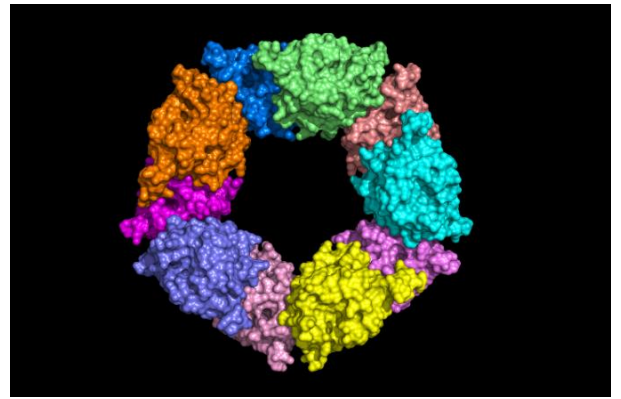


Universidade do Algarve

Faculdade de Ciências e Tecnologia

Campus de Gambelas  
(Edifício 8, Anfiteatro Verde)

**JORNADA ANUAL DOS DOUTORANDOS DE CIÊNCIAS  
BIOLÓGICAS e DE CIÊNCIAS BIOTECNOLÓGICAS- 2021**



9 de setembro de 2021

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## 9H00 – ABERTURA DAS JORNADAS

9H10 - JOÃO MIGUEL RODRIGUES DA SILVA BRAZÃO

***“The phylogenies of streptophytes and diatoms and an assessment of heterogeneous processes during their evolution”***

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ORIENTADOR: CYMON COX

The phylogeny of streptophytes, in particular, the sister relationship between charophytes and land plants, and the backbone phylogeny of diatoms were reassessed in this study taking advantage of the large quantity of data released by the OneKP and MMETSP sequencing projects. Phylogenetic relationships were determined using nuclear data and data-estimated amino-acid substitution models rather than the usually employed empirical models. Time- and site-heterogeneous evolutionary processes were also assessed. The results showed that data-specific models had a better fit to the data and heterogeneous evolutionary processes among lineages were present in most proteins. Nevertheless, time-heterogeneous model analyses were congruent with homogeneous model analyses. The charophyte group Zygnematophyceae was consistently recovered as the sister group of land plants. The inference analyses of diatoms always recovered the three main groups, with the earliest diverging group (Coscinodiscophyceae) recovered as a paraphyletic clade, while the remaining two (Mediophyceae and Bacillariophyceae) were recovered as monophyletic groups.

These results supported that the inferred phylogenies are robust and heterogeneous evolutionary processes, although present, have no influence in the relationships under study.

09H30 - OUMAINA BOUTOUB

***“Euphorbia resinifera and E. officinarum plants and honeys from Morocco”***

ORIENTADORES: MARIA DA GRAÇA MIGUEL, LAHSEN EL GHADRAOUI

For decades, raw products isolated from plants or even animals have been widely used in traditional medicine to treat vast human diseases. Honey or plant extracts are among the natural substrates with very versatile uses used not only in traditional and modern medicine but also in pharmaceutical fields based on the hemi-synthesis and synthesis of active molecules of natural origin. The family Euphorbiaceae is one of the largest families of higher plants it includes about 7,500 species, about 2,160 species in genus *Euphorbia* therefore is regarded as the 6th largest genus among flowering plants. *Euphorbia resinifera* and *Euphorbia officinarum* are Moroccan endemic plants possessing a number of medicinal properties and is one of the oldest medicines of the western medicinal tradition. These species and their honeys have medicinal and therapeutic importance in the prevention, the palliation, the treatment or the cure of diseases and infections in Morocco. Morocco is a favorable territory for beekeeping and honey production owing to varied resources and climate, *Euphorbia* honey is considered one of the most distinguished and valuable honeys from a consumer perspective in this North African country. Due to the large amounts of *E. resinifera* and *E. officinarum* in Morocco, there is a strong acceptance of this type of honey, whereby the Physico-chemical classification of these unifloral honeys is crucial for its distinction from other Moroccan *Euphorbia* honeys.

**09H50 - ANA ISABEL DE MAGALHÃES TAVARES**

***“Contrasting evolutionary histories from the warm Atlantic to the cold Pacific - overlooked seagrass diversity”***

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ORIENTADORES: ESTER SERRÃO, GARETH PEARSON, MASAHIRO NAKAOKA

Contrasting processes in tropical vs temperate regions are hypothesized to cause genetic differentiation and connectivity across populations and species that occupy similar ecological niches, as seagrasses. Past climate-driven range shifts, may have had a greater impact on the genetic structure of *Phyllospadix* species, distributed in the temperate Pacific region, which may have resulted in demographic effects with severe ramifications for evolution and extant genetic diversity. Oceanic connectivity, rather than climate variability, may drive patterns of genetic differentiation in tropical species that occupy limited warm ranges. *Halodule wrightii*, used to infer the genetic connectivity in the tropical Atlantic region revealed population differentiation between east and west Atlantic and biophysical models showed a low probability of connectivity between populations belonging to distinct genetic clusters. These findings will provide the first insight into *Halodule* and *Phyllospadix* metapopulation connectivity.

**10H10 - CRISTIANA DO COUTO PEREIRA MAIA**

***“Pathogenic potential of 8 new Halophytophthora species isolated at the Algarve Coast “***

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ORIENTADORES: LUISA CUSTODIO, ASCHWIN ENGELEN, THOMAS JUNG

Halophytophthora species are oomycetes inhabiting marine and estuarine ecosystems from the tropics to temperate regions. They have been described as saprophytes but might become pathogenic under certain circumstances. During a stay at Geomar in Kiel, Germany, the pathogenic potential of 8 new Halophytophthora species from the Algarve Coast to the seagrass *Zostera marina* was tested. The plants were collected and leaves showing any symptoms of disease were discarded. One agar disc of each actively growing isolate of Halophytophthora was placed in direct contact with healthy *Z. marina* leaves in aerated 1.5L aquaria, with six replicates per isolate. Leaves were regularly checked for signs of infection and after approximately two weeks the plants were taken out of the aquaria and necrotic lesions indicative of Halophytophthora infections were cut and plated onto selective NARPH media and checked daily for growth. Isolates were subcultured onto V8A and subsequently sequenced to confirm Koch's Postulates. From the 8 tested species, 5 were able to produce necrosis on *Z. marina* leaves.

**10H30 ÀS 10H50 - PAUSA/BREAK**

***“Neuroendocrine Regulation of Shell Production in Bivalves”***

ORIENTADORES: DEBORAH POWER, JOÃO CARDOSO

Shellfish aquaculture is one of the fastest growing food production sectors in the world (FAO 2018). During this PhD an experimental challenge was set up with the view to establishing how Ocean Acidification (OA) influences shell production in mussel (*Mytilus galloprovincialis*) and oysters (*Crassostrea gigas*). Mantle edge transcriptomes were produced, and the response to OA of genes involved in the regulation of shell mineralization were analyzed and compared. Currently, it is unclear if the effects of climate change on shell growth and mineralization are mediated by modifications in its organic framework. Here I focus on the regulation of chitin turnover (synthesis/breakdown) which is a widespread natural amino polysaccharide, and an important organic structural polymer of the shell since it provides the framework for mineralization of calcium carbonate crystals. Overall, the chitin-synthases-gene complement in different species of bivalves diverged and may explain their varying response to acidified sea water and indicates that the vulnerability of bivalve species to changes in the marine environment and the impact on the mineralized shell will not be uniform.

Acknowledgements: This work received national funds from FCT- Foundation for Science and Technology through projects UID/Multi/04326/2019. MP is in receipt of a scholarship from Shanghai Ocean University.



***“Climate change driven range shifts promote introgression between two south African kelp species”***

ORIENTADORES: ESTER SERRÃO, GARETH PEARSON, HIROSHI KAWAI

Commonly known as kelp, brown algae from the Laminariales order form major ecosystem-structuring marine forests around the world. Kelp are cold-adapted taxa, whose distribution is highly impacted by water temperature. Reports have shown that the distribution of different kelp species has shifted in recent years in response to sea surface temperature changes. When multiple species with similar niches are found near each other, range changes can result in overlapping distributions. These newly formed contact zones can lead to the loss of populations of the less resilient species or to possible introgression events between closely related lineages. Here we focus on the genus *Ecklonia* to understand how climate-driven range changes are affecting marine forests. *Ecklonia* species in the south African coast are already under climate pressure and have shifted their distributions to more suitable locations, leading to recently formed contact zones between *Ecklonia maxima* and *Ecklonia radiata*. These species are known to produce fertile hybrids under experimental conditions and the appearance of individuals with mixed morphologies suggests that hybridization might be occurring in situ. We have used transcriptomes from populations of *E. maxima*, *E. radiata* and the new morphotypes to test if introgression might be occurring in these contact zones or if new genetic lineages are differentiating as these species colonize new habitats. In addition to that, we have used ecological niche modelling to understand how the distribution of *Ecklonia* will respond to different climate change scenarios and to look for possible contact zones that might form in the future.

***"Impact of challenging environmental conditions on plant secondary metabolism"***

ORIENTADORES: ANABELA ROMANO, SANDRA GONÇALVES

Resisting environmental adverse conditions, which are now being exacerbated by climate change, is one of the major threats faced by plants. The main goal of this project is to provide new insights to understand the response of medicinal plants from Lamiaceae family to changing environmental conditions, with particular emphasis on plant secondary metabolites production and associated bioactivity. Since one of the aims of this project is to use green extraction procedures, the effectiveness of ten natural deep eutectic solvents on the extraction of phenolic compounds from *Lavandula pedunculata* was evaluated. Proline: lactic acid (1:1) and choline chloride: urea (1:2) mixtures showed the best result and were selected to assess the composition and bioactivity of plant extracts in subsequent studies. The capacity of metallic nanoparticles to trigger the up-regulation of phenolic compounds in in vitro cultures of *Thymus lotocephalus* was investigated, being Fe<sub>3</sub>O<sub>4</sub> NPs the most promising. *T. lotocephalus* cultures were subsequently subjected to drought stress induced by polyethylene glycol and the alleviating effects of Fe<sub>3</sub>O<sub>4</sub> nanoparticles, salicylic acid, and methyl jasmonate are being investigated. Likewise, studies are in progress to evaluate the effects of temperature, UV-B radiation and nutrients deficiency on micropropagated cultures and plants of *Lavandula viridis* and *T. lotocephalus*.

***“Chemical communication in bivalves: hormonal and pheromonal roles”***

ORIENTADORES: PETER HUBBARD, SANDRA JOAQUIM

The current study aims to characterize reproductive hormones in two bivalves *Crassostrea gigas* and *Ruditapes decussatus*. Biochemical composition, gonadal maturation and physiological condition were assessed monthly, indicating a positive correlation between condition index and maturation, and an accumulation of lipids but a depletion of glycogen during gametogenesis. Two protocols have been tested to identify the suitable method to extract steroids from bivalve tissues for LC-MS/MS analysis.

Bivalves use pheromones to coordinate spawning, most likely contained in the sperm. However, the identity of these compounds is unknown. We developed an electrophysiological technique to record from the molluscan chemosensory organ - the osphradium. This technique was validated using amino acids as stimuli. Some, such as L-cysteine and L-proline, evoked strong concentration-dependent responses whilst others, such as L-arginine and L-glutamate did not. Sperm itself also evoked strong responses. Thus, this technique will likely aid isolation and chemical characterization of bivalve pheromones.

**12H10 - ANDRÉ ALÇADA BAPTISTA REBELO DE ANDRADE**

***"Unravelling the functional role of thyroid hormone receptors in zebrafish embryogenesis"***

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ORIENTADOR: MARCO CAMPINHO

Thyroid hormone (T3) related pathologies are among some of the most prevalent endocrine diseases that affect human development. Maternal T3 (MT3) plays an essential role in vertebrate neurodevelopment. After cell entry T3 acts via T3-receptors (T3R) that transactivate or repress expression of T3-target genes. During zebrafish embryonic development *thraa* and *thrab* are the only expressed T3Rs. To better understand the developmental role of each receptor and the genetics behind their action we are developing CRISPR/Cas9 zebrafish loss of function mutant lines for *thraa* and *thrab*.

We have generated a mutant line for *thraa* that presents impaired neurodevelopment. Further validation confirms that there is no genetic compensation by translation adaptation by *thraa* or *thrb*, thus establishing a fully functional *thraa* loss of function model. We are now characterizing neurodevelopment in the established *thraa* mutant line.

None of the developed *thrab* mutant lines gave rise to a defined neurodevelopmental phenotype. To overcome this obstacle, we are now deleting a 9kb genomic region of *thrab*.

**12H30 ÀS 14H - PAUSA PARA ALMOÇO/LUNCH**

14H00 - MELINA COELHO DA SILVA

***“Dominance pheromones in the Siamese fighting fish (Betta splendens)”***

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ORIENTADORES: ADELINO CANÁRIO, PETER HUBBARD

The Siamese fighting fish (*Betta splendens*) is a fish species known by its naturally high levels of male aggression by the sight of another male, by its own mirror image or replica. This species suffered a long-term artificial selection for aggression, making it an ideal model to study this behavior. Literature have been supporting the hypothesis that aggressive behavior in fishes is regulated by pheromones, and their study is relevant at the evolutionary, ecological, and economic levels. However, these compounds were not unequivocally characterized yet in fishes. This project aims to combine advanced techniques in animal behavior, physiology and analytical chemistry to underpin the role of chemical communication in aggression and try to identify, for the first time, a dominance pheromone in fishes.

***"Identification of antibody responses predictive of protection against Malaria using novel statistical pipelines"***

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ORIENTADORES: NUNO SEPÚLVEDA, CLARA CORDEIRO

Various statistical pipelines have been proposed to discover antibody responses associated with protection against clinical malaria. However, these have often produced inconsistent results among studies due to inadequate statistical assumptions. In the present work, I have developed two new statistical pipelines to analyze data from IgG antibodies against 36 *P. Falciparum* antigens from 121 Kenyan children. The first pipeline relied on traditional statistical techniques for the normal distribution after Box-Cox transformation together with the use of flexible finite mixture models for seropositivity determination. The second was based on the identification of cutoff values in the antibody distributions that maximized the distinction between susceptible and protected individuals. These pipelines, enabled to develop several classifiers based on antibodies against the msp2, msp4, msp7, msrp3 and pf110373 antigens, with estimated AUCs of 89%, outperforming previous results based on random forest (AUC=68%). In summary, the performance of our pipelines suggests their wide applicability in antibody data analysis aiming to identify antimalarial vaccine candidates.

**14H40 – VIANA CASTANEDA-LOAIZA**

***“XtremeCrops: Optimization of the agronomic conditions for the sustainable cultivation of edible halophytes in an integrated multi-trophic aquaculture (IMTA) system”***

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ORIENTADORES: LUISA CUSTÓDIO, NARCISA BANDARRA

Halophytes can thrive in highly stressful environments (high salinity, temperature, UV radiation), which make them suitable for cultivation in saline aquaponics/IMTA systems. The produced biomass may have relevant nutritional applications in the food industry. The aim of this PhD is to optimize the cultivation of edible halophytes in an IMTA system combined to the production of marine fish. Assays on seed germination and seedling growth (Task 1), showed that only 1/3 of the species had germination above 70% in different salinities and substrates. To improve germination, different treatments were tested to break the dormancy of recalcitrant species. Preliminary results showed an improvement in germination of some species (e.g., *Mesembryanthemum crystallinum*), while in others no effect was observed

**15H00 – AMIR NOBAHAR**

***“Innovative combination of chemical and biological strategies for the recovery of metals from metals bearing wastewaters and leachates”***

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ORIENTADORES: MARIA CLARA COSTA, JORGE CARLIER

In this work, Zn separation from the Cu-free and 94% Fe-free acid mine drainage (AMD) obtained in the Cu recovery process previously developed. In this regard, Zn was recovered through the addition of biogenic sulfide and complete separation of the metal ion was observed at pH=3.5. Analysis of the obtained particles confirmed the presence of ZnS in both forms of wutzerite and spherulite in a size ranging from 40 to 1328 nm.

The second part of the work focuses on the evaluation of sulfate reduction capability in acidic conditions (pH=2-5) of bacterial communities obtained from sediments of AMD affected ponds in the São Domingos mining area. Furthermore, acid-tolerant SRB were isolated, and their taxonomic classification was performed using sequences of the 16S rRNA gene.

The third part included experiments using plant extracts aiming to precipitate gold from solutions obtained from leaching of printed circuit boards



**15H20 – BABAK NAJAFPOUR**

***“Transcriptomes Reveal Biological Capacity of The Larvae During Early Ontogeny”***

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ORIENTADOR: DEBORAH POWER

Gilthead sea bream, *Sparus aurata*, is a commercially exploited fish species, which during the hatchery stage is very vulnerable to fluctuations in environmental conditions and disease. Studies on fish larval development to establish their biological capacity will contribute to establishing the best rearing practices that enhance larval performance. In this study, the association of the transcriptome profile with age and weight was characterized in sea bream larvae from commercial production. 2243 differentially expressed gene (DEGs) transcripts were identified between larvae 24 days post hatch (dph) and 51 dph, and 2299 DEGs were identified when 46 dph larvae were compared to the 54 dph. Analysis of the enriched pathways and biological process represented in the DEGs revealed that they are age/weight-dependent during early ontogeny. Overall, of the genes identified the most enriched processes were immune response, detoxification, protein digestion in the stomach, eye lens structure, the ubiquitin-proteasome system, bone formation, and apoptosis at the end of larval period during the transition to the juvenile stage at 51-54 dph.

Acknowledgments: This work was financed by the European Union Horizon2020 Programme (PerformFISH, grant nº 727610) and Portuguese National funds from FCT - Foundation for Science and Technology through project UID/Multi/04326/ 2020, and from the operational programmes CRESCE Algarve 2020 and COMPETE 2020 through the project EMBRC.PT ALG-01-0145-FEDER-022121.

15H40 – LISEN LI

***“Comparative Proteomics Provide Insight Into Hatching in Teleosts”***

ORIENTADORES: ADELINO CANÁRIO, DEBORAH POWER, LILIANA ANJOS

The production of good quality eggs is a major bottleneck in aquaculture particularly since early life history influences subsequent health and performance. However, the molecules linked to egg quality and hatching of fish embryos are still obscure. To address this question, comparative proteomics was used to explore the protein repertoire from 24 hours before hatch to hatching in four Mediterranean fish species. A myriad of quantified proteins in two developmental stages of the white sea bream (*Diplodus sargus*), meagre (*Argyrosomus regius*), gilthead sea bream (*Sparus aurata*), and the sea bass (*Dicentrarchus labrax*) were identified and explored. Hatching enzyme (HE) was identified among the stage specific proteins and phylogeny revealed two choriolytic enzyme clusters with high and low activity, that underwent different evolutionary trajectories. Our results show that the high activity choriolytic enzyme (fghce) significantly increased and presumably drives hatching in white sea bream and gilthead sea bream. The importance of the HE complex for hatching in different fish species will be considered.

Acknowledgments: This work was financed by the European Union Horizon2020 Programme (PerformFISH, grant nº 727610) and Portuguese National funds from FCT - Foundation for Science and Technology through project UID/Multi/04326/ 2020, and from the operational programmes CRESC Algarve 2020 and COMPETE 2020 through the project EMBRC.PT ALG-01-0145-FEDER-022121.

***“Functional analysis of sea cucumber chemosensory receptors”***

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ORIENTADOR: ADELINO CANÁRIO

Sea cucumbers (Holothuroidea: Echinodermata) are marine invertebrates that largely depend on chemical communication to survive and reproduce as they lack a well-differentiated visual system and our knowledge on how they recognize and respond to environmental signals is limited. The large majority of chemosensory receptors are belong to the group of G-protein coupled receptors (GPCRs). At least 591 distinct GPCRs were found but no homologues of the human odorant receptors (OR). Phylogenetic identified at least eight potential sea cucumber ORs which cluster in two groups, one closer to sea urchins ORs (scOR1) and the other with the sea anemone (scOR2). The aim of this PhD thesis is to extend these studies with a larger transcriptomic and genomic analysis to identify other putative chemosensory receptors and to deorphanize at least some of the receptors. The intracellular signalling pathways will also be studied.

PRESENT AND DISCUSS A POSTER DURING THE MORNING BREAK  
AND/OR LUNCH TIME:

**BRÍGIDA GONÇALVES RODRIGUES**

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ORIENTADORES: SARA RAPOSO; RAUL BARROS

**ELIANA FERNANDES DOMINGUES E DOMINGUES**

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ORIENTADORES: LUISA CUSTÓDIO, FERNANDO ALBERICIO

**SANDRA CRISTINA MACHADO DA SILVA**

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ORIENTADORES: DEBORAH POWER, MANUEL MANCHADO

**ZHI LI**

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ORIENTADOR: DEBORAH POWER

16H20 ÀS 16H30 - CONCLUSÕES/CONCLUDING  
REMARKS