approach or exceed that of their renewal. In conclusion, our work provides us a useful test example of a conceptual and methodological model for an integrated management of water resources in rural area.

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"Cow breeding and feeding methods as a bridge between environmental sustainability and human health"


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Background:

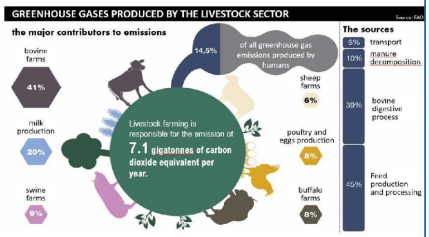
The nutritional quality of cow milk is of special interest not only from the point of view of environmental sustainability, but also for human health. Identifying the key components of milk's nutritional quality is crucial to promote sustainable production and ecological impact of dairy products and to improve human health.

Ruminant agriculture has been criticized for the uncontrolled usage of land, and for the contribution to greenhouse gas emissions. Low-yield, pasture-based production may have lower emissions per liter of milk than more intensive, higher-yielding system and, interestingly, higher forage consumption by cows correlates with an increased concentration of beneficial fatty acids in the milk, linking environmental profits with nutritional gains.

An important parameter to determine the nutritional value of milk is its fatty acid profile and in particular, the content of the essential fatty acids n-3 and n-6. Indeed, a low n-6:n-3 ratio, ranging from 2 to 4, is considered optimal for human health.

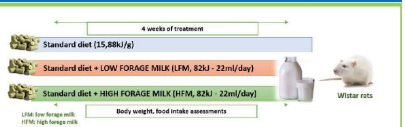
Recent studies have shown that animal diet is the decisive factor determining the fatty acid profile of cow milk. Indeed, a high forage:concentrate ratio (F:C) results in a milk with low n-6:n-3 ratio.

Among healthy fatty acids, the conjugated linoleic acids (CLAs) levels in the milk from different ruminant species is significantly increased when animals are fed with fresh forage and based on this data, some Italian breeders are feeding dairy cows with a high F:C (70:30), obtaining milk with a low n-6:n-3 ratio and high CLA level that satisfy consumer demand for healthy foods.



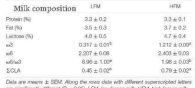
Aim:

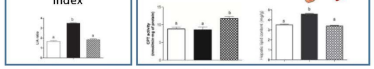
Several studies have indicated that administration of CLA and n-3 fatty acids to rats improves fatty acid oxidation and decreases inflammation and oxidative stress through the modulation of mitochondrial function. We hypothesized that milk from cows fed a high-forage diet (high forage milk, HFM), modulating mitochondrial function, would ameliorate the inflammatory state and oxidative stress in consumers. To test this hypothesis, we evaluated, in a rat model, the effects of HFM administration on energy balance, lipid metabolism, and anti-inflammatory and antioxidant defenses, compared with those of rats fed isoenergetic amounts of milk obtained from cows fed with a diet with a low F:C ratio (low forage milk, LFM).

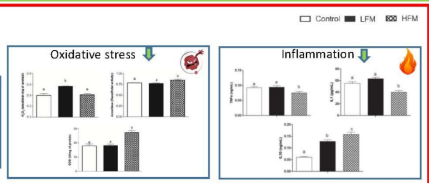


Results & Discussion:

Our results indicate that HFM may positively affect lipid metabolism, leptin:adiponectin ratio (L/A), inflammation, mitochondrial function, and oxidative stress, providing the first evidence of the beneficial effects of HFM on rat metabolism. This shows how breeding and feeding methods are important not only for the environment but also for human health.







Data are presented as means ± SEM from $n = 7$ animals/group. Data with different superscripted letters are significantly different ($p < 0.05$).

F. Cimmino, L. Petrella, G. Cavaliere, C. Sarro, Z. Coppola, R. Tudisco, P. Iommelli, A. Pizzella, G. Trinchese

Cow breeding and feeding methods as a bridge between environmental sustainability and human health

Cow milk is widely used for human nutrition and in food industry processing, thus the nutritional quality of milk is of special interest not only from the point of view of environmental sustainability, but also for human health. Identifying the key components of milk's nutritional quality is crucial to promote sustainable production and ecological impact of dairy products and to improve human health.

Ruminant agriculture has been criticized for the uncontrolled usage of land, and for the contribution to greenhouse gas emissions. A recent study indicates that low-yield, pasture-based production may have lower emissions per liter of milk than more intensive, higher-yielding system [1]. Furthermore, despite claims that dairy products are unnecessary sources of saturated fat and calories, milk fats are a complex of important fatty acids (FAs) [2], many of which are beneficial to human health [3,4]. II is noteworthy that higher forage consumption by cows correlates with an increased concentration of beneficial fatty acids in the milk, linking environmental profits with nutritional gains.

Different animal species yield milk of different quality, with different compositions of FAs, but also within the same animal species the quality of milk depends on several factors, such as animal feeding, rearing systems, and seasonal variability. An important parameter to determine the nutritional value of milk is its fatty acid profile and in particular, the content of the essential fatty acids n-3 and n-6. Indeed, a low n-6:n-3 ratio, ranging from 2 to 4, is considered optimal for human health [5]. Recent studies have shown that animal diet is the decisive factor determining the fatty acid profile of cow milk [6]. Indeed, a high forage:concentrate ratio (F:C) results in a milk with low n-6:n-3 ratio.

Among healthy fatty acids, the conjugated linoleic acids (CLAs) are positional and geometric isomers derived from octadecadienoic acid, whose content is high in milk fat. The major isomer of CLA, cis-9,trans-11 (rumenic acid), represents up to 80% of total CLA in food. The CLA level in the milk from different ruminant species is significantly increased when animals are fed with fresh forage [7]. Based on this data, some Italian breeders are feeding dairy cows with a high F:C (70:30), obtaining milk with a low n-6:n-3 ratio and high CLA level that satisfy consumer demand for healthy foods [8].

Several studies have indicated that administration of CLA and n-3 fatty acids to rats improves fatty acid oxidation and decreases inflammation and oxidative stress through the

modulation of mitochondrial function [9,10]. We hypothesized that milk from cows fed a high-forage diet (high forage milk, HFM), modulating mitochondrial function, would ameliorate the inflammatory state and oxidative stress in consumers. To test this hypothesis, we evaluated, in a rat model, the effects of HFM administration on energy balance, lipid metabolism, and anti-inflammatory and antioxidant defenses, compared with those of rats fed isoenergetic amounts of milk obtained from cows fed with a diet with a low F:C ratio (low forage milk, LFM).

Our results indicate that HFM may positively affect lipid metabolism, leptin:adiponectin ratio, inflammation, mitochondrial function, and oxidative stress, providing the first evidence of the beneficial effects of HFM on rat metabolism.

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Use of *Ulva lactuca* to detoxificate and reduce DNA damage in *Lates calcarifer* (Bloch, 1790)

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Dr. Bianchi learned her PhD in biochemistry and cell and molecular biology in 2015 at the University of Naples "Federico II". She has published 10 manuscripts (in Scopus indexed journals, h-index 4, 83 citations). Together with Professor De Maio she studies the poly(ADP)ribosylation and the antioxidant capacities in animals and plants.

Prof. Sulaiman is currently scientist at Alfred Wagener Institute of Polar and Marine Research. He serves as Professor, Visiting Professor, Adjunct Professor to institutions around the world. He also worked with different maritime industries. He has published 12 books. He editorial members peer review journals and members of notable professional societies.

Senior Researcher and Professor of Clinical Biochemistry at the University of Naples "Federico II". She has published 56 manuscripts (in Scopus indexed journals, h-index 20, 829 citations). Dr. De Maio is the Scientific Responsible for Analysis of Oxidative stress in the Certificate Laboratory of Identification and Molecular Traceability in Biology Department.

Background and Aim of the Research

Heavy metals and organic contaminants are present in the environment as a result of both natural phenomena (e.g., volcanic dust, photochemically formed ozone, sea salt particles) and various human activities (e.g., industrial discharges, agricultural runoff, sewage). At high concentrations these compounds represent a threat to all forms of life, and negatively affect not only the quality of the environment but also the stability of the aquatic ecosystems [1].

Macro and micro algae play a key role in biomonitoring and restoration of aquatic systems due to their ability to degrade or convert pollutants to less toxic or inert compounds [1, 2]. In addition, algae are the base of the aquatic food chains and being a good source of proteins, carotenoids, minerals and vitamins, they lend themselves to various industrial applications which include the production of additives for animal feed. Several studies reported that dietary supplements with algae and their extracts used in aquaculture, leads to improved immune system and gut function and favours the lipid metabolism [3].

A fundamental capacity of living organisms is their ability to counter the toxic effects of these heavy metals by developing of antioxidant and detoxification mechanisms, which favour the maintenance of genomic integrity.

The poly (ADP-ribose) polymerase (PARP) enzyme is a "sensor" of DNA damage and is involved in its repair [4].

The present research was conducted on mesocosms of *Lates calcarifer* after xenobiotic cadmium exposure at not-lethal concentration. Aim of our study was to measure the total soluble and fat-soluble antioxidant capacity and PARP activity in *Lates calcarifer* liver, to demonstrate the detoxifying action of *Ulva lactuca* on this edible fish and to verify whether PARP can represent a new marker of the health of fish.

Materials and Methods

The *U. lactuca* was collected from the seaweed farming prototype along the Terengganu coast in Malaysia.

Mesocosms (n=9) contained three specimens of *L. calcarifer* fish of similar average weight (170±6 g) and size (20±5 cm) were kindly provided by the Setiu Wetlands fish farm in Malaysia.

Cadmium chloride was added to six of the nine tanks with a non-lethal concentration for the species (10 mg/L) [5] for a period of 39 hours and used for three mesocosms with and three without seaweed. After the treatment or exposure period the fishes were euthanized and liver was preserved in -86 °C until its use.

The total soluble and fat-soluble antioxidant capacity was measured by the $ABTS^{•+}$ method, slightly modified from Re *et al.* [6]. The poly (ADP-ribose) polymerase activity of whole nuclear fractions of seaweed was routinely assayed in according to De Maio *et al.* [4].

Results

The toxic effect of cadmium produces a decrease of the total soluble and fat-soluble antioxidant capacity and an increase of PARP activity in *L. calcarifer* liver. Conversely, both soluble and fat-soluble antioxidant capacity increases following to addition of the only *Ulva lactuca*. Under these experimental conditions no significant alteration of PARP activity is measured with respect to that determined in the control liver. Finally, the soluble and fat-soluble antioxidant levels return comparable to those measured in the controls, while PARP activity is significantly higher in *L. Calcarifer* exposed to cadmium in presence of *U. lactuca*. The cadmium effect was also studied in the *Ulva lactuca*. The results show a reduction in antioxidant defenses and an increase in PARP activity following to exposure of this seaweed to metal.

Discussion

The PARP activation observed in *Lates calcarifer* after exposure to cadmium, demonstrates that the metal induces oxidative damage as reported by the authors for other vertebrates too [4]. The addition of *Ulva lactuca* to the fish treated with cadmium restores the antioxidant defenses as the seaweed, the food of *Lates calcarifer*, is very rich in antioxidants. The evidence that the PARP activity continues to be higher than the control, but lower than that measured after treatment with cadmium alone, allows us to hypothesize that this enzyme can be used as a new marker of *Lates calcarifer* healthy status.

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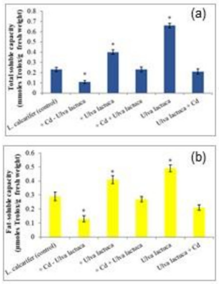

Figure 1. Total soluble (a) and fat-soluble (b) antioxidant capacity in *L. calcalifer* and *U. lactuca*, before and after cadmium exposure. (*) Significant differences (P< 0.05) were analysed by Mann Whitney U test. Cadmium exposure and the presence of the seaweed produce a significant alteration in the antioxidant capacity of *L. calcarifer* compared that measured in the control; the values of the soluble and fat-soluble antioxidant capacity of *U. lactuca* decrease significantly following to cadmium exposure.

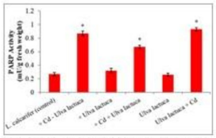

Figure 2. Poly (ADP-ribose) polymerase activity in *L. calcarifer* and *U. lactuca*, before and after cadmium exposure. (*) Significant differences (P< 0.05) were analysed by Mann Whitney U test. Cadmium exposure produces a significant increase in PARP activity in both *U. lactuca* and *L. calcarifer*. This increase is observable in the presence and absence of the seaweed.

A.R. Bianchi, O.S. Olanrewaju, E. Leonetti, A. De Maio

Use of Ulva lactuca to detoxificate and reduce DNA damage in Lates calcarifer (Bloch, 1790)

The accumulation of heavy metals and organic pollutants introduced into the environment through industrial discharges, agricultural uses, or improper waste disposal practices, domestic waste and agricultural runoff represents a threat not only to the environment, but also negatively affects the stability of many aquatic ecosystems. The persistence of these pollutants in the environment is a chronic threat to the health and safety of human and wildlife.

Recently, there has been increasing interest on using algae to remove, degrade, or to make harmless the organic pollutants in aquatic systems. Furthermore, since algae are an excellent source of proteins, carotenoids, minerals, polysaccharides and vitamins they lend themselves to various industrial applications which include the production of human food and additives for animal feed.The present research was conducted on fish mesocosms using a non-lethal cadmium concentration as a trace metal pollutant to verify, respectively, whether post-remediation by Ulva lactuca reduces the need for activation of cellular antioxidative defenses and DNA repair mechanisms. Spectrophotometric measures of total soluble and fat-soluble antioxidant capacity and Poly(ADP-ribose)polymerase activity were performed on the Lates calcarifer liver (DOI:10.1007/978-3-030-51210). Cadmium represents an environmental risk but its toxic effect seems mitigated by the bioaccumulation properties of Ulva lactuca. We detected high total soluble antioxidant capacity, low levels of PARP activity and undamaged DNA in the fish liver when seaweeds were added as compared to standard feeding. These results suggest a safe and sustainable implementation of Lates calcarifer sea farming using Ulva lactuca. In conclusion, as it's well known that nuclear poly(ADPR)polymerases are activated by DNA damages, we intend to use these enzymes as new markers of the health of fish, which live in polluted waters, in the context of international cooperation. In addition, we also consider it interesting to verify the detoxifying action of Ulva lactuga on other edible fish.

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Acute toxicities of Ketoprofen and Paracetamol in *Danio rerio* embryos

The withdrawal of various types of pollutants in water bodies is now a global concern. The monitoring of chemical substances in the environment is regulated by various directives and legislative frameworks. But, several uncontrolled substances pose serious ecological problems as the example of many pharmaceuticals active compounds (PhACs), their metabolites and personal care products (PCPs). PhACs like non-steroïdal anti-inflammatory drugs (NSAIDs) have been detected in various environmental aquatic matrices due to their continuous discharge from Wastewater treatment plants (WWTPs) or due to the limited effectiveness of conventional treatments to remove these residues and are detected at nano or micrograms per liter concentration levels. Due to the conservation between zebrafish and humans, along with other advantages, zebrafish became a common model system for the study of various diseases and behaviors as well as for the screening of chemicals' or drugs' toxicity and can decipher drug safety issues in patients.

The main objective of the present study, was to evaluate the toxic effects of NSAIDs with zebrafish fish due to their dominance in pharmaceutical purchases. The impact of Ketoprofen and Paracetamol on zebrafish eggs and larvae was assessed by recording mortalities and observing their morphologies. Fish Embryo Acute Toxicity (FET) using test protocol (OECD TG 236) was applied. Morphological alterations were observed by an Olympus CKX41 inverted microscope (Olympus, Hamburg, Germany) and images were captured using the Olympus C5040 AUD camera (Olympus, Hamburg, Germany). Lethal (LC), effect (EC), NOEC and LOEC concentrations, design of graphs and significant statistical differences were determined and performed using GraphPad Prism 9.0.0 et 9.0.1 (151). All conducted tests were two-tailed with a significance level of 0.05.

Significant effects were observed on hatching, morphology, heart rate and incidence of deformities were found to be sensitive indicators of the toxicity of these drugs during early growth of zebrafish.

Imen BEN CHABCHOUBI, 4th year PhD student. Field of interest and research in the (eco)toxicological risk assessment of pharmaceutical active compounds in the aquatic environment using zebrafish (Danio rerio). Endocrine and thyroid disruption. Practical skills in animal breeding, histopathology, fluorescence microscopy. Determination of PhACs in the aquatic media by FET based biosensors.

Rim ATTYA BOUCHHIMA, Doctor Engineer in Hydraulics and Development. Speciality in water and waste treatment (2009) Master's degree in Agricultural Hydraulics and Rural Development (2013) and doctorate in Georesources Engineering - Planning and Environment (2019). Having acquired a broad knowledge of halophytic plants and the study of their spatial distribution with remote sensing.

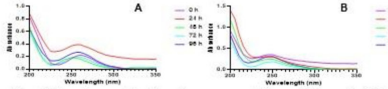

Fig. 1. Absorbance detection of exposure solutions of Ketoprofen (A) and Paracetamol (B) for recording drug peaks at the start of incubation (0 h of exposure) and at 24 h intervals (24, 48, 72 and 96 h of exposure)

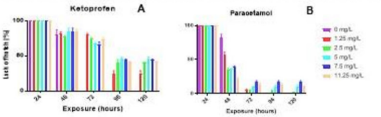

Fig. 2. Ratio of non-hatched eggs exposed to Ketoprofen and Paracetamol at different concentrations. Test Two-Way Anova.
A. Interaction = 12.75 (P value < 0.0001, ***), Row Factor = 73.10 (P value < 0.0001, ****) and Column Factor = 13.71 (P value < 0.0001, ****)
B: Interaction = 6.48 (P value = 0.0001, ***), Row Factor = 92.75 (P value < 0.0001, ****) and Column Factor = 0.618 (P value < 0.0001, ****)

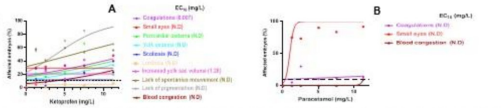

Fig. 3. Concentration-response curves with EC10 values after 120 hpf exposure of zebrafish embryos to Ketoprofen (A) and Paracetamol (B) for specific recorded sub-lethal parameters.
C.1 Scoliosis (Ketoprofen 7.5 mg/L, 72h); C.2 Lordosis, Increased yolk sac volume (Ketoprofen 5 mg/L, 72h). N.D: Not Determined.

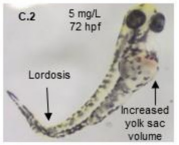

Table 1. Cumulative lethal (LC) and sub-lethal effect concentrations (EC) as well as no observed effect concentration (NOECs) and lowest observed effect concentration (LOECs) after 120 hpf of exposure to Ketoprofen and Paracetamol derived from all lethal and sub-lethal endpoints in *Danio rerio* embryos

Drug	NOEC (mg/L)	LOEC (mg/L)	Sub-lethal effects (mg/L)			Lethal effects (mg/L)		
			EC_{10}	EC_{20}	EC_{50}	LC_{10}	LC_{20}	LC_{50}
Ketoprofen	<1.25	1.25	0.42	0.73	1.91	0.76	0.98	1.52
Paracetamol	<1.25	1.25	1.1	1.11	1.12	1.1	1.65	3.27

Nacim Louhichi: PhD degrees in Biology Sciences from the Sciences Faculty, Sfax. Associate Professor and researcher at the Laboratory of Molecular and Cellular Screening at the Centre of Biotechnology of Sfax. Current research includes screening of biomolecules and CRISPR /Cas editing in zebrafish.

Saber Masmoudi: PhD degrees in Biology engineering from the National School of Engineers, Sfax. Professor and the head of the Laboratory of Molecular and Cellar Screening at the Centre of Biotechnology of Sfax. Current research includes high-throughput molecular tests and identification of genes, screening of biomolecules and CRISPR /Cas editing in zebrafish.

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I. Ben Chabchoubi, N. Louhichi, A. Baanannou, S. Masmoudi, O. Hentati

Acute toxicities of Ketoprofen and Paracetamol in Danio rerio embryos

The non-steroidal anti-inflammatory drugs (NSAIDs) have a major attention nowadays due to their great consumption by people who can be buy them without prescriptions. Most importantly, the lack of regulations of discharges of pharmaceutical wastes in aquatic environments represents a great concern for animal and human security.

The present study was designed to analyze the effects of NAIDs such as Diclofenac and Ibuprofen on zebrafish embryos e.g. malformations and heartbeats' rate. The test was performed in accordance with OECD TG 236 (OECD, 2013), the Fish Embryo Toxicity Test (FET). Zebrafish embryos (n = 20 per treatment group) exposed for 120 hours to each solution were analyzed for lethal effects according to OECD TG 236 as well as sub-lethal alterations. The calculation of the LC50 was based on the four main criteria of the FET: coagulation of the embryo, absence of heartbeat and blood circulation, absence of tail detachment and of somite formation. The EC50 calculation was based on at least one of the following effects: blood congestion, pericardial edema, yolk sac edema and yolk sac enlargement. In addition, special attention has been paid to the ocular effects associated with non-steroidal anti-inflammatory drugs, which are currently being investigated as new thyroid-related parameters in fish (Baumann et al., 2019).

Endpoints were monitored every 24 hours until the end of the test using a Stemi 2000-C stereomicroscope (Zeiss, Göttingen, Germany) and captured using the Zeiss Axiocam 105 color camera. In addition, heartbeats' rate was monitored for 1 minute after 48, 72 and 96 h of exposure.

After exposure to Ketoprofen and Paracetamol, the LC50 values were 1.52 and 3.27 mg/L, respectively. On the other hand, the EC50 was 1.91 and 1.12 mg/L after Ketoprofen and Paracetamol exposure, respectively.

Further investigations including additional assessment criteria, i.e.: axial malformation (scoliosis, lordosis), hyperactivity/decreased movement and decreased eye size, are necessary to identify the underlying modes of action and unambiguously interpret the toxic potential of the select NSAIDs

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STUDIES ON ANTIBACTERIAL ACTIVITY OF ACTINOBACTERIA ISOLATED FROM MOROCCAN ECOSYSTEM AGAINST A FRESHWATER PSYCHROPHILIC BACTERIUM

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INTRODUCTION

During the last decade, the productivity of the aquaculture industry has been intensified. Currently, it is a major economic activity in many countries (FAO. 2007). The massive production on salmonids farms can expose fish to stressful conditions which cause pathogenic infections; the most common is the cold water flavobacteriosis caused by *Flavobacterium psychrophilum*, this one is manifested in two pathological forms: deep ulcerative lesions appear on commercial size animals and hemorrhagic septicemia in fry and fingerlings with little or no external signs. (Wakabayashi, 1991). Infections are always prevented and controlled by veterinary medicine (Randgal et al., 1997). But the benefits of antimicrobial agents are often influenced by the selection of resistant pathogens (Nematollahi et al., 2003).

Thus, alternative strategies to minimize infections due to opportunistic pathogens are highly demanded in aquaculture and, following the development of bacterial resistance against the used chemical medicine (Maeda et al. 1997) especially in total absence of probiotic treatments, the present study aims to find a biocontrol against this pathogen, through a screening of the substances produced by actinobacteria ability of inhibit his development and pathogenicity.

MATERIALS & METHODS

Forty five strains of actinobacteria were isolated from different Moroccan ecosystems, then were grown and purified in Bennett agar medium. The antibacterial activity of isolates was tested against all *F. psychrophilum* strains by the Agar cylinders technique (Bauer et al, 1966). The production of bioactive substances is manifested by the presence of an inhibition zone around the agar disk (Figure 1).

Figure 1: photos showing the activity test by the agar cylinders technique

RESULTS & DISCUSSION

The screening results showed that 52% of tested isolated actinobacteria have an inhibitory effects on one or many strains of *F. psychrophilum*, three of which are among inhibited all eight strains of *F. psychrophilum* tested (table 1) and are therefore potential agents to fight against flavobactériosis.

Table 1: table summarizing the inhibition diameters

Actino-bacteria	The reference strains							
	CAE 445	CAE 540	CAE 607	CAE 817	CAE 738	CAE 733	CAE 442	CAE 739
OE7	47 mm	49 mm	46 mm	38 mm	41 mm	42 mm	52 mm	40 mm
OE11	40 mm	35 mm	35 mm	33 mm	30 mm	37 mm	60 mm	35 mm
Ph20/a	43 mm	39 mm	41 mm	35 mm	35 mm	44 mm	42 mm	40 mm

CONCLUSION

This preliminary study showed that actinobacteria could be a potential biocontrol agent against *Flavobacterium psychrophilum* which is a bio-aggressor agent responsible for significant mortality in fry Salmonideae worldwide. This will be followed by other secreening tests to discover the bioactive molecules produced by the isolated strains that inhibited all *F. psychrophilum* strains tested.

A. Krituhi, K. Ouaissa, M. Hasnaoui

Studies on antibacterial activity of actinobacteria isolated from Moroccan ecosystem against a freshwater psychrophilic bacterium

Rainbow trout (Oncorhynchus mykiss) is a salmonid bold, easy to lay and rapid growth. It is a species well adapted to the Moroccan climate and it is high in the cold waters in the region of Azrou. However, several diseases and pests can affect its intensive farming and cause significant mortality of trout in the early ages and this even though in some cases and under the permission of the veterinarian, antibiotics and other pharmaceutical products are prescribed and used for treatments.

Furthermore, it was noted that certain microorganisms developing resistance to broad-spectrum antibiotics, among these microorganisms, we find the species Flavobacterium psychrophilum, which is a Gram-negative bacterium, filamentous, rod-shaped. This bacterium is part of the bacterial flora of the skin of the fish and the aquatic environment (Bullock. 1972; Bullock and Snieszko. 1981) and because that the flavobacteriosis qualified as cold-water disease.

In order to fight against this pathogen, a screening program of bioactive substances has been developed which consists of among others the screening of Moroccan ecosystems actinobacteria capable of producing bioactive molecules against F. psychrophilum. Many isolates showed activities vary according to pathogenic strains and testing biological and chemical characterization of these activities is possible.

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Mortality of *Micropterus salmoides* (Lacépède, 1802) and *Cyprinus carpio* (Linneaus, 1758) and *Oreochromis niloticus* (Linnaeus, 1758) (Al-Massira dam Lake, Morocco)

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INTRODUCTION

Morocco has potential for the development of the continental fish farming sector, represented by a rich and diversified hydrographic network and a varied climate according to the regions, which has allowed the acclimatization of many freshwater species. These include Micropterus salmoides, Common Carp and Nile Tilapia. They contribute to the improvement of natural stocks and are intended for human consumption as well as for sport fishing.
These 3 species are under intense fishing pressure as their flesh is highly valued by the local population.
Management measures must be taken to avoid the collapse of the stock of these species and to ensure rational and sustainable management of these resources.

Material and Methods

Data collection:
- The samples were collected from Al-Massira dam.
- Total length measurements (Tl) of 233 fish were carried out.

Estimation of the total mortality coefficient (Z):
The method used is that of Jones and Van Zalinge (1981).
The equation is as follows: Ln (C (Li, L∞)) = a + Z/K Ln (L∞ -Li)

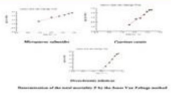
Estimation of the natural mortality coefficient (M) :
In our study, we used the method of Pauly (1980) which takes into account the growth parameters of the species studied and the average temperature of the waters frequented by the fish at the time of its capture. The equation of Pauly (1980) is :

Log M = -0.0066-0.279 Log(L∞) + 0.6543 Log (K) + 0.4634 Log (T°)

RESULTS AND DISCUSSION

Fishing mortality (F):
Fishing mortality is an essential parameter for studying the dynamics of an exploited stock. It is calculated by : F = Z-M

Exploitation rate (E):
The exploitation rate E is the ratio of individuals that died from fishing to the number of individuals that died from various causes. It is determined by the following formula: E = F / Z = F / (M + F)



Determination of mortality parameters (year-1) by the Jones Van Zalinge method

Species	Mortality (Z)	Mortality (M)	Mortality (F)	Exploitation rate (E)
Micropterus salmoides	3.9	0.93	2.99	0.42
Cyprinus carpio	2.3	0.97	1.33	0.58
Oreochromis niloticus	2.89	0.64	2.25	0.78

The value of the total mortality coefficient (Z) for the whole population was estimated using Fisat II software.
At this dam Lake, fishing mortality for all three species is higher than natural mortality. The exploitation rate is higher than the optimum reference rate of 0.5. These results reflect the state of overexploitation of the species in this sector.
Our results are similar to those found in Turkey by Alp and Balik (2000) and in Kenya by Njiru (2017). However, lower values were found in the work of Winker (2011) in South Africa and Mirza (2012) in Pakistan.

CONCLUSION

This study provides for the first time information on the exploitation parameters of Micropterus salmoides, Common Carp and Nile Tilapia caught in the Al Massira Dam.
It reports that these three species suffer fishing mortality far in excess of natural mortality and are in a state of overexploitation.
In view of these results, corrective measures are recommended to allow a better management of the current stocks, a sustainable recovery of these species in order to avoid the collapse of its stock.

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S. Ouahb, M. Bousseba, L. Ferraj, M. Hasnaoui

Mortality of Micropterus salmoides (Lacépède, 1802) and Cyprinus carpio (Linneaus, 1758) and Oreochromis niloticus (Linnaeus, 1758) (Al-Massira dam Lake, Morocco)

The present study is to address the stock status of Micropterus salmoides, Cyprinus carpio and Oreochromis niloticus at one of the interesting dam lakes in Morocco.It aims at estimating the important parameters necessary for the evaluation of the stock dynamics of these species which are economically important resources in Morocco where they are exploited by the commercial fishery.A better understanding of the dynamics and regulation of these species in this site is essential for the sustainable management of their stocks.

The FISAT II software was used to analyze the length data of 233 specimens caught at the Al Massira dam Lake between September 2020 and May 2021.The total length of the sampled fish varied from 17.5 to 37 cm for Micropterus salmoides, from 14.5 to 43 cm for Cyprinus carpio and from 10.5 to 43 cm for Oreochromis niloticus.

Total mortality (Z), fishing mortality (F), natural mortality (M) and exploitation rate (E) for Micropterus salmoides are respectively 2.5, 1.55, 0.95 and 0.62. For Cyprinus carpio, these parameters are 2.3 (Z), 1.33 (F), 0.97 (M) and 0.58 (E). For Oreochromis niloticus, they are recorded at 2.89 (Z), 2.25 (F), 0.64 (M) and 0.78 (E).

The high exploitation rate (>50%) and fishing mortality of all fish species analyzed in this study indicate that there is a sign of overfishing of these fishery resources in the waters of Al Massira dam Lake. Therefore, sustainable fisheries management is necessary to prevent the depletion of these important fisheries resources.

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Linear and weight growth parameters of *Micropterus salmoides* (Lacépède,1802) in Moroccan fresh waters

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INTRODUTION

The black bass is a freshwater fish native to South America, particularly the Mississippi basin and the Great Lakes region. It is one of the largest carnivores next to perch, pike and pikeperch, and one of the most widespread aquatic species in the world providing recreational fishing opportunities, preferring calm waters with slow currents and great depths, and characterised by a rapid growth rate, generally reaching adult size in 3 years. In order to ensure a sustainable exploitation of this species, we undertook a study of some parameters of weight and linear growth in males and females of black bass at the Al-Massira dam.

MATERIEL AND METHODS

Data collection:

- The sampling was carried out over a period of 5 months between September 2020 and January 2021.
- Measurements of total length and total weight were carried out on a sample of 81 fish (Micropterus salmoides) (48 females, 33 males).

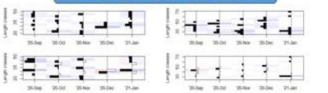
Relative growth or total weight-total length relationship:

Relative growth provides information on the overweight of the fish and is necessary for the estimation of fish biomass and the analysis of ontogenetic changes and different aspects of the population dynamics. This weight-length relationship is of the power type: $TW = aTL^b$

Determination of linear growth parameters:

To determine the linear growth parameters the Von Bertalanffy model was used based on the length-frequency data (LFQ) which were estimated by the ELEFAN _GA method using the TropFishR package integrated in the R language.

RESULTS AND DISCUSSION

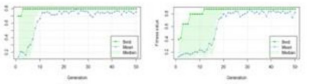


Females Males

Raw length-frequency data (a) and after restructuring (b) with MA = 5

Comparison of the parameters of the size-weight relationship in black bass with the results of other authors:

Species	Authors	Study regions	a	b
Micropterus salmoides	Keyombe and al. (2020)	Kenya (Lake Naivasha)	0.0082	3.1419
	Schulz and Leal (2005)	Brazil (reservoir in southern Brazil)	2.32	3.28
	Current study	Morocco (Al Massira Dam)	♂ : 0.0098 ♀: 0.0053	♂ : 3.1335 ♀: 3.2769



Females Males

Graph of the ELEFAN_GA optimization routine based on genetic algorithms

Growth parameters of *Micropterus salmoides* in different regions:

Species	Geographical area	L_∞	K	φ'	References
Micropterus salmoides	Kenya	50.8	0.46	3.07	Britton and Harper (2005)
	South Africa	42.0	0.33	2.77	Taylor and al. (2017)
	Morocco	♂ 43.17 ♀ 39.81	♂ 0.23 ♀ 0.15	♂ 3.63 ♀ 3.63	Current study

- In our study we found that b is higher than 3, so the growth of black bass is allometrically dominant, and its weight growth is higher than its size growth. These results are similar to those found in KENYA Keyombe and al. (2020) and BRAZIL Schulz and Leal (2005).
- It was also noted that the K value at the Al-Massira dam is high compared to other regions due to the optimal conditions of its habitat.
- There is also a dissimilarity of L^∞ values compared to other studies which is probably due to the variation of samples, methods used, and habitat characteristics.

CONCLUSION

The study of the length-weight relationship showed a good correlation between the total weight and the total length of black bass. The clarification of the knowledge on the growth of black bass in particular in the Al-Massira dam reservoir showed a good growth of this population in reference to other studies in other geographical areas.

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L. Ferraj, M. Bousseba, S. Ouahb, M. Hasnaoui

Linear and weight growth parameters of Micropterus salmoides (Lacépède,1802), in Moroccan fresh waters

Micropterus salmoides is of socio-economic interest and a sport fishery in Morocco. This noble fish has shown a good capacity of acclimatization to Moroccan conditions. Information on its bio-ecology is urgently needed to develop a sustainable resource policy for this species in Morocco.

The present work consists in establishing a study of the growth biology of males and females of Micropterus salmoides. For each specimen, the total length was measured and its total weight was weighed.

The study was based on a set of 81 specimens (48 females, 33 males) captured at Lake Al-Massira during 5 months (from September 2020 to January 2021). The length-weight regression was W= 0.0055LT3.2769 (females) and W = 0.0098LT3.1135 (males) with no significant difference between sexes.

The parameters of the Von Bertalanffy growth curve based on the frequency-length (LFQ) data were estimated by the ELEFAN _GA method using the TropFishR package embedded in the R language. These parameters are: L∞ = 43.17, K = 0.23 and t_anchor= 0.61 for females and L∞ = 39.81, K = 0.15 and t_anchor= 0.53 for males.

The sex ratio is 59.26% females and 40.74% males. The condition factor indicates that the population of Lake Al-Massira is in excellent condition.

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Aging effect on the reproductive output of silver carp (*Hypophthalmichthys molitrix*, Valenciennes, 1844)

Fatima-Zahra MAJDOUBI, Anouar OUIZGANE, Sana FARID, Mohammed DROUSSI,Mustapha HASNAOUI

Fatima-Zahra Majdoubi is an agro-food processing engineer and a PhD in life science. Her research interest is the improvement of fry production of freshwater fish, especially silver carp which has an economic and ecologic importance in Moroccan inland aquaculture. Her work was published in Scopus indexed journals (5 manuscripts) and she participated in national and international conferences.

1.Introduction:

Nowadays, there is an increasing interest in fry production of fish species that have an economic and ecologic importance. In fish farms, many efforts have been made in order to determine the safe time lapse in which eggs remain viable even if stripping was performed after the moment of ovulation.

In Morocco, Silver carp has significant importance in inland aquaculture. It's used as a performant tool for:

-Improving the quality of drinking water, eliminating the algae responsible for its degradation

-Its growth performances are significantly high (more than 8 g/day in Moroccan dam lakes), which makes this specie an important source to ensure food supply and to develop commercial fisheries.

The present study deals with the evaluation of the effect of ova aging of silver carp caused by suturing female genital papilla. It seeks to determine how long the eggs, when ready to be stripped, can remain in the ovarian cavity without affecting reproductive success and fry production.

2.Materials and methods:

Induced breeding :The experiment was carried out at Deroua fish farm in Morocco. Healthy, mature Breeders were transferred to the hatchery and given a hormonal injection to induce ovulation (females) and spermiation (males).

For a successful striping, at ovulation, fish are anesthetized in a clove solution to facilitate handling and to avoid stress. The ova of the same female were stripped at ovulation as well as at 30, 60 and 90 minutes after ovulation. The retention of ova in the female cavity post-ovulation was achieved by suturing the female's genital papilla.For each female and at every retention period, ova were immediately fertilized by sperm obtained from at least 3 males. Then, eggs were held in incubators with a volume of 40 liters at 23-24°C.

Viability rates : $\textbf{Fertilization rate (FR)} = \frac{\text{number of developing eggs}}{\text{total number of eggs in the sample}} \times 100$ $\textbf{Embryos survival rate (ESR)} = \frac{\text{number of viable embryos}}{\text{total number of embryos in the sample}} \times 100$

Eggs sampling and determination of total proteins and total lipids A sample of 3-4 g of unfertilized eggs were collected at ovulation as well as 60 and 90 min post-ovulation.The total proteins were determined using **photometry method at 540 nm**. Lipids extraction was performed using **Folch and al.(1957) method**.

Statistical analysis:Data were analyzed using SPSS version 23 (IBM Corporation, Somers, NY, USA). We used one-way ANOVA and Graphs were generated using Microsoft Excel 2016.

3.Results and Discussion

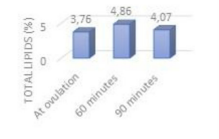
The highest fertilization rates (FR) were recorded for eggs stripped at ovulation followed by those fertilized 30 minutes after ovulation 63.26%. This rate (FR) dropped to 44.48% for eggs obtained at ovulation and 90 minutes' post-ovulation (figure 1). Embryos survival rate declined progressively during aging. This rate was high for eggs obtained at ovulation with an overall average of 44.99%. After 90 minutes' post-ovulation, the embryos survivability declined to reach 27.6%.The one-way ANOVA highlighted the strong effect of the post-ovulatory aging on the fertilization rate and the survival of the embryos (ESR). The present study showed that silver carp ova can be retained only for 30 minutes without impacting, significantly, the eggs viability. High proteins concentration was obtained in eggs stripped at ovulation 2.21%. After 90 minutes, the concentration of proteins was lower and reached 2.05% (figure 2). Moreover, total lipids levels increased from 3.76% to 4.86% then it dropped to 4.07% in eggs stripped at ovulation, 60 and 90 minutes after ovulation, respectively (figure 3). Further, the one-way ANOVA demonstrated that no statistical difference between the means of proteins and lipids during the aging phenomenon.

4.Conclusion: 1)Aging impacts the fry production of silver carp. It leads to a significant decrease of eggs viability (fertilization rate, survival of embryos) with the increasing ova retention time in the female ovaries.2)Safe retention time during which eggs can preserve their optimal viability was set to 30 minutes of post-ovulation. This fact proves that the stripping time of silver carp eggs after ovulation is a critical step during its breeding manipulation.3)The biochemical approach revealed that the main energetic components, total lipids and proteins, do not vary during the ova retention.

Figure 1:Variability of Fertilization rate (FR), Embryos survival rate (ESR) during aging

Figure 2: variation of total Proteins (g /dl) during aging

Figure 3: variation of total Lipids (% wet weight) during aging



F.Z. Majdoubi

Aging effect on the reproductive output of silver carp (Hypophthalmichthys molitrix, Valenciennes, 1844)

Nowadays, there is an increasing interest in fry production of fish species that have an economic and ecologic importance. In fish farms, many efforts have been made in order to determine the safe time lapse in which eggs remain viable even if stripping was performed after the moment of ovulation. Silver carp have been introduced in Moroccan inland waters to ensure water quality. After introducing it in 1983, this specie was successfully acclimatized and reduced the algal blooms significantly. Also, its rapid growth makes of it a sustained food resource to cover the protein demand of the population leaving near to water dams.

The present study was performed in Deroua fish farm and it deals with the evaluation of the effect of ova aging of silver carp (Hypophthalmichthys molitrix) caused by suturing female genital papilla. It seeks to determine how long the eggs, when ready to be stripped, can remain in the ovarian cavity without affecting reproductive success and fry production. Eggs quality was determined by assessing variability of fertilization success, survival of embryos for ova stripped between 0-90 minutes after ovulation. The obtained data revealed that eggs quality decreased during in vivo retention. The fertilization success at ovulation was 70.24% then declined to 31.2% in ova stripped after 90 minutes' post-ovulation. Further, the ova retention for 90 minutes decreases the survival of the embryos by 36 % which causes a fail in fry production of this specie.

On the other hand, the study investigated about the changes of total lipids and total proteins in the retained ova. These components are considered as the main ener getic source used for embryo's development. The results revealed that the concentration of the cited components didn't vary significantly from ovulation to 90 minutes of post-ovulation. The values were 2.21% for proteins and 3.76% for lipids at ovulation and 2.05 % for proteins and 4.07% for lipids at 90 minutes' post-ovulation.

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ASSESSMENT OF SEDIMENT QUALITY IN LAKE DAYET ER-ROUMI (MOROCCO) USING METAL CONTAMINATION INDICES

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INTRODUCTION

The metallic contamination of surface sediments has attracted researchers' attention from very different horizons. According to Forstner and Wittman (1981), a significant fraction of heavy metals in the aquatic environment is reversibly associated with surface sediments, providing access to a more or less complete record of the state of contamination in aquatic environment. Lake Dayet Er-Roumi (SBEI) is the only permanent natural lake in the Khemisset region, but this lac has experienced fluctuations linked to climatic hazards and anthropic activities. A complete diagnosis of the current pollution situation is essential to safeguard this ecosystem. Our work's perspective consists of evaluating the metal quality of the lake's sediment during the winter season of the year 2019.

MATERIALS AND METHODS

- **Study area**

Dayet Er-Roumi situated on the territory of three rural communes. It is characterized by a semi-arid climate with a maximum summer temperature of 38°C and a minimum winter temperature of 7°C and a Mediterranean rainy regime.

- **Sampling**

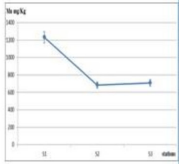
The choice of sampling sites was made based on lakeside activities. Five sampling stations are selected representing the area's most likely to be affected by human activities. Sediment samples are taken using an Ekman grab.

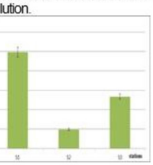
- **Statistical Analysis**

A calculation of the Contamination factor (FC), and a Degree of contamination (DC) are carried out. The FC is expressed by the following formula FC=Cx/Bgx with Cx: concentration measured for an element x, Bgx: Background for an element x. Contamination classes are defined for FC (Förstner and Wittmann1981; Hakanson1980) FC<1(absence to low contamination), 1≤ FC<3 (moderate contamination), 3≤ FC<6 (significant contamination), 6≤ FC(very high contamination). The DC is calculated according to the following formula (Hakanson 1980): DC=Σ FC. This index is associated with 4 quality classes: DC<6 (low contamination), 6≤DC<12 (moderate contamination), 12≤DC <24 (significant contamination), 24≤ DC (very high contamination).

Results and discussion

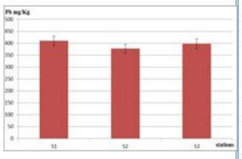
Concerning the Mn, the concentrations vary between 1232.5 mg/kg and 684.96 mg/kg. The maximal concentration was observed at S1, which indicates an anthropogenic activity (uncontrolled use of fertilizers and pesticides). The values recorded largely exceed the recommended standards (CCME 1999 and OMEE 1993). These results show the vulnerability of the lake to extreme pollution.





Zinc values varies between 993.94 mg/kg and 196.51mg/kg, the maximal value was recorded at S2. The high concentration is associated mainly with anthropogenic activities. Our results show that the average zinc concentration far exceeds the recommended standards (CCME 1999 and OMEE 1993). These high concentrations can have adverse effects on the aquatic environment.

Lead values varies between 410.66mg/kg and 377.21 mg/kg, the maximum value was recorded at S1. These results show that the average lead concentration greatly exceeds the recommended standards (CCME 1999 and OMEE 1993).



The index approach also makes it possible to identify priority polluted sites. It is found that the FC-Mn is greater than 1, which reflects enrichment by these elements with moderate contamination. For the FC-Zn and FC-Pb, the sediments of all sampling sites have FC greater than 6, reflecting enrichment or even contamination by this element, which is considered extremely toxic to wildlife. The calculation of FC shows that the sediments of the lake are highly contaminated by the metals studied. For DC, the analysis of the results reveals polymetallic contamination dominated by two or more elements. The averages DC exceed the maximum class threshold defined by Hakanson (1980) indicating significant contamination for all stations with an average DC of 35.97, this value indicates significant polymetallic contamination. (Table1).

Station	Mn mg/kg	Zn mg/kg	Pb mg/kg	FC			DC
				Fc Mn	Fc Zn	Fc Pb	
S1	1232,5	993,94	410,66	2,33883	19,1142	241,567	45,6098
S2	684,9	196,5	377,3	1,2997	3,7791	22,189	27,267
S3	709,44	534,54	388,146	1,34618	10,2796	23,4203	35,0462
Average	875,656	574,999	385,341	1,66158	11,0576	23,2553	35,97463

Conclusion

Overall, it appears that the levels of metallic trace elements (MTE) show Manganese, Lead, and zinc enrichment. This inventory reflects the direct influences of anthropogenic inputs. The various contamination indices calculated revealed situations of concern for several stations and several MTE. Cases of polymetallic contamination dominated by two or more elements have been recorded (zinc and lead being the most worrying). All analyses show significant concentrations in the sediment.

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S. El ghizi, S. Hssaissoune, M. El bouch, M.Sadik, M.Hasnaoui

Assessment of sediment quality in Lake Dayet Er-Roumi (Morocco) using metal contamination indices

Sediments are an essential compartment in aquatic ecosystems, they play an important role for many animals and plants as a biotope or spawning site, but they can act as a reservoir of micropollutants and then as a potential source of contamination for fauna and flora. Dayet Er-Roumi Lake is the only permanent natural lake in the region of Khemisset (Morocco), it also has a very important biological interest because it's a refuge and a vital feeding area for migratory birds and also shelters very important fish species, etc. This wetland is affected by several forms of pollution that are linked in particular to human activities (agricultural, domestic, industrial, etc.). The objective of this work is to evaluate and quantify the metallic contamination of the sediments of Dayet Er-Roumi Lake through spatio-temporal monitoring of certain toxic heavy metals such as Cd, Mn, Pb, and Zn. Metal analyzis carried out at three measuring points during winter season reveal high concentrations of Zn, Mn, and Pb, which largely exceed the recommended standards. The calculation of indices, such as the pollution load index, degree of contamination, and contamination factor, reveal polymetallic contaminations dominated by two elements, zinc and lead, which are the most worrying. These results state that the Dayet Er-Roumi Lake is highly polluted. The strategies to limit the pollution of the lake must be put in place to protect and maintain this site classified as a site of biological and ecological interest.

7th CUCS Conference | Naples, 21st - 23rd April 2022
UNIVERSITY COOPERATION IN THE NEW CHALLENGES FOR SUSTAINABLE DEVELOPMENT
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MUNA Mediterranean and Middle East University Network Agreement

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MANAGEMENT OF RELEASES FISH OF RAINBOW TROUT (ONCORHYNCHUS MYKISS) BY A MINIMIZATION APPROACH TO FISH FEED

Khadija OUAISSA received the doctoral degree on Environment and aquaculture in the faculty of sciences and techniques. University of Sultan Moulay Slimane, Beni Mellal, Morocco. She has presented numerous papers in congress and conferences. And also published many papers in reputed journals during her phD research. Her research interest is on environment and aquaculture.

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Mustapha HASNAOUI, professor at the faculty of sciences and techniques. University of Sultan Moulay Slimane, Beni Mellal, Morocco and the director of research head of the Environmental, Ecological and Agro-industrial Engineering Laboratory and He is also the editor in-chief to the journal of water and Environmental sciences and en environmental and aquaculture expert.

I. Introduction:

In order to maintain a high physical, biochemical and nutritional quality of the fish feed, extrusion technology is the main technique used [Hilton et al., 1981]. The extruded feed produced has many advantages, including reduced feed waste, improved feed efficiency and reduced bacterial contamination. Feed is known to be the most important cost of production of aquaculture production. As a result, there is a big effort to reduce feed costs by using low-cost ingredients. This extrusion process makes it possible to concentrate the protein content of vegetable flours by eliminating the maximum amount of fiber and reducing their content of antinutritional factors by making their feed compounds more digestible [Burel and Médale, 2014]. The comparative test of the three feeds (A, B and C) carried out in the Oum Er-Rbia fish farm showed that feed B had a better zootechnical yield with fewer rejects [Ouaissa et al., 2017]. Based on the biochemical composition of the high-performance feed B found in the comparative test, this present study has the specific objective of producing a high-performance and ecological feed with Moroccan raw material.

II. Material & Methods:

1. Formulation

Formulation elaborated is rich in raw materials of plant origin with a content of 60% and 40% of animal origin. The formulation is elaborated by the extrusion system of two screws. The experiment was conducted using the ingredients necessary to provide the nutritional requirements of trout in the required amounts of protein, fat and energy, essential fatty acids and premix (vitamins and minerals).

2. Experimental device

The experiment was carried in September 2017 at the rainbow trout farmin station of Oum-Er-Rbia (Morocco). The magnification basins were supplied with spring water of Oum Er-Rbia at a constant temperature about 14°C, with a water renewal time every half hour (48 times/day) and an oxygen saturation rate of 90 %. 600 trout with an average weight of ± 500g from the same batch of eggs were distributed randomly in both basins (2 repetitions). These fish are then fed manually with a daily ration distribution at 8 am and every 15 days, 90 fish are caught in each basin and anesthetized after 24 hours of fasting to measure zootechnical performances.

3. Rate of phosphorus releases in the outlet water of magnification basins

To estimate the concentrations of phosphorus releases (PO_4^{3-}) at the outlet of the basins, water samples are taken at a bi-monthly frequency. The releases are also measured at the outlet of both basins. phosphorus was measured by Spectrophotometry after mineralization followed by acid hydrolysis according to the AFNOR (1983) standard (NFT90-023).

III. Results & discussion:

The experiment was carried out under the same conditions for both feeds (Reference Feed B and the feed elaborated (F1)).

Table1 shows the remarkable growth of rainbow trout during the experimental period. In fact, the trout fed on the processed feed showed a significant growth with 988 g for 43 days (23g / day) compared to the reference feed B where the trout reached a weight of 1043.9 g in 50 days (21g/day).

Table 1. Growth performance of Rainbow trout fed by diets (F1 and B)

Settings	Elaborated feed (F1)	Reference feed (B)
Initial weight (g)	580.7	577.6
Final weight (g)	1043.9	988
Weight gain	463.2	410.4
Number of days	50	43
Daily growth (g/j)	9.26	9.54
Survival rate	99.65	98.83
Conversion index	0.90	0.82

Figure 1 indicate a low concentration of phosphorus released by fish fed by (F1) with (0.078 mg /L) this amounts to a mastery in the manufacturing process by better gelatinization and better extrusion cooking because the precise temperature of the extrusion and the moisture makes the phosphorus of plant origin assimilable by the fish and subsequently a good absorption by ingestion which minimizes the phosphorus discharges in the fish effluents.

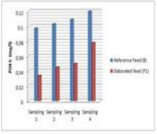

Figure 1 : Evolution of the phosphorus concentration in the outlet of the basins.

IV. Conclusion

The reduction of fishery products for the feeding of farmed fish by substitutions is the criteria of sustainable development, and one of the main challenges for the future of aquaculture.The ecological feed developed fully meets the nutritional needs of rainbow trout since this species showed better growth with a final weight of 988.5g for 34 days (29.07 g / day) with low phosphorus releases.

Aziz Meychal, Production Manager at Ain Aghbal fish farming in the agricultural domains.

Youness Oumessoud, production quality manager at Ain Aghbal fish farming in the agricultural domains

K. Ouaissa, A. Kritihi, A. aziz Maycha, Y. Oumessoud, M. Hasnaoui

Management of releases fish of rainbow trout (Oncorhynchus Mykiss) by a minimization approach to fish feed

The increase in world population and the increase in the average per capita consumption of fish, resulting the improvement in the quality of people life in developing countries, have led to an explosion in the demand for fish.

For both reasons ,economic and ecological, the comparative trial of the three feeds (A, B and C) carried out within the Oum Er-Rbia grow-out station made it possible to retain that feed B presented a better zootechnical performance and low reject fish.

In this sense, the recommendations of this trial on the issue of the economy / environment interaction have made it possible to continue research in order to develop an ideal and ecological feed.

The experiment was conducte at Oum-Er-Rbia fish farm, which is located almost 70 km from Azrou (Morocco). The magnification basins were supplied with spring water at a constant temperature about 14 ° C, with a water renewal time every half an hour (48 times / day) with an oxygen level of 90% of the water saturation. 600 trouts with an average weight of 500g from the same batch of eggs were randomly distributed at the two basins (2 repetitions). Every 15 days, 90 fish were caught in each pool and anesthetized after 24 hours of fasting to measure the size and weight of each fish, weight gain, feed conversion index, rate growth factor (SGR) and factor condition (K).

The results revealed that the rainbow trout fed with the elaborate feed showed better growth performance with a final weight of 1060g for 45 days while preserving the environment since the nitrogen and phosphorus discharged are negligible.

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Agenda 2030 and a Sustainable Future

COOPERATION IN TIMES OF EMERGENCY AND BEYOND: VIRTUAL, IN SILICO AND *IN VITRO* OR IN VIVO WET LABS FOR TRAINING INNOVATORS OF SUSTAINABLE DEVELOPMENT AND IMPROVING LIFELONG LEARNING OPPORTUNITIES.

Rosanna del Gaudio, PhD
Aggregate Professor of Molecular Biology at Federico II, University of Napoli

Her research activity-applying typical molecular biology methods, Bioinformatics and cito-hystological approaches- is focused mainly on problems related to the Life evolution, to molecular mechanisms involved in gene expression (alternative splicing) under environmental stress, to genetic code in relationship between pathogens and cells. Co-author and co-owner of an international patent on catalytic activities of terrestrial rocks and meteorites. Member of the NoRCEL Network, SIA. UMS reviewer team.

This contribution highlights findings about Innovative Continuing Professional Development and Learning (ICPDL) activities realized implementing CLIL (Content and Language Integrated Learning) teaching, ICT tools with IBSE (Inquiry Based Science Education) methodology.

Here I present a new interdisciplinary teaching proposal to improve High School students involvement through digital learning resources for Science education, through laboratory experiences of comparison and sharing that increase student participation and bring the class to a much higher communication level, and not only in English language (1)

Due to the beginning of the COVID-19 pandemic it was impossible to carry out any activity in person, because both the teachers and the students could not access the classrooms and the laboratories. To give a sense of continuity and normality to my undergraduate students, I started documenting and learning by myself choosing, and using some innovative technologies, to provide a suitable alternative to face-to-face laboratory activities (2, 3).

I reinvented molecular biology hands-on laboratory of my molecular biology teaching course (degree in Biology) during the COVID-19 pandemic, and I applied the lessons learned during my academic activities to High School students participating in the second edition of the Italian PLS Virtual Summer School (http://www.pls.unina.it/home/pubblicazioni/) and P.C.T.O activities (Orientamento Scuole | Dipartimento di Biologia – Università degli Studi di Napoli Federico II (unina.it).

Interactive learning and teaching; evaluation and feedback; open educational resources, students as producers and co-authors, are some methodological and operative ideas of my proposal for an innovative use of ICT to support teaching and to develop soft skills, transversal skills transferable in different contexts of study, work and/or personal life **(Fig. 1** and **Fig. 2**).

Science Education Resources at "Jove.com" and/ or MOOCs (Federica WebLearning) and virtual laboratory simulations (Labster.com) (**Fig.3**) were used as new tools in a risk-free simulated learning environment, to implement and make effective the teaching of STEM disciplines.

Moreover, the variety of languages of virtual laboratory simulations has been and will be an additional value for a different learning context useful to potentiate also learning of foreign languages learning with an inclusive experience in learning key science concepts.

In conclusion, although it is difficult to replace the "hands-on" experience of a real laboratory environment, I got a very positive in silico experience with Federico II university students and during last (2021) PVS3 edition (www.pls.unina.it). The overturning of some theoretical lessons in synchronous virtual simulations will be the basis of new creative and inclusive activities that students will be able to carry out in the future with greater mastery and confidence in a real laboratory with their own teachers or instructors in real scientific laboratories. Protocols of new activities will be one of the expected results building University-Industry cooperation networks for training innovators of sustainable development while also improving the inclusive, equitable Lifelong Learning opportunities.

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Figure 1

Figure 2

Figure 3

R. Del Gaudio

Cooperation in times of emergency and beyond: virtual, in silico and in vitro or in vivo wet labs for training innovators of sustainable development and improving Lifelong Learning opportunities

This contribution highlights findings about Innovative Continuing Professional Development and Learning (ICP-DL) activities realized implementing CLIL (Content and Language Integrated Learning) teaching, ICT tools with IBSE (Inquiry Based Science Education) methodology.

Here I present a new interdisciplinary teaching proposal to improve High School students involvement through digital learning resources for science education, through laboratory experiences of comparison and sharing that increase student participation and bring the class to a much higher communication level, and not only in English language.

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In conclusion, although it is difficult to replace the "hands-on" experience of a real laboratory environment,

I got a very positive in silico experience with my university students and during last (2021) PVS3 edition (www.pls.unina.it). The overturning of some theoretical lessons in synchronous virtual simulations will be the basis of new creative and inclusive activities that students will be able to carry out in the future with greater mastery and confidence in a real laboratory with their own teachers or instructors in real scientific laboratories. Protocols of new activities will be one of the expected results building University-Industry cooperation networks for training innovators of sustainable development while also improving the inclusive, equitable Lifelong Learning opportunities.

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Agenda 2030 and a Sustainable Future

TITLE: Why are Neglected Tropical Diseases (NTDs) persistent despite the significant efforts to eradicate them: case of Schistosomiasis in Burkina Faso?

Dr Frederic Compaore is an independent consultant in WASH and environment since 2014 and a researcher. He has performed research for many years on water related diseases. He is also the Head of the association United Citizens for Sustainable Development (UCSD) where he leads actions towards community well-being.

Dr Mariam SOU is a water and sanitation specialist for World Banks since 2019. Previously, she has worked for more than 12 years at the International Institute for Water and Environmental Engineering where she has occupied many positions from plain lecturer to the Head of Department of Scientific knowledge Management.

Professor Hamma Yacouba is currently the Secretary General of the International Institute for Water and Environmental Engineering. Prior to that, he has been the Director of research for many years. Affiliated to many professional associations, he is author and co-author of more than 50 papers and books.

Professor Jacques SIMPORE is a specialist of molecular biology/genetics. Doctor in Biochmy, Commander of the National Order, Member of the African Academy of Sciences, of Burkina Faso National Academy of Science, of the African Genetics Society. He has published 435 scientific articles (https://orcid.org/0000-0002-0415-9161) and supervised 51 unique PhD theses. .

Schistosomiasis is a water related disease caused by a parasite of the genus Schistosoma. Despites a significant effort to eradicate Neglected Tropical Diseases (NTDs), they are still exacting on human communities, as shown in figure2, a heavy burden estimated for the case of Schistosomiasis to 70 million Disability-Adjusted Life Years (DALYs). In order to achieve the SDG 3 related to NTDs by 2030, there is a necessity to figure out the factors governing this persistence of schistosomiasis, still endemic with high prevalence and high infection intensities, maintaining populations in poverty. The purpose of this study is to identify the health determinants of schistosomiasis persistence.

Three factors have been evaluated: the treatment method, the sampling method and the diagnostic technic. As regard to treatment, we assessed the accuracy of the World Health Organization height gauge (figure3) for drug doses estimation; the drug doses has been estimated according to each of involved 258 subjects' weight and their height and compared through Spearman ANOVA at 1% significance level. Regarding the sampling method for prevalence estimation currently based on school-age children effectively attending schools, we compared using Fisher Exact test at 5% significance level, the prevalence from three groups of people: scholarized children, non-scholarized school age children and the overall population of Panamasso, the village where the study has been performed. As regard to the diagnostic technic, we compared the traditional parasitological technic of Kato-Katz for stools samples screening to a molecular biology technic especially Real-Time Polymerase Chain Reaction.

A significant difference has been observed between the treatment adapted according to height and the normal one based on weight (p-value <0.0001). It appeared from the analysis of height-based doses, 50 cases of overdoses (19.38%), 117 (45.35%) cases under the normal dose and 91 (35.27%) cases of normal doses. Besides, according to World Health Organization (WHO) criteria, 50.78% of acceptable doses (30-40mg/Kg), 97.29% of appropriate doses (30- 60mg/Kg), 46.51% of optimal doses (40-60mg/Kg) and 2.71% of inaccurate doses (< 30mg/Kg) were noted. As for sampling method, we noted a significant difference between the prevalence (p-value = 0.307). As regard to the diagnostic technics comparison (table1), the Kappa indice of 0.634 indicated a substantial correspondence between the two methods; however, the PCR technic showed a sensitivity of 100% while the Kato-Katz technic showed a sensitivity of 57.14%.

The significant differences identified in this study revealed a very relevant issue: the one of accurate data shortage. Indeed, development plans in health sector are established based on data and the necessity of getting accurate data is well known. Considering the treatment based on height that entails low doses administration, these low doses contribute to develop a parasite resistance to treatment. As of today, praziquantel is the only one medicine used to treat schistosomiasis in the world (figure1) and a resistance of parasite will be a big obstacle to the eradication of the disease. Also, high doses of drug that entail violent adverse events in body will lead to people reluctance or refusal to take part to the mass treatment; another obstacle to disease eradication. As regard to the sampling method, the study revealed a significant difference between the reality and the data on which strategies are based. The sampling method based on scholarized children only does not allow getting the accurate disease profile that is the basis for health plans development. This is an important aspect to consider as the eradication of this debilitating disease relies on the ability to establish accurate disease profile. At last, the PCR technic showed that there is a high risk of not getting a real prevalence using Kato-Katz technic and then, that influences the decision making on the solutions to apply to eradicate the disease.

The emergency of using suited methods and tools to get accurate profile for the disease is a stake of major concern. A strong collaboration between world universities and stakeholders intervening in the fields of NTDs is a high level priority.

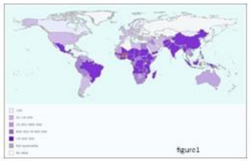

figure1

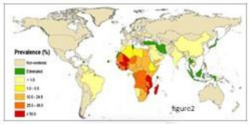

figure2

figure3

table1

		Kato-Katz		
		Positifs	Negatifs	Total
PCR	Positifs	4	3	7
	Negatifs	0	13	13
	Total	4	16	20

Kappa indice: 0.634 between [0.6-0.8] → substantial conformity.

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Why are Neglected Tropical Diseases (NTDs) persistent despite the significant efforts to eradicate them: case of Schistosomiasis in Burkina Faso?

Context: Despites a significant effort to eradicate Neglected Tropical Diseases (NTDs), they are still exacting on human communities a heavy burden estimated for the case of Schistosomiasis to 70 million Disability-Adjusted Life Years (DALYs). In order to achieve the SDG 3 related to NTDs by 2030, there is a necessity to figure out the factors governing this persistence of schistosomiasis, still endemic with high prevalence and high infection intensities, maintaining populations in poverty.

Objective: The purpose of this study is to identify the health determinants of schistosomiasis persistence.

Methods and Materials: Three factors have been evaluated: the treatment method, the sampling method and the diagnostic technic. As regard to treatment, we assessed the accuracy of the World Health Organization height gauge for drug doses estimation; the drug doses has been estimated according to each of involved 258 subjects' weight and their height and compared through Spearman ANOVA at 1% significance level. Regarding the current sampling method for prevalence estimation based on school-age children effectively attending schools, we compared using Fisher Exact test at 5% significance level, the prevalence from three groups of people: scholarized children, non-scholarized school age children and the overall population of Panamasso, the village where the study has been performed. As regard to the diagnostic technic, we compared the traditional parasitological technic of Kato-Katz for stools samples screening to a molecular biology technic especially Real-Time Polymerase Chain Reaction.

Results: a significant difference has been observed between the treatment adapted according to height and the normal one based on weight (p-value <0.0001). It appeared from the analysis of height-based doses, 50 cases of overdoses (19.38%), 117 (45.35%) cases under the normal dose and 91 (35.27%) cases of normal doses. Besides, according to World Health Organization (WHO) criteria, 50.78% of acceptable doses (30-40mg/Kg), 97.29% of appropriate doses (30-60mg/Kg), 46.51% of optimal doses (40-60mg/Kg) and 2.71% of inaccurate doses (< 30mg/Kg) were noted. As for sampling method, we noted a significant difference between the prevalence (p-value = 0.307). As regard to the diagnostic technics comparison, the Kappa Indice of 0,634 indicated a relatively weak correspondence between the two methods; the PCR technic showed a sensitivity of 100% while the Kato-Katz technic showed a sensitivity of 57.14%.

Discussion: The significant differences identified in this study revealed a very relevant issue: the one of accurate data shortage. Indeed, development plans in health sector are es-

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Conclusion: the emergency of using suited methods and tools to get accurate profile for the disease is a stake of major concern. A strong collaboration between world universities and stakeholders intervening in the fields of NTDs is a high level priority.

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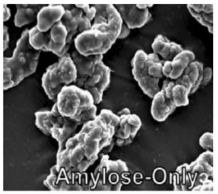
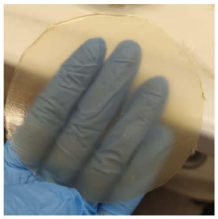
ARGAN SEEDS PROTEINS VALORISATION TO OBTAIN AMYLOSE-CONTAINING BLENDED BIOPLASTICS

Loredana Mariniello, PhD in Biochemistry. Professor at University "Federico II". (ORCID 0000-0002-6800-5890) Main Fields of interest: Transglutaminase-mediated reactions, Bioplastics production and characterization, *In vitro* digestion models. Author of 2 patents. Scopus: Author of 75 documents, h-index 26; Cit. 1976. Google Scholar: Author of 96 documents, h-index 30; Cit. 2865.

Michela Famiglietti, PhD student in Biotechnology at University of Naples "Federico II". ORCID (0000-0002-6191-4303). Master's degree in Industrial Biotechnology, specialization in Biomaterials production from biomass by means of green processes. Main fields of interest Bioplastics production and characterization, valorization of wastes to produce high-added-value products.

Contributing to the development of new and sustainable processes of production, by means of the valorization of a by-product destined for disposal, is the aim of this work. The extraction of argan oil from seeds produces a waste, called oilcake, still reach in organic material (mainly proteins), until now used as animal feed. According to the prospective defined from the circular economy, we investigated the possibility to use the proteins extracted from argan oilcake to produce hydrocolloid-based bioplastics, mixing them with amylose (AM) obtained from barley by means of RNA interference technique. Previous studies, in fact, have already demonstrated interesting and complex changes in the rheological behavior of amylose in respect to the normal starch, that reflect a better performance in terms of both mechanical and barriers properties of the amylose-based films in respect to the normal starch-based films. At the same time, the film-forming properties of proteins extracted from argan oilcake (APC) have already been investigated ending up in successful results. Thereby, we studied the possibility to produce blended bioplastics made up of these components to verify the possible improvement of their characteristics. Moreover, we studied the effect of the enzyme microbial transglutaminase (mTGase E.C.2.3.2.13) as reticulating agent for the argan protein component to influence the properties of these novel bioplastics. We produced blended films constituted of 50% of argan proteins and 50% of amylose (APC-AM-50) and we compared them with films made up of APC alone and AM only. Different film-forming solutions (1 % w/v) were prepared, cast in Teflon-coated pre-heated Petri dishes (9 cm) and dried in an oven at 50° C for 28 h. Glycerol (50% w/w in respect to the total mass) was used as plasticizer. AM gelatinization was carried out by a hydrothermal autoclave reactor at 140° C; proteins, after the extraction, were solubilized in distilled water at pH 12. For the films prepared in presence of mTGase, proteins were incubated for 2 h at 37°C after the addition of the enzyme (40 U/g). The dried films were peeled intact from the casting surface and analyzed after their conditioning at 50% RH and 25° C by placing them in a desiccator for 4 days. Film Tensile Strength (TS), Elongation at Break (EB) and Young's Modulus (YM) were measured by an Instron universal testing instrument model no. 5543 A (Instron Engineering Corp., Norwood, MA, USA), water barrier permeability (WVP) was investigated by a MultiPerm apparatus (ExtraSolutions s.r.l., Pisa, Italy). . The results demonstrated that blended films (APC-AM-50) have interesting characteristics: AM can improve the EB of AP-based films while the TS and the YM of them are not influenced. This confirms our aim to valorize a by-product as argan oilcake because blending APC with AM makes the films more suitable for different applications. Moreover, also the WVP does not seem to be influenced by AM content. AM-based films, in fact, show a higher permeability to water vapor with respect to APC-based films. Anyway, the WVP value for APC-AM-50-based films remains close to that one of APC films, avoiding a possible drawback relative to the mixing with AM. Finally, the films prepared in presence of mTGase do not show particularly significant changes in terms of mechanical properties, on the contrary, the enzyme seems to influence the WVP, reducing it in respect to the films prepared in absence of mTGase. These results confirm our aim to produce novel bioplastics and valorize a by-product unexploited, laying the foundations for next and more in-depth studies. This model of production reflects the objective of circular economy and the transition towards processes that consider with high priority the life cycle of products.





M. Famiglietti, L. Mariniello

Argan seeds proteins valorisation to obtain amylose-containing blended bioplastics

Argan, Argania spinosa, is a plant typically widespread in arid and semiarid regions of Northern Africa useful for protecting soil from desertification and erosion. Until now, argan was mainly used to obtain a biologically active oil extracted from its seeds producing oilcake, a by-product rich in proteins, generally used as animal feed. Recently argan oilcakes have been attracting attention as a waste to be recovered to obtain high-add value products for different applications. This work aimed to investigate the possibility to produce novel bioplastics, made up of argan proteins extracted from oilcakes and amylose obtained from barley by RNA interference technique. Amylose is an optimal raw material for bioplastic purposes because of its linear molecular structure and it was already demonstrated that it is provided with better performances compared to starch. Moreover, we studied the effect of the enzyme transglutaminase as reticulating agent for the argan protein component to influence the mechanical properties and gas barrier properties of these novel blended bioplastics. Our results confirmed the possibility to valorise a by-product using it as new raw material, thus contributing to the development of new sustainable processes of production.

The contributions of the MUNA network to CUCS Naples 2022

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MUNA Mediterranean and Middle East University Network Agreement

Session Title: NET-3 | MUNA | ORBIS
Agenda 2030 and a Sustainable Future

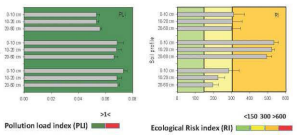
Identifying integrated approaches to soil quality assessment in Mediterranean areas: Italy-Algeria cooperation

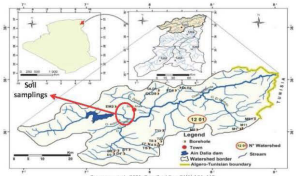
Prof. Anna De Marco
She is currently Associate Professor in Ecology at the Department of Pharmacy of the University of Naples Federico II. Her research activity focuses on several aspects of Soil Ecology in forest, arable and urban ecosystems, with particular attention to the decomposition of organic matter and microbial biomass and activity.

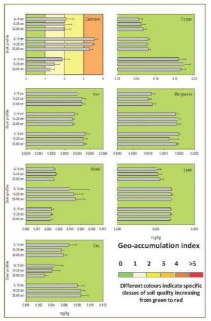
Dr. Pasquale Napoletano
He is a Ph.D candidate in Soil Science at the Department of Agricultural, Environmental and Food Sciences, University of Molise. His research activity focuses on soil quality, Carbon sequestration and plant nutrition in natural, urban and agricultural ecosystems.

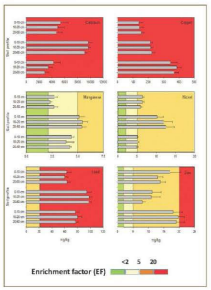
Prof. Noureddine Guezgouz
He is currently Associate Professor at the Department of Biology of the University Mohamed cherif Messaadia (Souk-Ahras in Algeria). His research activity focuses on several aspects of Soil quality in agricultural and urban ecosystems, and sustainable development with particular attention to the contribution of GIS and artificial intelligence in study of water quality.

The Sustainable Development Goals promote human prosperity through the protection and preservation of the environment, emphasizing the close relationship among the economic, social and ecological interests. The need to provide food and have water to support the predicted world's population of over nine billion requires good quality and availability, without affecting ecosystems and services providing as they are challenging into global biodiversity preservation. The EU Biodiversity Strategy 2030 as well as the EU Nature Restoration Plan highlight the key role of soil in ensuring the maintenance and functioning of ecosystems and as important non-renewable resource, vital for human health and economy, as well as for production of food and new medicines. Soil is pivotal for human wellbeing although the persistence of many threats. International and national (Italy and Algeria) global policies and agreements are facing the issues both directly and indirectly. In fact, without healthy soils and sustainable land use, many goals set by the UN 2030 Agenda for Sustainable Development cannot be achieved. The priority is therefore to curb soil consumption and restore degraded soils by focusing on soil fertility protection, soil erosion reduction and soil organic carbon (C) increase. Decreases in water resources and C-storage capacity, soil erosion, soil fertility loss, desertification, salinization, food production reduction and several (alien) species endangerment or spread are the most critical aspects to consider especially in Mediterranean areas. In fact, in the Mediterranean Basin the combination of a large range of ecosystems, the high biodiversity, socioeconomic conditions, governmental policies, and long-term human influence make soil monitoring and soil quality maintenance extremely important. Additionally, the arid and semi-arid regions are particularly sensitive to degradation processes induced by both direct and indirect human interference because of their intrinsic main characteristics. In this view, the current research highlights the impact of anthropogenic activities on the soil quality starting from single (Geo-accumulation index and Enrichment factor) and integrated indices (Pollution load index and Ecological risk index) that help to monitor heavy metal content over time. Among the several sampling sites, interesting data were obtained for three soil profiles located in the upstream part of Medjerda River, close to Ain Dalia dam (Algeria): this region was characterized by a strong human impact due to the urbanization and agricultural activities. The results suggested a certain geo-accumulation of Cadmium in the soils of that area, less evident for the other metals. Indeed, focusing on the Enrichment Factor by using Iron as normalizer, it is possible to detect an "extremely high enrichment" for Cadmium, as well as for Copper and Lead, whereas Manganese, Nickel and Zinc showed only a "significant enrichment". Moreover, the Ecological risk index (RI) seemed to be more accurate than Pollution Load Index (PLI): in fact, the first better responded to heavy metals fluctuations in the investigated soils by defining them between "moderate" and "considerable risk" soils whereas the second index is not specific enough to detect any form of contamination ("absence of pollution") for our data set. The study highlights the importance to use integrated approaches, such as the application of RI, to evaluate and monitor ecosystem health, in order to elaborate models on ecosystem status and evolution for the decision makers, by supporting their choices among different locations for international planning and cooperation at different scales.









A. De Marco, P. Napoletano, N. Guezgouz

Identifying integrated approaches to soil quality assessment in Mediterranean areas: Italy-Algeria cooperation

The Sustainable Development Goals promote human prosperity through the protection and preservation of the environment, emphasizing the close relationship among the economic, social and ecological interests.

The need to provide food and have water to support the predicted world's population of over nine billion requires good quality and availability. The provision of reliable and affordable energy while minimizing impacts on climate will depend on continuing energy supply and alternatives that do not result in increased greenhouse gas emissions. These pursuits can deeply affect ecosystems and services providing as they are challenging into global biodiversity preservation.

The EU Biodiversity Strategy 2030 as well as the EU Nature Restoration Plan highlight the key role of soil in ensuring the maintenance and functioning of ecosystems and as important non-renewable resource, vital for human health and economy, as well as for production of food and new medicines.

Soil is pivotal for human wellbeing although the persistence of many threats. International and national (Italy and Algeria) global policies and agreements are facing the issues both directly and indirectly. Without healthy soils and sustainable land use, many of the 17 goals (targets) set by the UN 2030 Agenda for Sustainable Development cannot be achieved.

The priority is therefore to curb soil consumption and restore degraded soils by focusing on soil fertility protection, soil erosion reduction and soil organic carbon (C) increase.

Decreases in water resources and C-storage capacity, soil erosion, soil fertility loss, desertification, salinization, food production reduction and several (alien) species or communities endangerment or prevalence are the most critical aspects to consider especially in Mediterranean areas. In fact, in the Mediterranean Basin the combination of a large range of ecosystems, the high biodiversity, socioeconomic conditions, governmental policies, and long-term human influence make soil monitoring and soil quality maintenance extremely important. Additionally, the arid and semi-arid regions are particularly sensitive to degradation processes induced by direct and indirect human interference because of their intrinsic main characteristics.

In this context, the current research aims to highlight the impacts of different human activities on the soil quality by using indices that may help to monitor soil variation over time, more than individual pedogenetic characteristics. Soil quality has been related to several degrees and types of anthropogenic impacts and, in this view, specific single and integrated indices have been tested. Moreover, agricultural and natural soil losses have been related to the biodiversi-

ty decline occurring in the study site. Interesting data were obtained in the upstream part of Medjerda River before Ain Dalia dam (Algeria): this region was characterized by different land managements and anthropogenic impacts due to the urbanization and agricultural activities. Therefore, soils were sampled according to different land uses and human impacts along the river banks. Different water quality was taken into account to better focus on quality dynamics of the investigated soils.

In conclusion, our results suggest their usefulness into defining methods and tools to evaluate and monitor ecosystem services, in order to elaborate models on ecosystem status and evolution for the decision makers, by supporting their choices among different locations for planning and designing at different scales.

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Dosage of trace metals and Biochemicals in The organs of the mussel Mytilus galloprovincialis

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Introduction and objective of the study

The Mediterranean environment is the focus of pollution Special mention is made of metal pollution The two main sources of pollution are on the one hand the natural processes of soil erosion on the other hand the anthropic activity

Problem

The dosage of heavy metals and biochemicals in the flesh of the mussel, *Mytilus galloprovincialis* for the biomonitoring of coastal pollution in the Annaba golf course at six sites: Saint Cloud, Chetaibi, Seraidi, Cap de Garde, Sidi Salem El Battah.

Water quality biomonitoring study The species: *Mytilus galloprovincialis* , The sites: Saint Cloud, Chetaibi, Seraidi, Cap de Garde, Sidi Salem, El Battah. During the winter period Biochemical assay and trace metals

Experimental study

Presentation of the species *Mytilus galloprovincialis*, Part of the Mollusca phylum, Class of bivalves or lamellibranchs, The body is protected by a shell composed of two hinged valves, It is a sessile filtering mussel (said of animals characterized by their fixation on hard substrates)

Choice of biological model

A species whose sensitivity serves as an early indicator of changes in the environment of a given ecosystem It is part of biological monitoring programs for marine pollution because they are in direct contact with water, Easy to sample, Very abundant on the Annaba coast, It is characterized by their ability to bioaccumulate contaminants

mussel anatomy *(Fig1)*

Some metals are essential to the body, others have no biological function. But even essential, they can be toxic at high concentrations defined as natural metallic elements, Toxicity of heavy metals: Their toxicity at low concentration, Their non-degradability, their tendency to accumulate in living organisms and to concentrate along trophic chains, Their natural and anthropogenic sources.

Heavy metals that are studied: ***Copper*** an impairment of the reproductive potential of fish Decreased egg hatch.

Zinc: It acts on the reproduction of oysters and the growth of larvae.

Lithium: It is harmful in particular to aquatic organisms

Mapping (cartographie *(Fig2)*

Guard cloak Is not exposed to any source of pollution due to its location far from the various discharges
Saint cloud It is in the middle of an urban area; it receives several sewers that carry domestic waste
El battah Site with less pollution Significant hydrodynamic regime
Sidi salem the presence of straw whirlpools that extend to the south and south-east of the port
Processing of samples: calculate their length, height, thickness and total weight.
Steps for the ETM assay: thawed and drained the samples, Separated the pulpit from the shell, Drying using the oven, Mineralization
The commotion, Filtration dilution: heating on a hot plate, Last step SAA

Extraction of metabolic constituents:

Protein assay Tissue + 1ml of TCA, Grinding, Centrifugation (5000 rpm, 10 min), Base I + 1 ml of etherchlroform, Centrifuge (5000 rpm, 10 min),1ml NaOH pellet (0.1N)
Lipid assay The same first steps except at the end we use Supernatant II
Carbohydrate dosage Grinding , Centrifuge (5000 rpm, 10 min), Supernatant I

Results: ETM

Zinc results: a significant difference ($p < 0.01$) is clearly marked between the Sidi Salem site and the other study sites
Copper results: show a significantly ($p < 0.05$) high rate in individuals from Cap de Garde compared to other sites during the study period
Lithium: shows relatively small amounts.
Metabolic compositions:
Protein levels: reveals significantly ($p < 0.01$) lower levels in individuals from Sidi Salem compared to those from Saint Cloud and Chetaibi during the winter of 2021
Lipid levels: show no significant difference ($p > 0.05$) between the different study sites during the winter of 2021
Carbohydrate rate: reveals no difference ($p > 0.05$) is observed between the different study sites

Conclusion :

Referring to our research, we find that:
Seasoning
Linked to sea currents and the reproduction cycle of this species in the Gulf of Annaba, Metal concentrations are higher in winter than in summer.
Site effect
The Sidi Salem site is the most polluted because the discharges from the Seybouse wadi are produced by the industrial zone located along its river, But in general conclusion we find that there is no contamination in large quantities

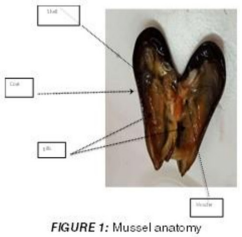

FIGURE 1: Mussel anatomy

FIGURE 2: Representative map of the six sampling sites

Outlook

The construction of specialized wastewater treatment stations depending on the nature of the discharge, whether urban, domestic, industrial, or mixed
Includes a monitoring program using active monitoring techniques, mainly in areas considered polluted
The establishment of a Biomonitoring Network of the impacts of pollution along the Algerian coast and at different levels of ecological organization.
Determine the nature and the chemical quantity of the pollutants presented in the Gulf of Annaba.

S. Amamra, K. Melwah, F. Amamra, C. Bouallegu, N. Kaouachi

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Bioactive Material Based on Whey Proteins Functionalized with Palestinian Satureja capitata Essential Oil

Manar Abdalrazeq is A researcher at the Biochemistry and Genetics division, at An-Najah National University, Palestine. She was enrolled in a Ph.D. course in Biotechnology at University Federico II, Italy. Manar does research in Biotechnology, particularly preparing and developing biodegradable material "bioplastics" made from proteins and polysaccharides.

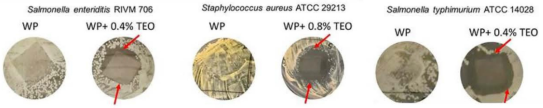
Nidal Amin Jaradat Professor in Pharmaceutical Chemistry, An-Najah National University.
He is a medicinal plant expert with over 180 publications in various fields of pharmaceutical sciences. Herbal medicine, phytochemistry, pharmacognosy, drug information, and alternative medicine are among his research interests.

Mohammad Qadi Professor and Division Head in the Division of Microbiology, Immunology, and Pathology, An-Najah National University, Palestine. His research interest includes bacterial characterization, antibiotic resistance, and antimicrobial activity.

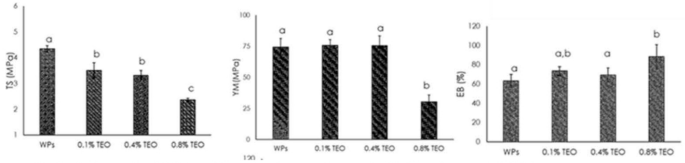
Natural additives with antimicrobial and antioxidant activities are of interest for many researchers. In particular, essential oils (EOs) extracted from plants, could be used as natural additives in food packaging applications because of their biological properties. Among these plants, particular attention should be devoted to *Satureja capitata*, an aromatic plant of the Lamiaceae family, commonly named "Thymbra".

In this study, two different Thymbra leaf samples from Nablus city (TEO1) and Qabatiya town in Palestine (TEO2) were collected. Thymbra essential oil (TEO) has been extracted, characterized, and then used to produce bioactive whey protein (WP)-based materials. Following TEO extraction, different components have been identified using GC-MS. The major identified volatile compounds in TEO1 were γ-terpinene, carvacol, and p-cymene with the following percentages: 38.9%, 22.9%, and 19.5%, respectively. As far as TEO2 the carvacol percentage was in the same range as that found in TEO1, whereas γ-terpinene content was higher, being present with a percentage of 57.8% and no p-cymene was detected. TEO antimicrobial activities were investigated against the following microorganisms: Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Enterococcus faecium, Klebsiella, Methicillin-Resistant Staphylococcus aureus (MRSA), and Proteus vulgaris. In the two TEOs, revealed powerful antimicrobial activity against both gram positive and gram-negative bacteria. More in detail, TEO1 showed stronger inhibition effect than TEO2 against all the studied microorganisms. After characterization, TEO1 was added to WP containing film-forming solutions (FFSs) at different concentrations (0.1, 0.4 and 0.8%, v/v of FFS) to produce bioactive films. The TEO1-derived films, shown to possess improved mechanical properties, exhibited decreased moisture content and marked antimicrobial property when tested against gram-positive and negative bacteria such as *Salmonella enteriditis*, *Staphylococcus aureus* and *Salmonella typhimurium*. Therefore, TEO1 may represent an effective bioactive additive of protein-based materials to be used in food packaging against specific spoilage bacterial strains.

Palestinian Satureja capitata



Antimicrobial effects of whey protein (WP)-based films, prepared either without or with Thymbra essential oil (TEO1). Antimicrobial effects were evaluated by analyzing the growth of the different bacterial cells held in direc



Mechanical properties of WP-based films either incorporated or not with different amounts of TEO1

CVL Giosafatto, PhD in Biotechnology. Professor at University of Naples"Federico II". (ORCID 0000-0001-8762-2206) Main Fields of interest: Protein digestion, Bioplastics production and characterization, active packaging.. Scopus: Author of 53 documents, h-index 29; Cit. 1200. Google Scholar: Author of 68 documents, h-index 30; Cit 1704.

Angela Arciello, Professor at University of Naples "Federico II" (ORCID 0000-0001-8269-6459). She is co-author of 53 publications in leading scientific journals (Current bibliometric: Google scholar: h-index 21, total citations 1640. SCOPUS: h-index 18, total citations 1228). Fields of interest: antimicrobial peptides and natural substances, antibiofilm peptides, peptidomimetics, functionalization of surfaces with antimicrobial compounds.

Eliana Dell'Olmo, Research Associate at Council for Agricultural Research and Agricultural Economy Analysis Italy

Raffaele Porta,. Professor at University of Naples "Federico II". (ORCID 0000-0003-4455-0064)) Main fields of interest: industrial enzymology; food biotechnology; hydrocolloid films for food coatings or wrappings. Scopus: Author of 153 documents, h-index 30; Cit. 3102.

M. Abdalrazeq, N. Jaradat, M. Qadi, C.V.L. Giosafatto, R. Gaglione, E. Dell'Olmo, A. Arciello, R. Porta

Bio-active materials based on whey proteins functionalized with Palestinian Satureja capitata essential oil

Natural additives with antimicrobial and antioxidant activities are of interest for many researchers. In particular, essential oils (EOs) extracted from plants, could be used as natural additives in food packaging applications because of their biological properties. Among these plants, particular attention should be devoted to Satureja capitata, an aromatic plant of the Lamiaceae family, commonly named "Thymbra".

In this study, two different Thymbra leaf samples from Nablus city (TEO1) and Qabatiya town in Palestine (TEO2) were collected. Thymbra essential oil (TEO) has been extracted, characterized, and then used to produce bioactive whey protein (WP)-based materials. Following TEO extraction, different components have been identified using GC-MS. The major identified volatile compounds in TEO1 were y-terpinene, carvacol, and p-cymene with the following percentages: 38.9%, 22.9%, and 19.5%, respectively. As far as TEO2 the carvacol percentage was in the same range as that found in TEO1, whereas y-terpinene content was higher, being present with a percentage of 57.8% and no p-cymene was detected. TEO antimicrobial activities were investigated against the following microorganisms: Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Enterococcus faecium, Klebsiella, Methicillin-Resistant Staphylococcus aureus (MRSA), and Proteus vulgaris. In the two TEOs, revealed powerful antimicrobial activity against both gram positive and gram-negative bacteria. More in detail, TEO1 showed stronger inhibition effect than TEO2 against all the studied microorganisms. After characterization, TEO1 was added to WP containing film-forming solutions (FFSs) at different concentrations (0.1, 0.4 and 0.8%, v/v of FFS) to produce bioactive films.

The TEO1-derived films, shown to possess improved mechanical properties, exhibited decreased moisture content and marked antimicrobial property when tested against gram-positive and negative bacteria such as Salmonella enteriditis, Staphylococcus aureus and Salmonella typhimurium. Therefore, TEO1 may represent an effective bioactive additive of protein-based materials to be used in food packaging against specific spoilage bacterial strains.

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Session Title: NET-3 | MUNA | ORBIS
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Bisphenol-A and estrogen-regulated expression of brain-specific cyp19a1 genes in swim-up fry of Labeo rohita

Prof. Dilip Mukherjee

Department of Zoology,
Kalyani University,
Kalyani, Nadia

Publications

What are Endocrine disruptors?

❖Any chemical agent in the environment that can alter normal endocrine system actions leading to deleterious.

❖Disruptors may act directly or indirectly.

❖Direct acting disruptors are usually hormone agonists or antagonists that interfere with hormone actions on target cells.

❖Indirect acting disruptors alter hormone dynamics in circulation, change hormone metabolism, or interfere with hormone regulation.

Classes of Endocrine Disruptors

Estrogens : DES, o,p'-DDT, Bisphenol A Anti-estrogens: Hexachloro-4-biphenylol Anti-androgens: p,p'-DDE, vinclozolin Progestogens : Norethindrone, norgestrel

Thyrotoxic agents: PCBs, goitrin Aryl hydrocarbons: CDD, PAH Pancreatic toxins: Azoxyglycosides Metals: Cadmium, nickel, aluminium Retinoids : Vitamin Aanalogs

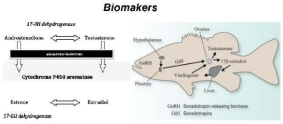
Objective of the study

❑To understand estrogen and estrogenic chemical regulation of aromatase gene isoforms in early developmental stage of *L. rohita*

Methods used

- RT-PCR
- q-PCR
- Gene sequencing
- Homology analyais
- Western Blot
- ELISA of vitellogenin

Biomakers

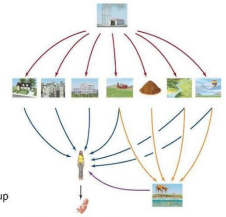


Model organism

Model: Indian major carp, rohu (*Labeo rohita*)

Developmental stage:
30 days post fertilisation
(dpf) swim-up advanced fry.

Size: 1.2-1.8 cm
Wet weight: 3.82-4.86gm



Results

Effect of exogenous 17-β-estradiol & BPA

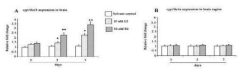
E2 exposure significantly upregulate *cyp19a1b* in brain of *L. rohita* swim-up fry

Homology analysis and phylogenetic tree construction

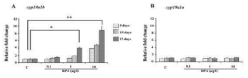
Conclusion

❑Different estrogenic chemicals show different patters of aromatase gene and protein along with vitellogenin protein in *L. rohita* swim-up

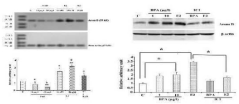
❑Thus this model can be very useful to assess estrogenic chemicals in in different aquatic bodies of India.



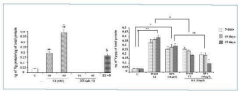
E2 exposure significantly upregulate cyp19a1b isoform of P450 aromgene in brain of *L. rohita* swim-up fry, confirmed by q-PCR



BPA exposure significantly upregulate cyp19a1b isoform of P450 aromgene in brain of L. rohita swim-up fry, confirmed by q-PCR



E2 and BPA exposure significantly upregulate Aromatase B protein in brain of L. rohita swim-up fry



E2 and BPA at dose response manner induce vitellogenin protein in whole bod homogenae of L. rohita swim-up fry

D. Mukherjee

Bisphenol-A and fedrozole-regulated expression of brain-specific cyp19a1b gene in swim-up fry of Labeo rohita

In all vertebrate species, estrogens play a crucial role in the development, growth, and function of reproductive and nonreproductive tissues. A large number of natural and synthetic chemicals present in the environment and diet can interfere with estrogen signalling. These chemicals are called endocrine disrupting chemicals (EDCS) or xenoestrogens disrupt endogenous sex steroidogenic pathways including aromatisation of androgens to estrogen by cyp19 aromatase. Here, we investigated the hypothesis in swim-up fry of Indian major carp Labeo rohita by examining the mRNA expression of cyp19a isoforms in brain and undifferentiated gonad region. After exposure of two EDCs, Bisphenol A [BPA, (1.0,10,50 µg/l)], and the other, a non-steroidal aromatase inhibitor, [Fad, 1,10,50 µg/l)] for 5 and 10 days. The results suggest that BPA did not affect cyp19a1a expression in undifferentiated gonad at any concentration whereas 50 µg/l of fadrozole significantly attenuated its expression in same tissue. In contrast, BPA exposure gradually and significantly increase expression of cyp19a1b in brain region with increasing dose and time, whilst fadrozole had contrasting effect in brain. BPA , except at the highest dose tested, did not have any significant effect on cyp19a1b expression in undifferentiated gonad. Collectively the results suggest that BPA and FAD can disruptcyp19a1b activity more effectively than can cyp19a1a.

The enhanced spatial and temporal sensitivity of cyp19a1b than cyp19a1a suggest that brain sex of fish is more susceptible to disruption by environmental pollutants such as BPA and Fad and we propose that the response of cyp19a1b in brain tissue of early swim-up fry of Labeorohita is a more suitable marker or indicator of estrogenic pollution of aquatic environment.

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Impact of agricultural activities on the quality of groundwater in semi-arid regions: the case of Oued Medjerda; Algerian Northeast

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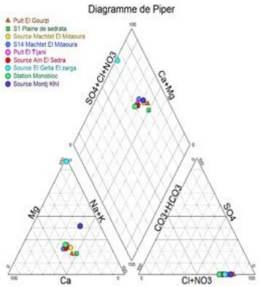
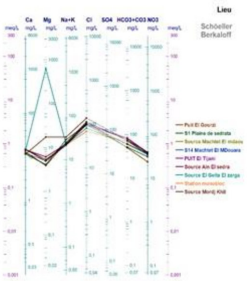
He is currently Associate Professor at the Department of Biology of the University Mohamed cherif Messaadia (Souk-Ahras in Algeria). His research activity focuses on several aspects of Soil quality in agricultural and urban ecosystems, water resources manager and sustainable development with particular attention to the contribution of GIS and artificial intelligence in study of water quality.

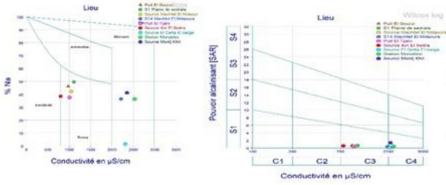
Prof. Fadila Khabti
She is currently full Professor at the Department of Biology of the University Mohamed cherif Messaadia (Souk-Ahras in Algeria). His research activity focuses on biochemistry, fertilisation, plants and soil interaction biology and agricultural ecosystems.

Prof. Anna De Marco
She is currently Associate Professor in Ecology at the Department of Pharmacy of the University of Naples Federico II. Her research activity focuses on several aspects of Soil Ecology in forest, arable and urban ecosystems, with particular attention to the decomposition of organic matter and microbial biomass and activity

The semi-arid climatic conditions of Algeria have always made irrigation an essential technique which, over the years, has acquired very important economic and social dimensions. Irrigation has established itself as a privileged way of agricultural development and therefore receives special attention. Intensive agriculture in irrigated areas is one of the sources of water pollution in arid and semi-arid areas under the effect of climate change, for its part this type of activity is the main source of groundwater pollution. In fact, excessive uses of agrochemical additives and manure are the direct causes of this type of pollution. In this context, a study was carried out in the region of Sedrata, considered as a semi-arid zone of the watershed of Oued Medjerda, located in the extreme North-East of Algeria, in order to establish a diagnosis of the state groundwater pollution, and to understand the behavior of this ecosystem with respect to certain pollutants. Representative water samples were taken at nine points in the largest areas of agricultural activity in the region. We measured the physico-chemical parameters, as well as the microbiological parameters; and we evaluated the concentrations of the seven heavy metals (Cd, Pb, Cu, Fe, Zn, Ni, Mn). Different methods us well us Piper diagram and statistical interpretation was used. The results carried out show that most of the sampling points are of poor quality, and present high concentrations of heavy metals, due to pollution which undoubtedly constitutes a significant danger to the health of the populations consuming these waters. And also show the importance of preserving water resources against the risk of pollution of agricultural origin. This requires adequate management and good control of the use of agrochemical inputs in this region. In this view, the current research highlights the impact of agricultural activities on the water quality starting from The piper diagram consists of two triangles representing the distribution of anions and cations respectively, and a diamond representing the synthetic distribution of major ions. The point clouds concentrated in one pole represent for the different samples the combination of cationic and anionic elements. The Schöeller-Berkaloff diagram is used to represent the chemical facies of several waters. Each sample is represented by a broken line. The concentration of each chemical element is represented by a vertical line in logarithmic scale. The broken line is formed by connecting all the points representing the different chemical elements. A group of waters of varying minerality but with the same proportions of dissolved elements will give a family of broken lines parallel to each other. Where the lines cross, a change in chemical facies is evident. the most commonly used method for assessing the potential risk of salinity or alkalinity by determining the sodium absorption coefficient (SAR). For the same conductivity, the higher the coefficient, the greater the risk. The S.A.R. is given by the formula below and is used in combination with the electrical conductivity of the water. Generally, plants do not tolerate sodium-saturated soils. The Wilcox classification is based on the electrical conductivity and the sodium content of the water expressed as a percentage. The representation of the different samples on this diagram allows the characterisation of waters for their suitability for irrigation.







Guergouz et al., 2021. Proc. Zool Soc., 74(3):324-333.

N. Guezgouz, F. Khaldi, A. De Marco

Impact of agricultural activities on the quality of groundwater in semi-arid regions: the case of Oued Medjerda; Algerian Northeast

The semi-arid climatic conditions of Algeria have always made irrigation an essential technique which, over the years, has acquired very important economic and social dimensions. Irrigation has established itself as a privileged way of agricultural development and therefore receives special attention. Intensive agriculture in irrigated areas is one of the sources of water pollution in arid and semi-arid areas under the effect of climate change, for its part this type of activity is the main source of groundwater pollution. In fact, excessive uses of agrochemical additives and manure are the direct causes of this type of pollution. In this context, a study was carried out in the region of Sedrata, considered as a semi-arid zone of the watershed of Oued Medjerda, located in the extreme North-East of Algeria, in order to establish a diagnosis of the state groundwater pollution, and to understand the behavior of this ecosystem with respect to certain pollutants. Representative water samples were taken at nine points in the largest areas of agricultural activity in the region. We measured the physico-chemical parameters, as well as the microbiological parameters; and we evaluated the concentrations of the seven heavy metals (Cd, Pb, Cu, Fe, Zn, Ni, Mn). Different methods us well us Piper diagram and statistical interpretation was used. The results carried out show that most of the sampling points are of poor quality, and present high concentrations of heavy metals, due to pollution which undoubtedly constitutes a significant danger to the health of the populations consuming these waters. And also show the importance of preserving water resources against the risk of pollution of agricultural origin. This requires adequate management and good control of the use of agrochemical inputs in this region. In this view, the current research highlights the impact of agricultural activities on the water quality starting from The piper diagram consists of two triangles representing the distribution of anions and cations respectively, and a diamond representing the synthetic distribution of major ions. The point clouds concentrated in one pole represent for the different samples the combination of cationic and anionic elements. The Schöeller-Berkaloff diagram is used to represent the chemical facies of several waters. Each sample is represented by a broken line. The concentration of each chemical element is represented by a vertical line in logarithmic scale.The broken line is formed by connecting all the points representing the different chemical elements.A group of waters of varying min-

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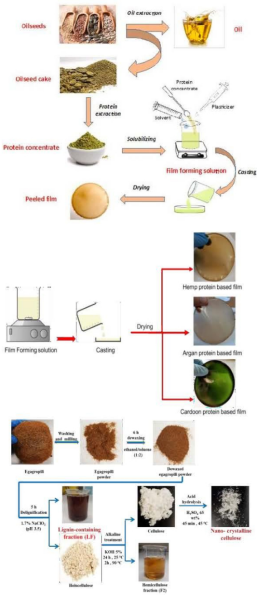
Renewable sources for active packaging products

CVL Giosafatto, PhD in Biotechnology. Professor at University "Federico II". (ORCID 0000-0001-8762-2205) Main Fields of interest: Protein digestion, Bioplastics production and characterization, active packaging. Scopus: Author of 53 documents, h-index 23; Cit. 1200. Google Scholar: Author of 68 documents, h-index 30; Cit1704.

Seyedeh Fatemeh Mirpoor PhD student at the university of Naples, Federico II. During my PhD I focused on the valorisation of waste coming from oil industry by-products to protein-based bioplastics for food packaging and successfully published 6 papers during my PhD. Holder of master degree in food science and technology.

One of the most crucial problems that the world is facing these days is disposing of the petroleum-based plastics since they are not biodegradable and only less than 10% of them are recycled. Petroleum-based plastic application has increased enormously in the last years causing huge waste-disposal problems and a consequent environmental pollution such as releasing of small and toxic petro-polymers in oceans and on the lands swallowed by fish and birds. It is worth to say that yearly a huge amounts of waste (almost 600 million tons in 2018/2019, according to USDA) are produced by oil industries and only a small amount of them are utilized as an animal feed, human nutrition, food additives and plant fertilizers, even though most of them are a rich sources of bio-active molecules, fibres, proteins and polysaccharides. In this regards, the proteins existing in the oilseed cakes (SOCs) can be considered as an abundant, biodegradable and inexpensive resources for developing edible and environmental-friendly plastics in order to replace at least a portion of non-biodegradable materials that are currently used in the world. In our work, biodegradable protein-based films were prepared from the by-product obtained from Argan (*Argania spinosa L.*), hemp (*Cannabis sativa*) and cardoon (*Cynara cardunculus* var. altilis) oilcake following the oil extraction process. Cultivation of industrial hemp with low levels of Δ9-tetrahydrocannabinol has an increasing rate due to its multipurpose utilization for a wide variety of products, such as cellulose and fiber for paper and textile, hemp seed oil and SOC for food, cosmetics and pharmaceutical industries. Although cardoon (*Cynara cardunculus* L.), a native crop belonging to the Mediterranean region, is a minor vegetable crop in most countries (except in Italy, Spain and France where it is produced in few thousands of tons/year and used in traditional dishes), it has recently achieved increasing interest and economic value due to its multipurpose applications. *Argania spinosa* L., known as Argan, belongs to the *Sapotaceae* family and it is an endemic plant of Morocco but it is also cultivated in desert and semi-desert regions such as the south-west of Algeria. The proteins obtained from different SOCs were demonstrated to give rise to handleable films, however, protein-based films generally exhibit poor mechanical and water vapor barrier properties. Therefore, in order to improve the protein-based film properties, different methods have been often applied such as enzymatic crosslinking or grafting with nanocrystalline cellulose and lignin. In this regard, hemp, cardoon and argan demonstrated to act as both acyl donor and acceptor substrates of microbial transglutaminase (mTGase). Film morphological characterization demonstrated that mTGase treatment was effective to produce more homogeneous and smoother films, influencing in turn positively their properties. In fact, mTGase-crosslinked films were shown to be more resistant, still flexible and exhibited a higher heat-sealing strength. Moreover, nanocrystalline cellulose (NC) and a lignin-containing fraction (LF) were added to hemp protein-based films as a reinforcement agent that were obtained from egagropili, the so called sea balls produced from rhizome and stem fragments of *Posidonia oceanica* that accumulate in large amounts along the coastal beaches in the form of tightly packed and dry materials of various dimensions. Both egagropili fractions have been shown to be able to improve the physicochemical properties of biodegradable films prepared from protein concentrates derived from hemp oilseed cakes. These materials, manufactured with a biodegradable industrial by-product and grafted with equally biodegradable waste-derived additives, exhibited an acceptable resistance with a still high flexibility, as well as they showed an effective barrier activity against water vapor and gases (O_2 and CO_2). An active cardoon based protein films were developed by adding cardoon leaf extract (CLE) to the obtained films and further characterizations have been carried out. Film microstructure observed by SEM revealed a good compatibility among cardoon proteins and CLE, showing a uniform distribution of the leaf extract components throughout the film network that reflected, in turn, an improvement in the mechanical and barrier properties of the obtained material. In addition, the CLE containing films exhibited higher hydrophobicity, as well as a marked antioxidant activity, highlighting the potential of *Cynara cardunculus* to be exploited as a biorefinery where different low-value renewable biomass materials are turned in several higher value bio-based products.



C.V.L Giosafatto, S.F. Mirpoor

Renewable sources for active packaging products

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Stock assessment of the *Sander lucioperca* (Linnaeus, 1758) in the Al-Massira Dam Lake, Morocco

Meriem BOUSSEBA is a Phd student in aquatic biology at Environmental, Ecological and Agro-industrial Engineering Laboratory in the Faculty of Sciences and Techniques. University of Sultan Mouley Slimane, Beni Mellal, Morocco. She has presented numerous papers in congress and conferences.

Mustapha HASNAOUI is a professor of the Faculty of Sciences and Techniques. University of Sultan Mouley Slimane, Beni Mellal, Morocco and a director of research and head of the Environmental, Ecological and Agro-industrial Engineering Laboratory. He is also the editor in-chief of the Journal of Water and Environmental Sciences and an expert in environment and aquaculture.

Sara OUAHB is a Phd student in Ecotoxicology and aquatic biology at Environmental, Ecological and Agro-industrial Engineering Laboratory in the Faculty of Sciences and Techniques. University of Sultan Mouley Slimane, Beni Mellal, Morocco. She has presented numerous papers in congress and conferences.

I. Introduction:

Sander lucioperca is one of the species for which the fishery has developed considerably in recent decades. However, the lack of scientific research on the biology and ecology of this species, which has an important economic interest, constitutes a major problem for the management of its stocks in Moroccan fresh waters. To properly manage this halieutic resource, it is therefore necessary to know the biological characteristics of the fishery. It is in this context that this study sought to assess all the basic elements of *S. lucioperca* population dynamics, such as growth parameters and morphometric relationships, with a view to obtaining useful information for management stocks.

II. Material & Methods

Fish sampling was carried out on a monthly basis, between January and December 2019. For each specimen, the total length (TL) was measured to the nearest 0.1 cm and the total weight (TW) was recorded with a precision of 0.1 g. The TropFishR package implemented in R was used to estimate growth parameters. With this objective, modified version of the von Bertalanffy growth function VBGF, which accounts for oscillating growth, was used: $Lt = L\infty\ (1 - e^{-(K\ (t-t0)\ +C\ (K/2\pi)\ \sin 2\pi\ (t-ts))})$ .To assess growth variability among other regions, we used the ϕ' value whose equation : ϕ' = log10k + 2log10 L∞ (Munro and Pauly, 1983). The length-weight relationship was determined using the equation: $W = aTL^b$ (Le Cren, 1951). The b value from the length-weight equation was tested using the Student's t-test statistical analysis to ascertain the growth pattern of the population.

III. Results & discussion

The estimated VBGF equation of the *S. lucioperca* at Al-Massira dam Lake had K= 0.46 ($year^{-1}$) and L∞ = 88.87 cm (TL) (Fig.1). Our results showed that *S. lucioperca* is a fast-growing species (K = 0.46). Moreover, the C Parameter (C = 0.59) indicated that the growth characteristics of the *S. lucioperca* fluctuate considerably during the year (Fig.1). The ϕ' test showed differences in VBGF parameters between regions (Table 1).

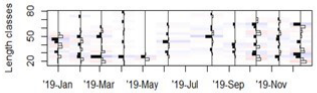

Figure.1 The VBGF (grey lines) estimated with the TropFish-R program from monthly length–frequency data (black histograms).

Table 1. Parameters of the Von Bertalanffy equation obtained in different regions.

Regions and authors	a	b	L∞	K	ϕ'
Iran (Abdolmalaki & Iwona Psuty, 2007)	-0.0206	2.85	55.05	0.15	2.65
Finland (Milardi & al., 2011)	0.00217	3.371	69.56	0.10	2.63
Algeria (Bouamra, 2017)	0.0033	3.237	125.72	0.13	3.31
Morocco (Present study)	0.0047	3.09	88.87	0.46	3.56

The length–weight relationship of *Sander lucioperca* was described by the parameters: a = 0.0047 and b=3.09. The value b was founded different from 3 (P<2e-16). This indicates a significant majoring allometry (Table 1).

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IV. Conclusion

At the end of this study on the general morphology and growth characteristics of *Sander lucioperca* in the Al-Massira reservoir, it appears that it is a large species with a rapid and increasing growth and which could therefore be exploited as a potential species for aquaculture, in order to improve human nutrition.

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M.Bousseba, S. Ouahb, L. Ferraj, M. Droussi

Stock assessment of the Sander lucioperca (Linnaeus, 1758) in the Al-Massira Dam Lake, Morocco

The pike perch Sander lucioperca is present in numerous Moroccan water bodies. This species has shown functional acclimatization capacity and growth. However, the lack of researches dealing with the biological and ecological aspects of this species of important economic interest constitutes a great problem for the management of its stocks in the Moroccan fresh water.

The objective of our study is to highlight all the basic elements of the population dynamics that constitute preliminary data for the evaluation of the stocks of aquatic species, namely the growth parameters and the morphometric relationships.

Fish sampling was carried out on a monthly basis, between January and December 2019. For each specimen, the total length (TL) was measured to the nearest 0.1 cm with a graduated ichthyometer and the total weight (TW) was recorded with an electronic balance with a precision of 0.1 g.

A total of 1002 Sander lucioperca between 15-79 cm length range were caught in the Al-Massira Dam Lake. The length–weight relationship of Sander lucioperca were described by the parameters: a=4.7.10-3 and b=3.09. The value b was founded dierent from 3 (P<2e-16). This indicates a significant majoring allometry. The Von Bertalanffy growth parameters were estimated by the ELEFAN_GA method using the TropFishR package.

These parameters are given as follows: L∞= 88.87, K = 0.46, t_anchor = 0.51, ts = 0.65 and C= 0.59. This study provides new knowledge, necessary for the assessment of stocks and populations, which could contribute to the implementation of new management strategies for the populations of Sander lucioperca exploited at the level of the Al-Massira Dam Lake in Morocco.

7th CUCS Conference | Naples, 21st - 23rd April 2022
UNIVERSITY COOPERATION IN THE NEW CHALLENGES FOR SUSTAINABLE DEVELOPMENT
Capacity-building, Science Diplomacy and Open Science between Global North and Global South within the new world context

MUNA Mediterranean and Middle East University Network Agreement

Session Title: NET-3 | MUNA | ORBIS
Agenda 2030 and a Sustainable Future

Pollutants Impact Detection on Biosentinels by Non-Invasive Procedures: a Cooperative Sustainable Development Goal to Achieve

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New emergent xenobiotics come from different sources including drugs used in COVID-19 pandemic and post-pandemic period, for cancer therapy, infertility treatments and several others. These contaminants from different sources once released in the ecosystem, may cross physiological barriers of organisms and may interfere with their biological functions, leading to lethal, sub-lethal and physiological changes.
Non-invasive procedures can be applied on large numbers of specimens and also can be used for repeated assessments without negatively impacting the population of the selected biological species but hardly ever used. In our monitoring we are adopting the redox skin biopsy status evaluation in amphibian and the symmetry detection in reptiles. Skin biopsy is an epithelial cells removal procedure which does not require animal sacrifice, avoiding ethical issues. It provides the adequate biological material needed for biochemical and molecular antioxidative assays. Fluctuating asymmetry results a morphological measure of developmental instability defined as a random deviation of both sides of a bilateral symmetric organism.
The amphibians *Pelophylax bergeri* and *Bufo spinosus* and the reptile *Podarcis sicula* are considered sentinel organisms, serving as bioindicators to evaluate environmental pollutants which have a wide European distribution. *Pelophylax bergeri* and *Bufo spinosus* use their skin as a secondary respiratory surface, which is permeable to endogenous and exogenous substances. Their highly vascularized skin permits cutaneous gas exchange resulting in being highly susceptible to environmental stressors. *Podarcis sicula* is characterized by a large set of measurable and countable meristic features such as scales, femoral pores and head shape/size which can be easily recorded for fluctuating asymmetry evaluations. The deleterious biological effects of xenobiotics to these species include developmental instability and/or abnormalities, decreased growth and fertility, damage to germ lines, and susceptibility to disease.
Joint studies have previously demonstrated that the reactive oxygen species status and antioxidant defense systems, as well as the body symmetry, are influenced and shaped by xenobiotics. In particular, we have shown that Reactive Oxygen Species (ROS) by Electron paramagnetic resonance-Spin Trapping as well as antioxidants expression by quantitative Real Time-PCR of Glutathione S-Transferase (GST) and Glutathione Peroxidase 4 expressions (*gpx4*) on skin biopsy can be used as optimal biomarkers for eco-monitoring.
Thus, the advantages of non-invasive procedures avoiding sacrifice must support and enhance eco-friendly approaches for biomonitoring pollutants in fragile geographical areas. Since new emergent xenobiotics and their impact are issues of global concern for biodiversity and sustainability loss, the use and implementation of non-invasive procedures require awareness and a cooperative international effort.

C. Parisi, J. Sandonnini, M.R. Coppola

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The amphibians Pelophylax bergeri and Bufo spinosus and the reptile Podarcis sicula are considered sentinel organisms, serving as bioindicators to evaluate environmental pollutants which have a wide European distribution. Pelophylax bergeri and Bufo spinosus use their skin as a secondary respiratory surface, which is permeable to endogenous and exogenous substances. Their highly vascularized skin permits cutaneous gas exchange resulting in being highly susceptible to environmental stressors. Podarcis sicula is characterized by a large set of measurable and countable meristic features such as scales, femoral pores and head shape/size which can be easily recorded for fluctuating asymmetry evaluations. The deleterious biological effects of xenobiotics to these species include developmental instability and/or abnormalities, decreased growth and fertility, damage to germ lines, and susceptibility to disease.

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Mediterranean and Middle East University Network Agreement

Session Title: NET-1 | MUNA | MARE NOSTRUM

A MULTIDISCIPLINARY APPROACH TO THE STUDY OF SIDEROPHORES FROM CYANOBACTERIA

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Despite of being predominantly known for their toxin-producing blooms, cyanobacteria also represent a class of not-yet fully explored source of novel lead compounds for drug discoveries, that in turn has inspired the development of synthetic analogues with improved bioactivity and pharmacokinetics such as the dolastatins, cryptophycins, curacins, etc. Siderophores are versatile molecules secreted by cyanobacteria to maintain the organisms' Iron homeostasis, in response to Iron starvation conditions and to facilitate Iron uptake in conjunction with specific transport systems. These molecules are routinely used in the clinical trials to treat Iron overload diseases. Siderophore conjugated antibiotics are now tested in the several research investigations to overcome bacterial resistance and improve anti-infective therapy. Few recent studies showed the atheroprotective effect of siderophores in humans providing a need to develop siderophore-rich food additives or a functional food to increase the siderophore uptake in people prone to cardiovascular diseases.
We used a multidisciplinary approach in the study of siderophores from cyanobacteria by exploring their biosynthetic capability through the cultivation of a reference strain of *Anabaena flos-aquae* UTEX 1444 in different Iron conditions to stimulate the production of siderophores and analyzed the extracts through the combined use of LC-HRMS and molecular networking.

All the *Anabaena flos-aquae* UTEX 1444 ***(FIG 1)*** cultures #1-6 [0 μM Fe^{3+} (#1), 5 μM Fe^{3+} (#2), 10 μM Fe^{3+} (#3), 20 μM Fe^{3+} (#4), 60 μM Fe^{3+} (#5), and 100 μM Fe^{3+} (#6)] were extracted with the various solvents (methanol; chloroform; butanol). Each sample was analyzed by LC-HRMS using an LTQ Orbitrap instrument and pre-processed using the MZmine program 2.53.

The result revealed that the most significant extract for each culture was the butanol one (the representative of each entire metabolome of *Anabaena*). Further, the global .mgf file, containing the MS^2 data from #1-6 butanol extract and the MZmine tables were analyzed via an online platform at the Global Natural Products Social Molecular Networking website, where a Feature-Based Molecular Network (FBMN) was generated (https://gnps.ucsd.edu/ProteoSAFe/status.jsp?task=664d019a6b52486d880014bb1e16bd69).

Molecular network was visualized using the Cytoscape program 3.9.0 revealing #1-6 butanol extracts ***(FIG 2 A)*** contains 165 features, grouped into 10 clusters. In the network, each node is represented as a pie chart showing the amount of the compound in the source cultures containing different iron concentrations ***(FIG 2 B)***.

Furthermore, one of the ten clusters was composed of 23 nodes and13 of which were derived solely from the Fe (III) depleted culture ***(FIG 2 C)***. These nodes didn't match to any known compounds in GNPS' library. The first node of the series ***(FIG 3)*** is Schizokinen (apo [M+H] +, m/z 421. 1934, $C_{16}H_{29}O_9N_4^+$) followed by lipophile synechobactin A (apo [M+H] +, m/z 561.3477, $C_{26}H_{49}O_9N_4^+$); synechobactin C16 (apo [M+H] +, m/z 617.4098, $C_{30}H_{57}O_9N_4^+$); new synechobactin C 16:1 (apo [M+H] +, m/z 615.3940, $C_{30}H_{55}O_9N_4^+$) and so on ***(TABLE 1)***.

To our best knowledge, this is the first report unveiling the biosynthetic capability of UTEX 1444 to produce a large array of synechobactins (11 variants), beside Schizokinen, showing the ability to incorporate a variety of saturated and unsaturated fatty acids, likely as biosynthetic final step. Biosynthesis of Schizokinen and synechobactins is directed by NRPS-independent siderophore (NIS) pathway and four enzymes are encoded by the gene cluster iucABCD, usually organized as an operon. Considering the potential high impact of siderophore's production as ferric ion scavenger as well as toxic metal chelators, and then, the large array of applications in many different fields, from ecological research to drug discovery, our future studies will be focused on this aspect, to make UTEX 1444 a suitable model-organisms for a scale-up production of siderophores.

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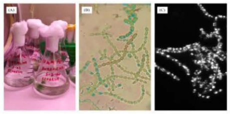
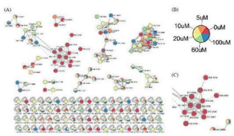
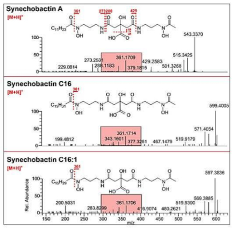
Image captions
Fig. 1. (a) Cultures of Anabaena flos-aquae UTEX 1444. Microscopic observation of 0 μM Fe3+ (#1) culture with (b) optical microscope and (c) fluorescence microscope (RFP filter).
Fig. 2. A) The molecular network obtained combining the LC-HRMS/MS analyses of all the extracts of #1-6 cultures. (B) Nodes are represented as a pie chart showing the source culture of the compound ($[Fe^{3+}]$ = 0μM (red), 5μM (orange), 10μM (dark yellow), 20μM (yellow), 60μM (green), 100μM (blue)). (C) Cluster of synechobactins, present almost exclusively in Fe (III)-depleted culture (0μM, red).
FIG 3- HRMS/MS analysis and fragmentation pattern of synechobactin A, C_{16} and the new synechobactin $C_{16:1}$.
TABLE 1- Synechobactins in *Anabaena flos-aquae* UTEX 1444. The new variants are highlighted in yellow.







No.	Name	apo[M+H]+	Molecular Formula	t_R (min)
1	Schizokinen	421.1934	$C_{16}H_{29}O_9N_4^+$	4.7
2	Synechobactin A	561.3477	$C_{26}H_{49}O_9N_4^+$	30.7
3	Synechobactin B	533.3165	$C_{24}H_{45}O_9N_4^+$	27.7
4	Synechobactin C_{14}	589.3788	$C_{28}H_{53}O_9N_4^+$	33.0
5	Synechobactin C_{16}	617.4098	$C_{30}H_{57}O_9N_4^+$	35.1
6	**Synechobactin $C_{16:1}$**	**615.3940**	$C_{30}H_{55}O_9N_4^+$	**33.6**
7	**Synechobactin C_{14}OH**	**605.3734**	$C_{28}H_{53}O_{10}N_4^+$	**30.9**
8	**Synechobactin deacA**	**517.3212**	$C_{24}H_{45}O_8N_4^+$	**30.3**
9	**Synechobactin deacC_{14}**	**545.3525**	$C_{26}H_{49}O_8N_4^+$	**32.7**
10	**Synechobactin deoxyC_{14}**	**573.3839**	$C_{28}H_{53}O_8N_4^+$	**32.4**
11	**Synechobactin dehydroC_{14}**	**571.3681**	$C_{28}H_{51}O_8N_4^+$	**33.3**
12	**Synechobactin $C_{14:2}$OH**	**603.3579**	$C_{28}H_{51}O_{10}N_4^+$	**30.7**

R. Teta, G. Esposito, K. Kundu, M. Lega, V. Costantino

A multidisciplinary approach to the study of siderophores from cyanobacteri

Despite being predominantly known for their toxin-producing blooms, cyanobacteria also represent a class of not-yet fully explored sources of novel lead compounds for drug discoveries, which in turn has inspired the development of synthetic analogues with improved bioactivity and pharmacokinetics such as the dolastatins, cryptophycins, curacins, etc. Siderophores are versatile molecules secreted by cyanobacteria to maintain the organism's Iron homeostasis, in response to Iron starvation conditions and to facilitate Iron uptake in conjunction with specific transport systems. These molecules are routinely used in clinical trials to treat Iron overload diseases. Siderophore conjugated antibiotics are now tested in several research investigations to overcome bacterial resistance and improve anti-infective therapy. Few recent studies showed the atheroprotective effect of siderophores in humans providing a need to develop siderophore-rich food additives or a functional food to increase the siderophore uptake in people prone to cardiovascular diseases.

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Further, the molecular networking analyses of MS/MS data have been successfully used to reveal that #1-6 butanol extracts contains 165 features, grouped into 10 clusters (In the network, each node is represented as a pie chart showing the amount of the compound in the source cultures containing different iron concentrations). One of the ten clusters was composed of 23 nodes, 13 of which were derived solely from the Fe (III) depleted culture however, these nodes didn't match any known compounds in GNPS' library. The first node of the series is Schizokinen, followed by lipophile synechobactin A; synechobactin C16; new synechobactin C 16:1 The HRMS/MS analysis and fragmentation pattern of synechobactin A, C16 and the new synechobactin C16:1 was reported as a useful diagnostic way to detect them in any extract. Together with five known synechobactins, six new var-

iants have been identified, showing unusual modifications occurring on the acyl chain (unsaturation, hydroxylation) and in the hydroxamate-citrate backbone. To our best knowledge, this is the first report unveiling the biosynthetic capability of UTEX 1444 to produce a large array of synechobactins. It is interesting to note that UTEX 1444 produced 11 variants, besides Schizokinen, showing the ability to incorporate a variety of saturated and unsaturated fatty acids, likely as a biosynthetic-final step.

Considering the potential high impact of siderophore's production as ferric ion scavenger as well as toxic metal chelators, and then, the large array of applications in many different fields, from ecological research to drug discovery, our future studies will be focused on this aspect, to make

UTEX 1444 a suitable model-organisms for scale-up production of siderophores.

Univeristy of Naples Federico II
Culture of diversity. Law, science, education, 7

The Muna Consortium (Mediterranean and Middle East University Network Agreement) was founded in 2015 and renewed in 2021, when 30 Universities coming from all Countries of Mediterranean area and some others from Middle East signed the Framework Agreement.
As written in the Framework Agreement, also in this Muna space in the CUCS Conference, we propose three different main themes: MARE NOSTRUM (our Sea, the Mediterranean), PERSONA (Man) and ORBIS (the Earth), to summarize the proposals of Cooperation between Muna Network Universities.
A round table discusses the opportunities of the Cooperation, especially to understand which proposals can be followed in the Universities Cooperation and maybe to establish future projects

Gilberto Sammartino, is Full Professor of Oral Surgery and Implantology, head of the Unit of Oral and Reconstructive Surgery University of Naples “Federico II”, dean of the Degree Programme in Dentistry of the University of Naples "Federico II", Chief of the School of Oral Surgery, University of Naples “Federico II”, Past National Coordinator of all Italian Schools of Oral Surgery, delegate for the International activities of the University of Naples “Federico II”, past President of the Italian Society of Oral Surgery (S.I.d.C.O.), past President of the S.E.N.A.M.E implantology Association, chairman of S.E.N.A.M.E Implantology Association, I.C.O.I International Board Member, President of the I.C.O.I Italy Association, past President of ANTHEC - Academy of Non Transfusional Hemo-components, past President of intHEMA – International Non Transfusional Hemocomponents Academy, past Co-Chairman of the I.C.O.I Europe Association, author of more than 300 articles published on national and international journals, lecturer in national and international courses and conferences, co-Editor of Poseido Journal, guest editor of Case Report in Dentistry, lead Guest Editor of Special issues of Journal of Biomedical Research 2015, guest Editor of Special Issue of Journal of Biomedical Research 2016, associate editor of International Journal of Dentistry, member of the Editorial Board of different International Journal, referee of many International Scientific Journals.

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