CoNISMa
Consorzio Nazionale
Interuniversitario
per le Scienze del Mare

1994

Thinking of the sea

2014

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Interuniversitario
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THE CONISMA NETWORK

CONISMA 1994-2014

THINKING OF THE SEA

Twenty years after the birth of the Consorzio Nazionale Interuniversitario per le Scienze del Mare (the National Inter-University Consortium for Marine Sciences) it is essential to take stock of the results obtained and therefore, of the rightness of the choices and predictions made by the founders, who had understood its importance and potential.

Generally, the institutional function of inter-university consortiums as provided for by Italian law consists in selecting qualified, like-minded academic research Unities in order to form and reinforce specific inter-university research chains with a prevailing interdisciplinary character.

The idea underlying the creation of research networks was to make the best of all the different expertise within an interconnected system, stimulating both debate and coordination among universities with regards to aspects of special interest in the development of knowledge, innovation and technological transfer and, in general, in the advance of the Country's competitiveness on the international scene.

Thanks to the initiative of its founder, Professor Francesco Maria Faranda, CoNISMa was thus established on these assumptions and on the conviction that Marine Sciences, in particular, result from the cultural interest of experts from the most varied backgrounds and the widest ranging branches of learning who do scientific and technological research in the fields of biology, geology, sedimentology, geophysics, physics, chemistry, meteorology etc. The list can never be complete as it also encompasses law, economics, social sciences, engineering and whatever else may contribute to better understand and, consequently, better utilize a very important share of the territory.

Today more than ever, we can say that such an interdisciplinary approach to Marine Sciences proves to be very sound to rectify a course set upon following the significant increase in needs for specialties in many scientific subjects. Although on one hand, specialization is necessary for scientific progress, on the other hand, a correct approach to environmental sciences requires a holistic vision on the part of the researcher, an ongoing debate with other colleagues in order to make the most of all the various expertise.

Such a debate does not stop within Italian borders, but rather opens up towards the rest of Europe and of the world, aiming at creating first-rate networks to promote the currency of ideas and knowledge and, above all, their transfer to young people.

Nowadays, CoNISMa numbers about 700 affiliates counting research professors and technicians coming from the 32 associated universities. Just in 2013 it offered 250 contracts and grants such as research awards, scholarships, collaborations and professional assignments, thus participating in 61 institutional and business research projects. Among them, some – which we do not mention to avoid drawing up a ranking of importance – have an international scope, involving dozens of countries and hundreds of researchers.

This shows that, thanks to CoNISMa, even the smallest Universities can take part in major research projects on the basis of their true competence. It avoids duplication and guarantees projects of high scientific value. All may count on an efficient concentration of administrative and management functions which require specifically dedicated professional expertise; and furthermore, they may depend on common research infrastructures through the possibility of acquiring instruments and structures at the disposal of the whole scientific community, rather demanding from a financial viewpoint. This way it is possible to carry out research activities both in the field and/or in laboratory, extended to more users and thus helpful in many subject-matters.

The outcome of these first 20 years of operation can only be regarded as positive, and in keeping with the founding fathers' expectations. The internalization of scientific research has led Italian universities to have a debate with other research networks established abroad, taking part in prominent research forums and prestigious institutions such as the European Marine Board and Euromarine. We hope that this round-table conference "Talent building in Marine Sciences: a New Vision for Trans-disciplinary European Training Programs" opens up new development prospects for knowledge. And that the Faranda Prize may reward and give opportunities to those young researchers from around the world who have managed to draw inspiration from the leading principles which have founded and guided the CoNISMa to this day.

THE PRESIDENT OF CONISMA
Prof. Angelo Tursi

TALENT BUILDING IN MARINE SCIENCES: AN INTEGRATED VISION

The approach described below for the "building of talent" in marine sciences is based on the fundamental principles of "The European Charter for Researchers". Meaning that even the field of Marine Sciences feels the need to respond to the new demands of both research and labour market, to promote successful performance in generating, transferring, sharing and disseminating knowledge and technological development, and to the career development of researchers.

An extremely challenging scenario is taking shape in the EU, with a new vision for higher education. The Sorbonne Declaration, signed in May 1998, is the origin of the European area of higher education leading to the signing of the Bologna Declaration in June 1999. The Bologna aims at reforming the European human capital, so as to achieve a European Higher Education Area.

At the end of 2 cycles of studies (Bachelor/Master), European universities form professional specialists in the various fields of knowledge. Only a few of the graduates in biology, chemistry, economics, physics, geology, law, engineering, sociology, have studied a branch of marine science, becoming experts in their specific field of science.

Today, science is becoming increasingly reductionistic, with very deep analyses of single phenomena that should determine, once assembled, complex situations. This approach is very fruitful in some branches of science (e.g. particle physics), but is causing problems in the description and interpretation of complex phenomena.

Furthermore, the availability of large research infrastructures for research and monitoring, allowing the collection of huge amounts of data, is leading to increasing needs of expertise in information and technology to store and sometimes analyse this "data deluge". The infrastructures usually allow the measurement of a vast array of data, usually covering chemical and physical descriptors of the water masses with some simple biological descriptors, such as chlorophyll.

In the past, these descriptors were considered as sufficient but, at present, for a sustainable use of ocean resources, an increasing awareness that different types of data are also needed is prevailing.

Descriptor 5.	Eutrophication is minimised
Descriptor 6.	The sea floor integrity ensures functioning of the ecosystem
Descriptor 7.	Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
Descriptor 8.	Concentrations of contaminants give no effects

Descriptor 9. Contaminants in seafood are below safe levels

Descriptor 10. Marine litter does not cause harm

Descriptor 11. Introduction of energy (including underwater noise) does not adversely affect the ecosystem

The variables of the descriptors of Good Environmental Status in the Marine Directive of the EU are more liable to automated measures with current instrumentations, but the first four descriptors.

Descriptor 1. Biodiversity is maintained

Descriptor 2. Non-indigenous species do not adversely alter the ecosystem

Descriptor 3. The population of commercial fish species is healthy

Descriptor 4. Elements of food webs ensure long-term abundance and reproduction) cannot be measured with instruments, and require scientists with specific skills, performing fieldwork to extract the needed information.

This changed perspective of what is important to describe the state of the Ocean is also reflected in continuous calls for integrated and holistic approaches, not to mention the ecosystem approach.

This is currently expressed with the notion of emerging properties of very complex systems: the whole is more than the sum of its parts.

What kind of scientists does society need?

The different approaches must be integrated, and new ones must be pursued.

This trend cannot be sustained with researchers trained in the prevailing ways, focusing on specific aspects that are now perceived as insufficient to cope with complexity.

Of course we still need focused scientists and technicians. Reductionism is a fruitful approach and cannot be abandoned. Mathematical modelling and powerful statistics are also crucial to handle data and organize them. But they are not sufficient to obtain a comprehensive view of the complexity of the marine realm. Paradoxically, the old approach of "natural history" gives justice to the historical nature of environmental systems that, indeed, do have a history. The events of today are the results of the events of the past. The demise of natural history, labelled as merely descriptive, in favour of predictive sciences led to the assumption that it is possible to predict the behaviour of historical systems, in the face of chaos theory that demonstrated the inherent unpredictability of complex systems over the medium and long term. The call for a timely shift from monitoring to observation now gives dignity to observation. Long-term series, aimed at keeping trace of historical events, are crucial to understand change and to identify trends.

The new specialists of "natural history" must be able to analyze complex systems and to single out the relevant components that make up an ecosystem, and the interactions among them that allow ecosystem functioning.

The knowledge of the components and of the interactions leads to a proper assessment of the relevant variables that need to be considered in any modelling exercise. This is exactly what is required by the ecosystem approach. Reductionist approaches extracted some variables from their ecosystems and analyzed them as if the rest remained stable. This approach led to miscomprehension of environmental systems and also to mismanagement of some of their components (e. g. fisheries). The proper appreciation of the variables can lead to develop new infrastructures and monitoring tools, leading to better instrumentations. New conceptual models can be designed, hopefully leading then to mathematically oriented models that might even lead to precise predictions. Current models do not cope properly with the complexity of the modelled systems, hence their failure. Instead of attempting to produce better models by improving their mathematics, it is wiser to produce better models by respecting the complexity of the systems to be modelled, and the intricacies of their functions.

This new knowledge, supported by the most sophisticated technologies, must lead to new scientists that are fully aware of the diversity of life. It is paradoxical, for instance, that in the era of biodiversity there are increasingly less scientists that are trained at studying the diversity of life, recognizing species, knowing their ecological roles, and their life cycles.

The challenge ahead is to merge the most modern technologies with traditional approaches that are being lost, since both are important and neither is sufficient to cope with the complexity of environmental systems.

This problem can be solved only by training a new generation of scientists with broader views than the current ones.

This does not mean that the in-depth study of specific topics is not to be pursued; but that the present analyses need also an attempt at generating syntheses. This broad view is increasingly absent in current master training programs.

An ideal "marine operator", in this framework, must master one topic but must also be aware of the complexity of the interactions between her or his topic and the rest of the components of marine systems, so as to be able to interact with other scientists with different expertise. These "marine operators" must have a common theoretical background of the components and the connections that define the patterns and processes of marine systems, and must also have a specific technical training in one of these components.

The Mediterranean Sea, in addition to its unique environment, has another feature: it is a marine basin shared between the European Union and Countries with different cultures, societies, and economies, spanning over three continents.

The ecosystem approach should be common to all of these actors in the management of the common good.

This can only happen if the new stakeholders, new researchers, new technicians and new politicians share a common culture, stemming from a common scientific training.

The solution proposed above can be achieved through two mechanisms.

The first one is represented by the second-level master's degrees, specifically dedicated to address the complexity of marine ecosystems. The master's degree should be organized in order to be attended by graduates from different Mediterranean countries. The use of tools such as video conferencing and e-learning makes it easier and less expensive to reach a vast array of students through networked electronic classrooms, accessible to both the tutors from different Mediterranean universities or research institutions, and the students, from the various countries of the basin.

The second tool is the creation of a Doctoral School of Mediterranean Marine Science aimed at creating not only the future marine scientists, but also future economists, lawyers, administrators.

The English word "PhD, Philosophiae Doctor" expresses clearly what it provides the highest level postgraduate degree of academia: philosophy asks questions and reflects on the world and man, explores the meaning of Nature and human existence, attempts to define Nature and analyzes the possibilities and limits of human knowledge.

The Doctoral School of Mediterranean Marine Science should be open to universities and students around the Mediterranean, both European and non European ones, divided into different curricula (environmental sciences, economic sciences, legal sciences, social sciences). It will be located in those universities that offer the best facilities for students.

Its main feature will be the initial path of learning that will be required from graduate students.

This path is aimed at broadening, in the early months of the first year of attendance, the knowledge of students of a particular curriculum, allowing them to get to know the salient aspects of the knowledge developed in other curricula.

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TALENT BUILDING IN MARINE SCIENCES: A NEW VISION FOR TRANS-DISCIPLINARY EUROPEAN TRAINING PROGRAMS

Chairman **Quentin Cooper** – *BBC Radio 4 science presenter*

Agenda

Welcome and Introduction

Angelo Tursi, University of Bari, President of CoNISMa (I)

The European view of the marine research scientist

Sieglinde Gruber, Marine Resources Unit, DG Research and Innovation EC
Richard Bates, DG Maritime Affairs and Fisheries EC

Inter-university and research institute networks as key tools for an interdisciplinary approach to talent building in marine sciences: state of the art and future prospects

Yves-Marie Paulet, University of Bretagne Occidentale – Universités Marines (F)
Ned Dwyer, CMRC – Marine Universities Consortium (IRL)
Mark James, Scottish Oceans Institute MAST (UK)
Ferdinando Boero, University of Salento-Lecce, CoNISMa (I)

Training next generation scientists in Marine Sciences: the role of research infrastructures

Enrico Brugnoli, Department of Earth System Science and Environmental Technologies CNR (I)
Laure Mousseau, Commission Nationale de la Flotte Côtière (CNFC),
Observatoire coéanologique de Villefranche sur Mer, LOV: Laboratoire d'Océanographie de Vilelfranche, UPMC: Université Pierre et Marie Curie – Paris (F)

The role of European networks in the international coordination of educational activities

Tim Deprez, University of Gent (B) – European Marine Board
Patrizio Mariani, Technical University of Denmark (DK) – EUROMARINE

Actions and tools available for the enhancement and promotion of talent building at a European level

Angelo D'Agostino, National Contact Point MCSA – APRE (I)
Mattea Capelli, "Sapienza" University of Rome, International Office (I)

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FarandaPRIZE 2014

2nd Edition

in memory of Francesco Maria Faranda, founder of CoNISMa

UNDER THE HIGH PATRONAGE OF THE PRESIDENT OF THE ITALIAN REPUBLIC

October 9th Rome - Italy

The prize is awarded to young researchers submitting outstanding but still unpublished contributions in the field of fundamental and applied Marine Sciences. These researches must have been carried out through an interdisciplinary approach, as fostered by the vision and mission of the CoNISMa.

- The winner is awarded 5.000,00 Euros (Inclusive all taxes)

- Authors of the top 10 contributions will be awarded 500€ each and free registration to promote their participation in

EurOCEAN2014

7 - 9 October, Rome - Italy

European Commission

OFFICIAL EVENT OF THE ITALIAN EU PRESIDENCY

European MARINE BOARD
Advancing Seas & Oceans Science

National Research Council of Italy

CoNISMa OGS

THE PRIZE IS SCIENTIFICALLY SUPPORTED BY THE EUROPEAN MARINE BOARD

Deadline for applications: May 31st 2014

Call: www.conisma.it

CoNISMa – 9 Piazzale Flaminio, Rome (Italy) Tel. +390685355476. Email: farandaprize@conisma.it

With the Faranda Prize we want to pay homage to our Founder, but also and mostly, we wish to remember the man who gave so much to Marine Sciences through his passion for research, for teaching and, above all, for the transfer of an innovative research idea to young people entering upon this field.

Immediately after his passing away in 2011, there was a unanimous desire to keep alive, by means of some initiative, the memory of his contribution to Marine Sciences. A contribution which, through the foundation of CoNISMa and thanks to the debate that Francesco Maria Faranda always continued to fuel, turned out to be a forerunner of the guidelines that the entire scientific community would later follow.

Thus, in 2012, the Faranda Prize was instituted with a biannual occurrence and under the patronage of the President of the Italian Republic who grasped its high scientific and educational value; a Prize for young researchers whose scientific work is characterized by multidisciplinarity and interdisciplinarity.

That first edition had consisted mainly of a national dimension, even though there were also, among the authors, some young researchers coming from other European and overseas countries.

This year, thanks to the opportunity we were given to include the Prize among the Side Events of EurOCEAN2014, and through the promotional support provided by the European Marine Board, to which we would like to express our heartfelt thanks, the Prize has been inserted within an international context of outstanding scientific value.

Owing to this, there has been an increased participation from those young people who, though working in widely different scientific environments, consider research not only as a collaboration and communion of experiences between different yet complementary subjects, but also – as proven by some of the articles we are now going to present – as a collaboration between scientific worlds and experiences that are often very distant geographically as well. As evidence that science does not have, nor should it have, any boundaries.

We like to think that the new generations of researchers are working with the awareness that Science unites and that the progress of human kind and the advancement of knowledge must necessarily be built and shared by all without distinction.

The second edition of the Faranda Prize, which coincides this year with CoNISMa's twentieth anniversary, is a very important moment in the life of our consortium.

For the second edition of the Faranda Prize, 22 authors took part with their submissions.

These submissions had to be presented in the same form as articles being sent to an international scientific journal. The substance, though, had to be original work, never published before nor even yet submitted to any review for possible publication.

The institutions that the authors of these essays belong to turned out to be mainly European. In addition, several authors come from Mediterranean countries outside the EU area or from American universities. This brings to light the now clearly international scope of the Faranda Prizes.

The topics treated in the works submitted for the Faranda Prize proved to be extremely varied. However, if we wish to offer a somewhat rough cataloguing into macro-categories, we could say that the main topics dealt with concerned:

1) trophic ecology,
2) distribution patterns of organisms (mainly planktonic and benthic organisms as a response to impacts or disturbances acting on different scales),
3) biodiversity (investigated using different approaches),
4) fisheries biology,
5) impact assessment and management of human activities including the protection of marine ecosystems (also from a sustainable and integrated perspective, so related to an appropriate contextualization),
6) marine geology and finally,
7) ecotoxicology and developmental biology.

It is difficult to say 'how many' submissions fall under each above-mentioned category, precisely due to the fact that, in the majority of cases, they are multidisciplinary studies.

Indeed, excepting a few works that the referees considered too sectorial, a clear effort was made by the authors to use a wide-ranging approach in their studies, striving for multidisciplinarity, which is one of the fundamental values of the Faranda prize, together with innovation and, obviously, scientific excellence.

The evaluation phase of the submissions entailed intensive work on the part of more than 30 referees of international standing coming from scientific institutes from 5 different countries, who were involved, made an essential contribution and to whom we wish to express our most sincere thanks.

And a special thank-you to the scientific coordinator of the Second Edition of the Faranda Prize, Professor Paolo Guidetti from the University of Nice who, with his competence and dedication, contributed greatly towards the success of this initiative.

APPLICANTS

ANTIFOULING ACTIVITY OF SELECTED ANTARCTIC INVERTEBRATES: *"IN SITU"* EXPERIMENTS AT DECEPTION ISLAND, ANTARCTICA

ANGULO-PRECKLER CARLOS[1], AVILA CONXITA[1], OLIVA FRANCESCO[1], CID CRISTINA[2]

[1]University of Barcelona; [2]Centro de Astrobiologia (CSIC-INTA)

Competition for space is a remarkable ecological force, comparable to predation, that produces a strong selective pressure on benthic invertebrates. Some invertebrates, thus, possess antimicrobial compounds to reduce bacterial growth on their surfaces. Antimicrobial inhibition is the first step in avoiding being overgrown by other organisms, which may affect feeding, respiration, reproduction... In this study, we used the inhibition of bacterial biofilm by in situ experiments as an indicator of antifouling activity, testing the hydrophilic extracts of twelve Antarctic invertebrates (sponges, cnidarians, tunicates and bryozoans). Using two different approaches (genetics and confocal techniques) we found different levels of activity in the organisms tested. In fact, we even found differences within different parts of the organisms, in agreement with the Optimal Defense Theory. Eight out of 15 extracts tested had a negative effect on fouling after 28 days submerged in Antarctic waters. Thus, although chemical defenses may be quite species-specific in their ecological roles, our results suggest that different chemical strategies may exist to deal with the competition for space.

ANGULO-PRECKLER CARLOS

I have obtained a FPU grant (2010-2014) for the Spanish Government to get the PhD thesis framed in the Actiquim project on chemical ecology of benthic invertebrates comparing ecological activity of natural products from different geographic areas. I have been analyzing the antimicrobial and antifouling properties of some invertebrates from Arctic and Antarctic waters. Currently I am studying macro-invertebrates and infaunal communities from Deception Island, Antarctica.

ANTHROPOGENIC IMPACT IN THE *MAR PICCOLO* BASIN (SOUTHERN ITALY): MAPPING, QUANTIFICATION AND PRELIMINARY ASSESSMENT

BRACCHI VALENTINA ALICE[1], TESSAROLO CHIARA[1], CHIMIENTI GIOVANNI[2], CARDONE FRINE[2], MARCHESE FABIO[1], SAVINI ALESSANDRA[1], MASTROTOTARO FRANCESCO[2]

[1]University of Milano-Bicocca – Depatment of Earth Sciences; [2]Università degli Studi di Bari

The *Mar Piccolo* basin is a coastal brackish marine ecosystem located along the northern coast of the Gulf of Taranto (Southern Italy, Northern Ionian Sea). It is divided into E and W inlets, and its total area is roughly 21 km^2.

A Site of Community Importance (IT9130004 – Directive 92/43/CEE), and the Protected Area "*Palude La Vela*" (EUAP1189) have their seat along the *Mar Piccolo* coasts, and several species protected by Barcelona convention (SPA/BIO protocol) have been identified into the basin.

Despite its ecological relevance, the Italian Military Navy is placed in both inlet, because of its small size and natural protected position. In addition, the whole basin has been intensively used for mussel-breeding, and important industrial activities are located along the coast, which is intensively inhabited.

Our study attempts to map and quantify such human pressure over the basin, through the integration of a wide set of data: MultiBeam Echosounder bathymetry, Side Scan Sonar data and direct observations by SCUBA diving and trawled camera (collected in 2013), ortophoto (from Apulia cartography database) and ESRI® Imagery Basemap.

At least eight categories of anthropogenic structures, whose origin is both in past and present day human activity, have been identified in the sea water column and over the seafloor of the *Mar Piccolo* basin: line farms, pole farms, breeding frame structures, anchoring traces, excavation, buoy, wreck and undefined traces. Each category has been mapped and described through its morphometric characterization. Visual surveys coupled with remote data allowed building an updated accurate biocenotic map, and evaluating the relationship of the main anthropogenic impacts on the benthic communities.

Our work provided a first quantitative assessment of the extent of direct human impact on the seafloor trough the production of specific thematic maps that could represent an instrumental tool for the management of this particular basin.

BRACCHI VALENTINA ALICE *v.bracchi@campus.unimib.it*

Is interested in paleoecology, paleontology and marine geology of Quaternary costal Mediterranean biogenic carbonates. She actually conducts studies on the geomorphological expression and spatial distribution of coralligenous habitat trough remote sensing techniques.

She worked for national (BIOMAP, RITMARE) and international (CORALfish) projects, acting as geophysicist during oceanographic cruises, and as paleontologist and sedimentologist on direct sampling.

CAN DIATOMS REDUCE BIOMASS AND GROWTH OF EARLY STAGES OF THEIR COPEPOD GRAZERS?

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[1]Università di Messina; [2]Stazione Zoologica "A. Dohrn" Napoli

Diatoms are key phytoplankton species in the world's oceans and essential in the transfer of energy through marine food chains. However their beneficial role has been questioned after the discovery that some diatom species produce teratogenic compounds such as polyunsaturated aldehydes (PUAs) and other oxylipins that induce abortions, poor larval development and high offspring mortality in many invertebrates. To test whether maternal and post-embryonic diatom diets affected copepod development, we carried out experiments in which the PUA producing diatom Skeletonema marinoi (SKE) was fed to the copepod Paracartia latisetosa. Controls were run with the dinoflagellate, Prorocentrum minimum (PRO), which does not produce any of these compounds. 4 treatments were tested: both mothers and progeny always fed on either SKE or PRO, and those in which mothers received either PRO or SKE, and neonates were switched to the other diet. Our results show that a SKE /SKE diet induced lower egg production and egg viability, as well as slower embryonic development than the control PRO / PRO diet. Naupliar development was also negatively affected with the SKE / SKE diet which blocked the metamorphosis of larvae at N3, 4 days after hatching, compared to the control diet that allowed for normal naupliar development in 10 days. Nauplii reared on PRO and spawned by females fed on SKE were able to complete development, but only after 11 days, whereas larvae reared on SKE spawned by females fed on PRO were arrested at the N5 developmental stage, 12 days after hatching. Apoptotic TUNEL-positive nauplii were detected with the SKE diet, indicating imminent death. Significant differences were also recorded by comparing biomass of equivalent naupliar stages obtained for each treatment, and the overall mean biomass female-1 day-1 for each diet. We conclude that growth inhibition due to oxylipin-producing diatoms may have important consequences on prey-predator relationships and on the biomass flux through marine food chains.

BRUGNANO CINZIA *cinzia.brugnano@unime.it – cinzia.brugnano@gmail.com*

PhD degree in "Environmental Sciences" gained with a thesis on temperature effects on reproduction, development and survival of a hyperbenthic copepod species. During the last 4 years of Research fellow, she has been interested on maternal and post-embryonic diatom diet effects on some ecological copepod traits, such as fecundity, development and survival. In addition, she is a specialist of copepod taxonomy, aimed to study community structure and diversity of marine and transitional ecosystems.

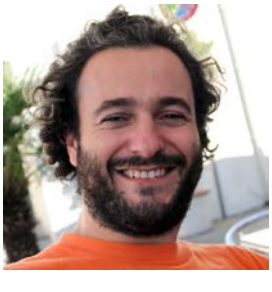
ENVIRONMENTAL FACTORS THAT INFLUENCE THE DISTRIBUTION OF *CARYBDEA MARSUPIALIS* (LINEO, 1978, CUBOZOA), IN SOUTH-WESTERN MEDITERRANEAN COASTS

CANEPA ONETO ANTONIO[1], BORDEHORE CESAR[2], ORTIZ DOMÍNGUEZ ANTONIO JESÚS[2], GILI JOSEP-MARIA[1], OLARIAGA ALEJANDRO[1], TOLEDO-GUEDES KILIAN[2], BOSCH-BELMAR MARIA DEL MAR[3], DURÁ CANDELA ELIA[2], ACEVEDO MELISSA[1]

[1]Institut de Ciències del Mar (CSIC); [2]University of Alicante; [3]Università del Salento

Jellyfish blooms cause important ecologic and socio-economic problems. Among jellyfish, cubozoans are infamous for their painful sometimes deadly stings and are a major public concern in tropical to subtropical areas; however, there is little information about the possible causes of their outbreaks. After a bloom of the cubomedusae *Carybdea marsupialis* (Carybdeidae) along the coast of Denia (SW Mediterranean, Spain) in 2008 with negative consequences for local tourism, the necessity to understand the ecological restrictions on medusae abundance and distribution was evident. Here we use different models (GAM and zero-inflated models) to understand the environmental restrictions that affect the abundance of *C. marsupialis* along the coast of Denia and the factors that lead to zero-inflated data in order to propose guidelines to conduct monitoring programs. Selected variables differed among medusa size classes, showing different environmental restriction associated to the developmental stages of the species. Variables implicated with dispersion (e.g. wind and current speed and direction) affected mostly small and medium size classes. Sea surface temperature, salinity and proxies of primary production (chlorophyll-a, phosphates, nitrates) were related to the abundances of small and large size classes, highlighting the roles of springtime salinity changes and increased primary production that may promote and maintain high densities of this species. The increased primary (and secondary) production due to anthropogenic impact is implicated as the factor enabling high numbers of *C. marsupialis* to thrive. Recommendations for monitoring blooms of this species along the study area and applicable to Mediterranean Sea include focus effort in coastal waters enriched by anthropogenic activities.

CANEPA ONETO ANTONIO *ajcanepa@gmail.com*



Actually, I'm a PhD (c) at the Institute of Marine Science (ICM-CSIC) in Barcelona. My work is based on the spatial-temporal dynamics, environmental drivers and socioeconomic impact of conspicuous jellyfish along the Spanish Mediterranean Sea. The research has been done through field based research projects, citizen science monitoring programs, interviews and contingent valuation and *ex-situ* controlled experiments on the biology and ecology of some species.

APPLYING VISUAL Q TO IDENTIFY DIFFERENT OPINIONS ABOUT UNFAMILIAR LANDSCAPES: THE CASE OF MEDITERRANEAN DEEP-SEA ECOSYSTEMS

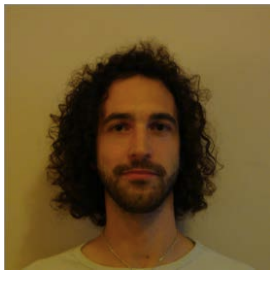
CARLESI LORENZO, MANDOLESI SERENA, NASPETTI SIMONA, ZANOLI RAFFAELE

Università Politecnica delle Marche

The Ecosystem service approach, by promoting effective social, economic and environment actions, is a prospective tool towards a more sustainable development. Assessing the value of goods and services of marine ecosystems is a complex task due to the existence of several gaps. This holds even more evident for the deep sea, which is one of the least explored environment in the world; furthermore, the extension of these systems (ca 65% of the world surface and 95% of the volume of the biosphere) make this evaluation an absolute priority for a comprehensive understanding of the global value of the natural capitols.

In this paper, Q methodology has been applied to explore subjective opinions of Mediterranean deep-sea ecosystems. The participant sample consisted in eight PhD students from different Faculties, among which the Marine Life Sciences. They were asked to perform a Q sorting experiment, and rank a Q sample of thirty-six underwater photographs of the marine wildlife, the landscapes and ecosystems in the Mediterranean deep sea. Photographs were sorted by each topic according to a subjective priority relative to: a) a personal overall view; b) their perception of the potential interest for fishermen; and c) as if they were a fisherman. The study revealed three distinct discourses on the subjective importance of deep-sea ecosystems in the Mediterranean Sea: "Noah's Ark Fans", "Ecosystem Functions Supporters" and "Deep Coral Lovers". Data analysis showed that main differences between factors were connected to the experience and the cultural background of the participants. This study improved our knowledge about individuals' perceptions on Mediterranean deep-sea ecosystems and may represent a preliminary step for their evaluation.

CARLESI LORENZO *l.carlesi@univpm.it*



I am a PhD student in Marine Biology and Ecology at Polytechnic University of Marche. I am primarily interested in the valuation of deep-sea ecosystem goods and services. I currently work on public perception of Mediterranean deep sea. I have also focused my attention on stated preference methods, in particular those employed to estimate the value of marine ecosystems. I plan to use a choice experiment to value some Mediterranean deep-sea ecosystem services.

SPATIALLY EXPLICIT ASSESSMENT OF BENEFITS PROVISION FROM MARINE COASTAL ECOSYSTEMS TOWARD MARITIME SPATIAL PLANNING AT LOCAL SCALE – NORTHERN TYRRHENIAN SEA

CARLI FILIPPO MARIA, GIOVACCHINI MONICA, MARCELLI MARCO, MANCINI EMANUELE

University of Tuscia

In this paper a high resolution, spatially explicit, assessment of coastal ecosystem benefits provisionis presented. Along the coastal zone of northern Latium region a variety of anthropic uses overlapsa large number of different ecosystems, both marine and terrestrial.

This generates massive conflictsbetween development and conservation, as well as among different uses. In this context the development of modern tools supporting the management is seen as an urgent need, also to achieve the implementation of the EU goals in terms of development and conservation.

As a background, we provide the framework within which we define ecosystem services and benefits and we provide our own operational definition. The largest part of the work was on marine environment, whose services and benefits were assessed. Terrestrial ecosystems provision was evaluated through literature review. As a result we have designed a Benefit Provision Map, in which marine and terrestrial ecosystems ability to supply benefits is displayed along with anthropic uses of coastal spaces.

For every typology of natural cover, the processes that build the ecosystem equilibrium, were studied under an ecological perspective; it was possible to identify actual and potential benefits that the existing ecosystems provide to human well-being. The high resolution local scale allows an accurate identification of the different typologies in the area, enabling the association of particular services and benefit to every trait of coast.

The purpose of the tool is to allow public administrations and decision-makers to have a clear view of the ecological and economic potential of the study area, so that spatial planning process can take into account easy access information on the importance of ecosystem benefit provision.

CARLI FILIPPO MARIA *fmcarli@unitus.it*

I am a Ph. D student at the Laboratory of Experimental Oceanology and Marine Ecology, University of Tuscia. My research activity is focused on marine ecology and coastal management and I am dealing with the study of marine ecosystem services to support sea-users management.

I have experience of oceanographic monitoring and scientific diving, as well as of project writing and implementation. I was recently nominated National Operator for the FEE's Blue Flag Program.

PHILOPATRY IN LOGGERHEAD TURTLES (*CARETTA CARETTA*): BEYOND THE GENDER PARADIGM

CLUSA MARCEL[1], AGUILAR ALEX[1], CARDONA LUIS[1], DEMETROPOULOS ANDREAS[2], PASCUAL MARTA[1], TURKOZAN OGUZ[3], REES ALAN[4], HAMZA ABDULMAULA[5], CARRERAS HUERGO CARLOS[4], LEVY YANIV[6]

[1]IRBio – University of Barcelona; [2]Cyprus Wildlife Society; [3]Adnan Menderes University; [4]University of Exeter; [5]General Environment Authority (Libya); [6]National Nature and Parks Authority (Israel)

Marine turtles have been traditionally considered model organisms for sex-biased behaviour and dispersal. Although female philopatry has been identified in the loggerhead turtle, with adult females returning to specific locations to nest, less is known about philopatry and breeding migrations of males. Genetic studies of female-mediated gene flow using mitochondrial DNA have revealed strong structuring in several nesting areas in the Mediterranean Sea. Nonetheless, genetic structuring assessment is incomplete without considering both female- and male-mediated gene flow. We analysed 152 hatchlings sampled from the major Mediterranean rookeries with 15 microsatellite markers to establish the influence of both male- and female-mediated gene flow in population structure. Five genetically differentiated units were identified: Libya and Cyprus, Israel, Lebanon, western Turkey and Greece. Our results reveal isolation by coastal distance and suggest that at least in Israel, Lebanon, western Turkey and Greece, mating might be mainly occurring near the nesting areas as these four areas were genetically differentiated with multiple nDNA markers. This reveals strong philopatry in both sexes due to limited gene flow. However, this seems not to be the case for Libya and Cyprus as these two nesting areas were identified as belonging to the same group, indicating a complex opportunistic pattern of breeding behaviour. Overall, we conclude that the previously suggested widespread male-mediated gene flow between loggerhead nesting areas might have been traditionally overrated.

CLUSA MARCEL *m.clusa@hotmail.com*

My professional career has evolved around the biology, ecology and conservation of marine vertebrates. As a PhD student at the University of Barcelona and as an MSc graduate from Bangor University, I assessed population structuring of marine turtles and cetaceans at a geographic and molecular level. My work covers a wide variety of fields such as population genetics, bycatch evaluation, stable isotope analysis, ecological niche modelling, coastal surveying and marine management and conservation.

THE ROLE OF SPONGES IN BENTHIC-PELAGIC COUPLING PROCESS IN MEDITERRANEAN COASTAL BOTTOMS

COPPARI MARTINA[1], GRINYÓ JORDI[2], ROSSI SERGIO[3], GORI ANDREA[2], VILADRICH NÚRIA[2], SAPONARI LUCA[2], OLARIAGA ALEJANDRO[4]

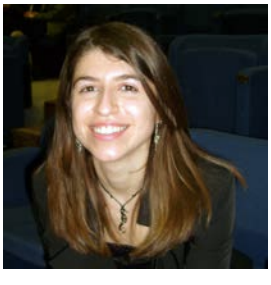
Autonomous University of Barcelona; [2]Institut de Ciències del Mar de Barcelona; [3]Institut de Ciència i Tecnologia Ambientals; [4]Marine Science Institute (CSIC)

Sponges are important constituent of marine benthic communities with a worldwide distribution ranging from polar to tropical regions. Through their active suspension feeding, they play a key role in benthic-pelagic coupling processes providing a trophic link between the benthos and the overlying water column. Despite this crucial role, little is known about their large scale distribution and feeding ecology. To fill this gap, two of the most abundant sponges in Mediterranean coastal bottoms were selected as study species: Aplysina aerophoba is massive, organized in chimney-like structure presenting "high microbial abundance" (HMA), whereas *Axinella polypoides* is an erect, tree-like, "low microbial abundance" (LMA) species. The spatial distribution has been investigated with Remotely Operated Vehicle (ROV) video transects, and the trophic ecology was studied in spring and autumn by means of in situ experiments with continuous flow incubation chambers. A. aerophoba is distributed between 5 and 20 meters, with maximum densities of 1.6 sponges m-2. A. polypoides is distributed throughout the study area between 10 and 70 meters depth, with maximum densities of 7.6 sponges m-2. Large-scale estimation of the species trophic impact and their potential role in benthic-pelagic coupling processes were obtained by coupling data of distribution and feeding.

In the 1.14 ha of coastal bottom explored, A. aerophoba ingested 0.8 g C in spring and 0.1 g C in autumn, corresponding to 0.20 and 0.02 mg C g AFDW-1 day-1, respectively. These quantities contrasted with the ingested 13.6 g C in spring and 29.0 g C in autumn of A.

polypoides that correspond to 0.12 and 0.25 mg C g AFDW-1 day-1, respectively. Population size structure has been taken into account to refine the estimation of the role of these organisms as carbon sinks.

COPPARI MARTINA *martina.coppari@uab.cat*



I'm a PhD student at the Autonomous University of Barcelona. The mean topic of my research is the ecology of benthic suspension feeders and the importance of these organisms in the benthic-pelagic coupling process. My research is focused on the Mediterranean coralligenous community.

A NEW MASS MORTALITY EVENT IN THE NW ADRIATIC SEA: WILL SOFT-BODIED CNIDARIANS RULE THE BENTHIC REALM?

DI CAMILLO CRISTINA, CERRANO CARLO

DISVA – Università Politecnica delle Marche

Massive outbreaks are increasing all over the world likely related to climate change. The Mediterranean basin is considered a natural lab where to test in shorter time future scenarios owing its smaller volume of water respect the rest of the Oceans. The Adriatic Sea, being small and shallower respect the rest of the Mediterranean Sea, can be considered a lab in the lab, recording faster and wider climatic anomalies. On October 2011 a mass mortality event took place in the NW Adriatic Sea with devastating effects on rocky benthic communities. The long-term observations of a benthic assemblage in NW Adriatic allowed monitoring its dynamics before, during and after the mortality event. The sponge *Chondrosia reniformis,* one of the key species of this assemblage, reduced its coverage of 70% and only few small individuals survived, leaving large bare areas on the rocky wall. Almost two years after the disease the survived individuals of *C. reniformis* did not increase significantly in size while the bare areas were colonized by fast-growing species such as stoloniferans, hydrozoans, mussels, algae, serpulids and bryozoans. Cnidarians were more resilient than massive sponges since they quickly recovered in less than one month. In the study area, the two last outbreaks caused a reduction of 67% of the filtration efficiency. The analysis of times series of wave heights and temperature revealed the conditions in summer 2011 were not so extreme as to justify a severe mass mortality, suggesting other factors concurred to trigger the disease. The long-term consequences of human-induced environmental stresses and water temperature increase could promote the replacement of slow-growing sponges in favour of more resilient organisms.

DI CAMILLO CRISTINA *c.dicamillo@univpm.it4*

Is a zoologist and studies marine benthic invertebrates of hard substrates. In particular, her research focuses on biodiversity, seasonality, climate changes, life histories and growth strategies of Mediterranean cnidarians and sponges. Her purposes are to understand the interactions between organisms and their environment and monitoring the biological diversity through long-term field observations of benthic assemblages.

TECTONIC ANALYSIS AND PALEOSTRESS DETERMINATION OF THE UPPER LAVA SECTION AT ODP/IODP SITE 1256 (EAST PACIFIC OCEAN)

FONTANA EMANUELE

University of Milano-Bicocca – Department of Earth Sciences

Research on deep-sea is of great importance to better understand the mechanism ofmagma emplacement and tectonic evolution of the oceanic crust. However, details of internalstructure in the upper levels of the oceanic crust are much less complete than that of the betterstudied subaerial areas. This study proposes, for the first time, a kinematic analysis using theinversion method on core data deriving from the drilled basement of the present day intactoceanic crust at ODP/IODP Site 1256 in the Cocos plate.
The research is based on aninnovative core reorientation process and combines different stress hypothesis approaches forthe analysis of heterogeneous fault-slip data by exploiting two distinct techniques. From theanalysis of the failure-slip data, both techniques produce 5 distinct subsystem datasets.
Allcalculated subsystems are mechanically and geometrically admissible.
Interpretation of theresults allows to point out a complex local and regional tectonic evolution deriving from theinterplay of (1) the ridge push and the rotation of both East Pacific Rise, and Cocos-NazcaSpreading Center; (2) the effect of the slab pull of the Middle America Trench; and (3) the influence of the cooling subsidence and intraplate deformation.

FONTANA EMANUELE *emanuele.fontana@unimi.it*

I am a postdoctoral researcher at the Dipartimento di Scienze della Terra – Università degli Studi di Milano. As structural geologist my work and field of interest are related to:
1) Analysis of stress and strain, kinematic analysis, deformation, and rock mechanics.
2) Relationships among deformation-metamorphism, alteration, and magmatism in active present and fossil margins.
3) Geodynamics of modern oceanic lithosphere.
4) Lithostratigraphy and structure of the ophiolitic complex.

BIOREMEDIATION OF CONTAMINATED MARINE SEDIMENTS CAN ENHANCE METAL MOBILITY DUE TO CHANGES OF BACTERIAL DIVERSITY

FONTI VIVIANA, BEOLCHINI FRANCESCA, ROCCHETTI LAURA, DELL'ANNO ANTONIO

DiSVA – Università Politecnica delle Marche

Bioremediation strategies applied to contaminated sediments can induce important changes of bacterial metabolism and diversity, with cascade effects on the mobility and bioavailability of metal contaminants. In this study we have investigated changes of bacterial abundance and diversity (by molecular fingerprinting and next generation sequencing analyses) during a biostimulation experiment carried out on anoxic marine sediment with a high metal content. We provide evidence that the addition of organic (lactose and/or acetate) and/or inorganic compounds to contaminated sediments determines a significant increase of bacterial growth coupled with changes in bacterial diversity and assemblage composition. Experimental systems supplied only with organic substrates were characterized by an increase of the relative importance of sulfate reducing bacteria belonging to the families Desulfobacteraceae and Desulfobulbaceae with a concomitant decrease of members affiliated with Flavobacteriaceae. An opposite effect was observed in the experimental systems supplied also with inorganic nutrients.

The increase of bacterial metabolism coupled with the increase of OTUs affiliated with Flavobacteriaceae were reflected in a significant decrease of Cd and Zn associated with sedimentary organic matter and Pb and As in the residual fraction of the sediment, with an increase in their mobility. However, independently from the experimental conditions investigated no dissolution of metals occurred, suggesting that the microbial community had a role in controlling processes leading to the solubilization. Overall results of this study have allowed to identify key biogeochemical processes and to provide new insights to a better understanding of the potential consequences of bioremediation actions on the metal fate in contaminated marine sediments.

VIVIANA FONTI *v.fonti@univpm.it*

Viviana Fonti is a postdoctoral fellow at Università Politecnica delle Marche (Italy). In 2014 she got a PhD in Marine Biology and Ecology, with a dissertation about the interactions between metal contaminants and prokaryotes in the marine sediment. Since 2008, she has studied also the potential of several microbial strains in the recovery of base valuable metals from hazardous wastes. At present, she is carrying out both lines of research.

MULTIDISCIPLINARY SCREENING OF TOXICITY INDUCED BY SILICA NANOPARTICLES DURING SEA URCHIN DEVELOPMENT

GAMBARDELLA CHIARA[1], DIASPRO ALBERTO[2], DI BARI GAETANO[1], RAMOINO PAOLA[3], FALUGI CARLA[4], MORGANA SILVIA[1], FAIMALI MARCO[1]

[1]ISMAR – CNR; [2] Istituto Italiano di Tecnologia;
[3]DISTAV – University of Genoa; [4]Università Politecnica delle Marche

Silica nanoparticles (SiO2 NPs) are widely used in industrials, such as additives for rubber and plastics and for diagnostic applications. Any direct and/or indirect release of these NPs in the aquatic ecosystem may pose potential hazards for the environment. The objective of this study was to investigate the potential toxicity of SiO2 NPs in seawater by using the sea urchin *Paracentrotus lividus* as biological model. We identified the effects of exposure to SiO2 NPs on the sperm of the sea urchin by using a multidisciplinary approach, combining developmental biology, ecotoxicology, biochemistry and microscopy analyses. We measured the following responses: i) the percentage of fertilized eggs by exposed sperm; ii) the percentage of anomalies and undeveloped embryos and larvae; iii) the enzyme activity alteration (acetylcholinesterase, AChE) in the first developmental stages, namely gastrula and pluteus. Sperm were exposed to seawater containing suspensions of SiO2 NPs ranging from 0.0001 mg/L to 50 mg/L. The fertilization ability was not affected at any concentration, whereas a significant percentage of anomalies in the offspring was observed and quantified by means of EC50 at gastrula stage, including not developed and anomalous embryos (EC50 = 0.06 mg/L), and at pluteus stage, including skeletal anomalies and delayed larvae (EC50 = 0.27 mg/L). Moreover, morphological anomalies were observed in larvae at pluteus stage, by immunolocalizing molecules involved in the larval development and in neurotoxicity activity, such as acetylated tubulin and choline acetyltransferase (ChAT), and measuring AChE activity. Exposure of sea urchin to SiO2 NPs caused neurotoxic damages, and inhibited AChE activity in a non dose-dependent manner.

In conclusion, the multidisciplinary approach used in this study allowed to verify the toxicity of SiO2 NPs in sea urchin offspring. Therefore, the investigated responses are suitable for detecting embryo – and larval – toxicity induced by these NPs.

GAMBARDELLA CHIARA *chiara.gambardella@ge.ismar.cnr.it*

She works as Post-Doc at the Institute of Marine Sciences (ISMAR-CNR), Genoa, Italy. Her activities focus on:
i) ecotoxicological bioassays with marine organisms exposed to toxic compounds and nanomaterials;
ii) environmental monitoring by means of marine organisms bioassays standardization and biomarker use;
iii) application of environmental protection regulations in marine and naval field. She is co-author of 25 peer-reviewed articles.

CUMULATIVE IMPACT ASSESSMENT ON ROCKY ASSEMBLAGES: REACHING CONSERVATION PURPOSES IN A HUMAN DOMINATED LANDSCAPE

GUARNIERI GIUSEPPE, BEVILACQUA STANISLAO, FRASCHETTI SIMONETTA, FARELLA GIULIO, DE LEO FRANCESCO, MAFFIA ANNA, TERLIZZI ANTONIO

Università del Salento – DiSTeBA

Marine Protected Areas (MPAs) are widely considered valuable tools to enhance ecosystemhealth, reaching the Good Environmental Status as required by the Marine Strategy FrameworkDirective, within the context of a sustainable socioeconomic development. However, in manycases, the process guiding MPA establishment and positioning is based on ad hoc criteria ratherthan a systematic planning approach.

In the Mediterranean Sea, where natural and humansystems generally overlap, Marine Spatial Planning is widely recognized as a valuableapproach to fulfil the need of harmonizing conservation purposes with sustainable development. Identifying the type and the distribution of local anthropogenic threats can helpsetting achievable management targets for degraded marine ecosystems and support theirresilience by identifying local actions. Here we used an integrated approach to investigate thepotential effect of different combinations of stressors on the spatial patterns of variability inbenthic assemblages inhabiting rocky habitats along a 40 km coastline. The study was carriedout in an area subjected to several human uses and associated potential impacts. The areaalmost entirely overlaps the MPA of Porto Cesareo (SW, Apulia), in which the lack ofeffective protection regimes, until few years ago, makes it a paper park.

Results showed thatnatural features of the coast (i.e. geomorphology) principally affect variations in the structureof rocky assemblages and that human stressors (e. g. sewage discharge, urbanization, datemussel fishery) have only local effects acting as small-scale drivers of changes. Our studyprovides evidence that human stressors can be possibly managed through specific actions and give information about the use of indicators that should be taken into account to address future actions aimed at guarantee effective and/or proactive policies of conservation.

GUARNIERI GIUSEPPE *giuseppe.guarnieri@unisalento.it*

Postdoc position at the University of Salento where he collaborated in several research projects related to coastal marine environment. Main research topics involvethe study of processes affecting the distribution of benthic organisms at different spatio-temporal scales, Marine Protected Areas effectiveness, the mechanisms shaping marine habitats and assemblages under different kinds of impact, the analysis of recovery trajectories of rocky assemblages as a result of human disturbance events.

REVISITING A BASIC TENET OF ECOLOGY WITH NEW TOOLS: HABITAT SUITABILITY MAPS AND ANALYSIS OF THE ECOLOGICAL NICHE FOR CONSERVATION

MAGLIOZZI CHIARA, CÁNOVAS GARCÍA FERNANDO

Centro de Ciências do Mar – Universidade do Algarve

Mapping current species distribution is becoming a critical issue for conservation ecology. Habitat Suitability Maps make a great contribution in studying niche characteristics relating the observed distribution of species to sets of environmental variables. In this work, a new computational and graphical approach has been used to study species – environment relationships using the Ecological Niche Factor Analysis (ENFA). We aimed to overcome the inefficient management of large geospatial information proper of the available software Biomapper and adehabitat library. With that purpose, Ecological Niche in R-GRASS library (ENiRG) is developed as a tool to compute ENFA, by interfacing GRASS, a GIS with optimal management capabilities, and R, a powerful object oriented program-language. In this study we used two fieldwork presence-only datasets on Holothuria arguinensis, collected across the Ria Formosa lagoon (Portugal); those provided calibration and validation data sets to test and validate the performance of the library. Our results show the potentiality of ENiRG in performing ENFA over high resolution and wide area, without technical constraints.

MAGLIOZZI CHIARA (3.01.1987) *chiara.magliozzi@libero.it*

She is an avid scuba diver and trekker, and was brought up and educated in Italy. She has just finished studying in the EMBC Programme and wants to continue her career in the field of marine biodiversity and conservation. Currently involved in a research project concerning habitat suitability maps, to examine where species are likely to occur and to produce visualizations of their relative importance in an attempt to minimize impacts on the use of coastal resources.

UNRAVELING ESTRADIOL METABOLISM AND INVOLVEMENT IN THE REPRODUCTIVE CYCLE OF NON-VERTEBRATE ANIMALS: THE SEA URCHIN MODEL

MERCURIO SILVIA[1], SUGNI MICHELA[1], PORTE CINTA[2], TREMOLADA PAOLO[1], FERNANDES DENISE[3], CANDIA CARNEVALI M. DANIELA[1]

[1]University of Milan, Department of Biosciences – CIMA, FCT, University of Algarve; [2]Institute of Environmental Assessment and Water Research CSIC; [3]CIMA, FCT, University of Algarve

Estrogens are widespread molecules, being present in both vertebrates and invertebrates. Weather their presence is also associated to similarly conserved roles in animal phylogeny is still uncertain. Due to their phylogenetic position, echinoderms represent ideal experimental models to provide evolutionary insight into estrogen appearance and function. Additionally, understanding estrogen roles in these ecologically relevant animals is also important to clarify their susceptibility to steroid-mimicking pollutants. In this research, we focused on the involvement of estradiol (E2), a well-known regulator of many reproductive processes in vertebrates, in the reproductive biology of the sea urchin Paracentrotus lividus. We first evaluated the physiological circulating E2 levels in wild adult specimens. Based on these results, we set up an experiment of direct E2 administration to study the endogenous hormone metabolism and its effects on gonad development. Although different E2 concentrations were tested, we did not observe a parallel dose-dependent increase of endogenous hormone levels in both body fluids and gonads, suggesting the presence of potent homeostatic mechanisms: these latter are particularly activated over a critical threshold and are more efficient in shortterm period or in specific tissue. These homeostatic mechanisms do not involve enzymes such as aromatase, sulfotransferase and acyltransferase, whose activities were not influenced by the E2 treatment. Despite the actual increase of endogenous E2, the hormonal treatment did not induce marked variations in reproductive parameters. Neither lipid content was influenced by E2 treatment, although a negative correlation with total E2 concentration in gonad was found.

Overall our results suggest that E2 does not markedly influence echinoid reproduction and, particularly, it does not promote female maturation, as on the contrary reported for vertebrates and also suggested for other echinoderms (asteroids).

MERCURIO SILVIA

Graduated with honors from the University of Milan in 2010, obtaining prizes for her academic results. She received her PhD in Animal Biology in January 2014 and collaborated with international groups, as the CSIC of Barcelona and the ITQB of Lisbon. Her research interests are reproductive and developmental biology of marine invertebrates. The current focus is echinoderm and tunicate endocrinology, particularly from ecotoxicological point of view.

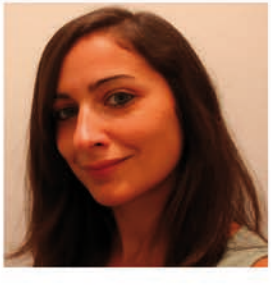
EVIDENCE FROM STABLE ISOTOPES (δ13C AND δ15N) ON THE EFFECTS OF OCEAN ACIDIFICATION ON TROPHIC INTERACTIONS BETWEEN ORGANIC MATTER SOURCES AND POLYCHAETE CONSUMERS AT A CO2 VENT SYSTEM

RICEVUTO ELENA[1], GAMBI MARIA CRISTINA[1], VIZZINI SALVATRICE[2]

[1]Stazione Zoologica Anton Dohrn of Naples; [2]Università di Palermo

Marine trophic interactions may change as a combined result of alterations in the chemical-physical balance of the sea and, to a larger extent, of global climate change (GCC), including ocean acidification (OA). Stable carbon and nitrogen isotopic analysis (SIA) was used to examine trophic interactions in a naturally acidified shallow coastal CO2 vents system in the Mediterranean Sea, and to determine the potential effects of ocean acidification on organic matter sources and consumers, which appear to be tolerant to high *p*CO2. Mesoherbivore consumers, represented by three polychaete species, *Platynereis dumerilii* (Audouin and Milne Edwards, 1833) (Nereididae), *Polyophthalmus pictus* (Dujardin, 1839) (Opheliidae) and *Syllis prolifera* (Krohn, 1852) (Syllidae), are abundant in the low pH conditions of the CO2 vents and occupy the same trophic level. Samples of consumers and potential food items (macroalgae, seagrass and epiphytes) were collected in two periods (May-June and October-November 2012) in two acidified and in two control areas. On the basis of isotope analysis it is suggested a substantial effect of high *p*CO2 on both organic matter sources and consumers, and an increase in carbon availability in the acidified sites, which can be detected in the recurring 13C depletion, also explicable due to the exploitation of volcanic-derived dissolved inorganic carbon (DIC) present in the area. The quality of the food sources was also affected by different pH conditions, in terms of C:N ratios, which resulted higher in low pH stations. Despite the occurrence of these effects, the trophic habit of high *p*CO2 tolerant polychaete consumers was not dramatically affected. Our findings shed the light on how some benthic organisms, such as the ones considered in this study may respond well to near-future OA conditions, exhibiting high phenotypic plasticity without being subject to dramatic ecological changes.

RICEVUTO ELENA *elena.ricevuto@szn.it*



I am a 3rd year PhD student at the Stazione Zoologica A.Dohrn in collaboration with the Open University, UK. My research focuses on the functional ecology of benthic polychaetes in the natural CO_2 vents of Ischia, with implications for Ocean Acidification and Global Climate Change. Objectives are addressed by several methods, including species settlement patterns, stable isotopes, ecotoxicology and molecular biology. My final interest is to discern between acclimatisation and adaptation of species.

FREE RADICAL SCAVENGING (ANTIOXIDANT ACTIVITY) OF NATURAL DISSOLVED ORGANIC MATTER

ROMERA-CASTILLO CRISTINA, JAFFE RUDOLF

Florida International University

Free radicals are produced in aquatic environments through photochemical reactions. They can affect the concentration and composition of organic matter and have negative effects on aquatic organisms. Free radical scavengers (antioxidants) can remove these highly reactive species from the media. Some dissolved organic matter (DOM) constituents are widely known to present antioxidant properties (e.g. polyphenols). However, the free radical scavenger capacity of DOM has not been assessed. Here we present and validate an analytical methodology adapted to assess the free radical scavenging capacity of aquatic DOM. This method was used to compare between samples from different environmental settings, including freshwater marshes, fringe mangrove estuaries and a coastal bay in Everglades National Park, Florida. All the samples presented antioxidant activity in different quantities depending on their origin and thus DOM quality. Samples associated with mangroves areas presented the highest antioxidant activity for 100 mg L-1 of DOC extract, possibly due to the presence of tannins which are known to be powerful antioxidants. The free radical scavenging capacity or antioxidant properties of DOM may have important implications in aquatic photochemistry as well as in microbial processes.

ROMERA-CASTILLO CRISTINA

Cristina is a Postdoctoral Associate at the Florida International University (FIU), working in Rudolf Jaffé's Lab, funded by a Beatriú de Pinós Postdoctoral Fellowship (Generalitat de Catalunya, Spain). Her focus is the study of the dissolved organic matter in different aquatic ecosystems and its role in the carbon cycle. She studies all this through mesocosms experiments as well as field work. In FIU, she is studying the composition and size of dissolved organic matter using techniques such as preparative HPLC, solid phase extraction, ultrafiltration and fluorescence and absorbance spectroscopy.

APPLICATION OF GAME THEORY TO PELAGIC RESOURCES FISHERY IN THE ADRIATIC SEA: JUST ANOTHER CHAPTER OF THE TRAGEDY OF THE COMMONS?

RUSSO TOMMASO[1], PARISI ANTONIO[1], COLELLA SABRINA[2], MARTINELLI MICHELA[2], BELARDINELLI ANDREA[2], SANTOJANNI ALBERTO[2], PULCINELLA JACOPO[1], ANDERLINI LUCA[3], CATAUDELLA STEFANO[1]

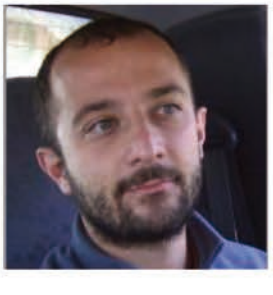
[1]Tor Vergata University of Rome; [2]CNR-ISMAR; [3]Georgetown University

One of the main fishing activities in the Adriatic Sea is performed by mid-water pair trawlers (PTM) targeting small pelagic resources. This activity is experiencing a long period of crisis due to resource depletion. This fishery basically consists in a daily search for fish schools, during which the captains of the PTM units interact with each other: the way they decide where to search for fish (the "strategy") largely depends upon the positions/status of other vessels.

Understanding this strategy represents a key step towards a more effective resource management, since strategies directly determine the pattern of fishing effort. In this study, a Conditional Logit model has been devised to predict the decisions of fishermen. The novelty of this work is represented by the fact that fishermen's strategy is analysed as a non14 cooperative game in which players cannot stipulate binding agreements about resource use and thus aim at maximizing the economic gain. This category of games is characterized by the existence of at least one equilibrium point – a Nash Equilibrium – in which each player plays his strategy, that is a Best Response (BR – an optimal response) to the strategies of the other players. This equilibrium point was estimated for the different scenarios defined by environmental (Sea Surface Temperature and Atmospheric Pressure) and economic (Fuel and Fish costs at market) variables.

Vessel Monitoring System data were used to capture fleet activity, while different datasets were collected to reconstruct environmental and economic drivers. Results indicate a good predictive power of the model, and suggest that the equilibrium strategy that guides units' behaviour is invariant with respect to environmental conditions, whereas it is largely influenced by economic factors. These factors, via equilibrium strategies, also determine important consequences for resource exploitation and the impact of fishing activity, as is demonstrated by key statistics (e.g. catch per unit effort). These findings confirm that non-cooperative systems are characterized by intrinsic problems that force the individual fishermen to maximize their efforts and thus overexploit resources. Management indications are presented and discussed.

RUSSO TOMMASO *tommaso.russo@uniroma2.it*



Researcher, he has a PhD in Evolutionary Biology and Ecology. His work was focused on ecology, morphology and teleost larvae, with applications for aquaculture. His approach was progressively oriented towards fisheries and the development of mathematical/statistical tools and predictive quantitative models. He mainly works on data (from the Vessel Monitoring System) about the Italian fleet activity. In this framework, he's working on bio-economics spatial models for the sustainable management of fisheries.

UNMASKING THE *AURELIA* JELLYFISH SPECIES COMPLEX ACROSS THE MEDITERRANEAN SEA: AN INTEGRATED MORPHOLOGICAL AND MOLECULAR APPROACH

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The number of known cryptic species in the marine environment is rapidly increasing, 5 following the recent development of molecular taxonomy methods. The moon jellyfish 6 *Aurelia* represents one of the most widely distributed and most investigated gelatinous taxon 7 worldwide, long considered as a three-membered genus, assuming a cosmopolitan and 8 ecological generalist species (*A. aurita*), a second species restricted to boreal cold waters (*A.* 9 *limbata*), and a third one inhabiting the US Northern Pacific coasts (*A. labiata*). Nevertheless, 10 recent molecular analyses led to the redefinition of the *Aurelia* group as a wider taxon, 11 including at least thirteen cryptic species. In the present study, we used integrated anatomical, 12 morphometric, developmental and genetic analyses of polyp, ephyra and medusa stages, to 13 screening for the identity of different moon jelly populations from different areas of the 14 Mediterranean and sorting out distinctive taxonomic features at species and population levels. 15 Morphological and morphometric analysis (at different stage of development) enabled the 16 selection and measurement of diagnostic taxonomic characters for intraspecific and 17 interspecific screening of morphological variation.
Corroborated by the cytochrome oxidase I 18 (COI) gene barcoding, our analyses supported the occurrence and current distribution in the 19 Mediterranean Sea of three cryptic species of *Aurelia* (sp. 1, sp. 5, sp. 8, *sensu* Dawson) and 20 the absence of *A. aurita* from the Mediterranean Sea. This work represents the first 21 morphological identification of the invasive alien *Aurelia* sp.1 for the Mediterranean Sea and 22 its first finding in the Adriatic Sea.

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My research focuses on jellyfish ecology and taxonomy, especially on scyphozoans.
My current research in these areas is related to the evaluation of the ecological impacts of jellyfish blooms, the influence of environmental factors on seasonal patterns of growth and abundance of jellyfish, scyphozoan life cycles, trophic ecology of jellyfish, and cryptic and invasive species.

SUSTAINABLE COASTAL DEVELOPMENT: TURNING KNOWLEDGE INTO ACTION

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Turning scientific knowledge into action for sustainable development is a major challenge for sustainability science. In order to turn knowledge into action, researchers and practitioners should be aiming to develop knowledge in an interactive way. Few studies have systematically analyzed how interactive knowledge development functions in practice. This paper presents a cross-case analysis of interactive knowledge development in coastal projects. Three cases are analyzed through the framework of project arrangements and knowledge arrangements. The projects are located in the Wadden Sea, San Francisco Bay and the Ems estuary and address issues of flood control, nature restoration, and livability. The cross-case analysis revealed eleven causal mechanisms that help explain how project decision-making impacts on interactive knowledge development, how a process of interactive knowledge development functions, and what its outcomes are.

The mechanisms reveal gaps in the theoretical understanding of interactive knowledge development.

Nevertheless, interactive knowledge development remains relevant for turning knowledge into action since it enhances feasibility and societal support for developed solutions.

As such, this paper contributes to a practice-oriented understanding of turning knowledge into action for sustainable coastal development.

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PhD candidate at the the University of Twente in the Netherlands. His research explores how coastal issues can be resolved through interactive knowledge development. Interactive knowledge development refers to the involvement of researchers, policy makers and stakeholders in knowledge production. Chris analyses these processes in the context of engineering coastal projects in the Wadden Sea, San Francisco Bay and the Ems estuary.

CLIMATE CHANGE MAY EXPLAIN THE SOUTHWARD EXPANSION OF SEAGRASS MEADOWS AT THEIR DISTRIBUTION LIMIT IN THE SOUTH-WESTERN ATLANTIC

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This is the first interdisciplinary analysis of the temporal dynamics of *Halodule wrighttii* meadows at their southernmost distribution range in the south-western Atlantic. Exposed meadows at the subtropical Paranaguá Bay have been appearing and regressing since 2005, whereas sheltered meadows are more stable. This work assesses the significance of temporal differences between sites at a seasonal scale and discriminates which environmental variables are early indicators of meadow regression. Differences between sites increased with an epiphytic overgrowth of the alga *Hincksia mitchelliae* at the exposed meadow, where seagrass growth was suppressed and the numbers of burrowing and opportunistic benthic species significantly increased together with an increase in algal biomass. In the sheltered meadow seagrass biomass and number of leaves increased seasonally and macrobenthic abundance and species richness remained stable with no evident community changes. Ecosystemic changes in the exposed meadow as expressed by oxygen fluxes between the bottom and the water column were evident only when the meadow was already collapsing. Signs of meadow decline were first detected in plants and animals, which may be used as early indicators of seagrass regressions. We specifically propose to monitor changes in the number of leaves per shoot, abundance and structure of the macrofaunal associations and host-epiphyte surface interactions.

The pioneering strategies of *Halodule wrightii*, as revealed by the rapid appearance and regression of meadows, suggests that it may be extending its southward distribution range due to the regional increment in temperature and carbon dioxide associated to climate change.

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My research focuses on understanding the effect of global change on coastal ecosystems. I graduated in marine biology at Old Dominium University, USA. I specialized on coastal and oceanic ecosystems in Federal University of Parana, Brazil. In Florence University, Italy, I studied the surface interactions of algae with seagrass. I built a novel Ocean Acidification (OA) experimental design in Algarve University, Portugal. My phD is about the effect of OA on rhodoliths beds.

FLOATING DEBRIS IN THE MEDITERRANEAN SEA

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CNR-ISMAR

Results from the first large-scale survey of floating natural (NMD) and anthropogenic (AMD) debris (>2 cm) in the central and western part of the Mediterranean Sea are reported. Floating debris was found throughout the entire study area with densities ranging from 0 to 194.6 items/km^2 and mean abundances of 24.9 AMD items/km^2 and 6.9 NMD items/km^2 across all surveyed locations. On the whole, 78% of all sighted objects were of anthropogenic origin, 95.6% of which were petrochemical derivatives (i.e. plastic and styrofoam). Maximum AMDdensities (>52 items/km^2) were found in the Adriatic Sea and in the Algerian basin, while the lowest densities (<6.3 items/km^2) were observed in the Central Tyrrhenian and in the Sicilian Sea. All the other areas had mean densities ranging from 10.9 to 30.7 items/km^2. According to our calculations, more than 62 million macro-litter items are currently floating on the surfaceof the whole Mediterranean basin.

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Post-graduate research Fellow at CNR-ISMAR (Italian Research Council – Institute of Marine Sciences). Currently working on the ecological impacts of marine litter, on the dispersal ecology of marine invertebrates and on the role of floating debris as dispersal vectors for marine organisms, as well as on the physical and anthropogenic drivers which lies behind the transport, abundance, distribution and composition of floating litter in the Mediterranean and in the Black Sea.