

Università degli Studi di Sassari



Alta Formazione

Scuola di Dottorato di Ricerca  
dell'Università degli Studi di Sassari



**Riassunti delle Tesi**

***Thesis Abstracts***

Cerimonia di Consegna delle Pergamene di  
Dottore di Ricerca dell'A.A. 2018/2019

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A cura di Antonello Cannas, Anna Paola Vargiu, Riccardo Zallu, Elisa Campus

Scuola di Dottorato di Ricerca dell'Università degli Studi di Sassari

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Sassari, Italia

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# Presentazione

La ricerca, quella libera, non immediatamente orientata o peggio asservita a logiche politiche o di profitto, è l'unica in grado di produrre i risultati scientifici più alti: l'indipendenza dei ricercatori, dell'Università e degli enti di ricerca è un bene da preservare ad ogni costo. L'Università degli Studi di Sassari, da sempre, persegue questo fine. Lo sancisce l'articolo 2 dello statuto e lo confermano i lavori dei nostri futuri dottori di ricerca, che si sono dimostrati all'altezza delle aspettative di un sistema universitario di primissimo livello.

L'Università di Sassari continua ad essere uno spazio di sperimentazione avanzata di linee di ricerca radicate e coltivate all'interno dei corsi di laurea e in questo ha avuto un ruolo determinante la Scuola di Dottorato, che riunisce 10 corsi dottorali, con più di 15 curricula nei diversi settori disciplinari.

La curiosità è il motore della conoscenza senza la quale non si impara né si insegna, è la motivazione che ci spinge a incrementare il sapere, è un bisogno innato che si sviluppa in relazione alle esperienze che possono favorirla o reprimerla. La scuola dottorale, nel tempo, ha stretto relazioni con enti e università straniere, anche attraverso la pratica della cotutela. È per questo che la nostra scuola spinge i nostri studenti a conoscere altre realtà e contesti culturali.

Le brevi presentazioni delle ricerche condotte dai nostri studenti, racchiuse in questo opuscolo, dimostrano la vitalità della ricerca, unico grande motore che permette di aprire nuovi e fecondi orizzonti di indagine.

Quest'anno ricorrono i 500 anni della nascita di Leonardo da Vinci. Pittore, scultore, inventore, ingegnere militare, scenografo, anatomista, pensatore, uomo di scienza. Leonardo è l'archetipo dell'uomo del Rinascimento, di cui incarna l'aspirazione di conoscenza del reale attraverso la ragione e l'esperienza; ma non solo, il suo genio creativo e la sua insaziabile curiosità, rappresentano qualcosa di universale: l'innato desiderio dell'uomo di superare i propri limiti. Forse i tempi che viviamo non sembrano promettere un nuovo Rinascimento; ma a maggior ragione è necessario che i giovani tengano vivi e presenti i valori seguiti da Leonardo: scienza, cultura e libertà.

*IL RETTORE*

*Prof. Massimo Carpinelli*

# La Scuola di Dottorato dell'Università di Sassari

## The Ph.D. School of the University of Sassari

Direttore: Prof. Antonello Cannas

La Scuola di Dottorato di Ricerca dell'Università degli Studi di Sassari è stata istituita nel febbraio 2018, con lo scopo di promuovere, organizzare e gestire le attività di servizio e supporto relative ai Corsi di Dottorato di ricerca. Alla Scuola afferiscono tutti i dieci Corsi di dottorato dell'Ateneo ed i loro 218 dottorandi. La Scuola ha come organi il Direttore (Prof. Antonello Cannas) ed il Consiglio della Scuola, costituito dai Coordinatori dei Corsi di dottorato (Proff. Fiammetta Berlinguer, Michele Comenale Pinto, Stefano Enzo, Ignazio Floris, Ludovico Marinò, Massimo Onofri, Vincenzo Pascucci, Andrea Piana, Leonardo Sechi, Raimondo Zucca) e da due rappresentanti dei Dottorandi, uno di area umanistica (dott.ssa Maria Cristina Idini) e uno di area scientifica (dott. Cristiano Depalmas). La Scuola di dottorato è supportata dall'Ufficio Alta Formazione (dott.ssa Anna Paola Vargiu, Responsabile dell'Ufficio; dott. Riccardo Zallu, Referente per i Corsi di Dottorato di ricerca; dott.ssa Elisa Campus, Segretaria della Scuola).

Gli obiettivi della scuola di dottorato sono di: offrire ai dottorandi, ai dottori di ricerca ed ai docenti un servizio amministrativo centralizzato; organizzare attività didattiche e formative comuni, condivise da tutti i corsi di dottorato e collabora alle attività didattiche e formative specifiche di ciascun Corso di dottorato; favorire l'interazione fra settori disciplinari diversi, gli scambi culturali e la creazione di un clima di studio e lavoro aperto, stimolante e creativo, promuovere gli scambi internazionali e l'ingresso

di studenti stranieri; promuovere le interazioni e gli scambi col sistema produttivo e l'inserimento dei dottori di ricerca nel mondo del lavoro.

In questo senso pensiamo sia importante dare il giusto riconoscimento alle attività di ricerca condotte, con grande impegno e sacrifici, dai dottori di ricerca del nostro Ateneo. Questo volume è quindi un modo per ringraziare le dottoresse ed i dottori di ricerca per il loro impegno ed i loro risultati, ma rappresenta anche una delle diverse azioni che la Scuola di Dottorato intende condurre per divulgare le loro competenze e le loro ricerche, promuoverle nella comunità scientifica e facilitarne il trasferimento negli enti pubblici e nel sistema produttivo.

Corso di Dottorato in Architettura e Ambiente

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**Ph.D. Program in Architecture and  
Environment**

Coordinatore/Coordinator: Prof. Vincenzo Pascucci

Dottori di Ricerca/Ph.D.

Arras Francesca

Bazzu Paola

Callea Laura

Calosci Alfredo

Lai Giuseppina Grazia

Marchinu Silvia

Dottore di Ricerca/Ph.D.: **Francesca Arras**

Data di Discussione della Tesi/Date of Thesis Defense: **1.03.2019**

Titolo della Tesi/Thesis Title: **Why a Learning City could be a Healthy City? Why and how to bypass the rhetoric of innovative learning spaces, using the construct of the [urban] capability [sensitive design] approach.**

Tutor/Adviser: **prof. Arnaldo Cecchini**

### **Abstract**

This research aims to demonstrate if and how a Learning City can exist, and satisfy the requirement of a Healthy City, trying to give an operational meaning to this word beyond the current definitions and guidelines (OMS, OECD, UNESCO, ONU, MIUR) reflecting on the educational potential of space. The results of the research demonstrate a "healthy city" is above all a fully, inclusive and enabling, innovative and safe "usable and used" city by all its inhabitants. A malleable and transformable urban environment, not only a container of health or learning, but also as an instrument that creates them and allows the people to be not only recipients, but co-authors of their own processes of development and well-being in the full sense, in an emancipatory perspective.

The research is therefore inscribed in the broad debate on what it means to be a "healthy city" as well as the particularly effervescent "innovative" learning spaces, "re-organizing" the priorities of the urban agenda. The research approach aims to overcome the limits inherent in the disciplinary and academic fields, often characterised by fragmentation and isolation, by moving onto other disciplinary domains, especially in the pedagogical sciences; re-center the city around the theme of learning, beyond the enclosures / standards/ disciplinary and exclusion devices produced by the contemporary city, from the beginning of the modern city. At the same time, the rhetoric of the Innovative Learning Spaces is replaced with projects / processes (of space and learning) based on the "Capability Approach" as a founding paradigm of the spatial and pedagogical choices (with the perspective for lifelong/wide/deep learning).

In the III part of the work (chapter IV and V) explains the reasons why this could occur, opening learning spaces to the city and vice versa, from the perspective of widespread learning, with a series of reflections, ideas, research trails, case studies, and direct experience in the field as well as in the sphere of research & action. A possible methodology is introduced suggesting to elaborate the concept of "tactical counter-device" chosen as a tool that, by its nature, is able to "hack" and "debug" space into an inclusive perspective, capacitative-enabling, "beta-permanent", open and incremental. Starting a new concept of learning, which guarantees different yet fair

opportunities to all, ensuring everyone will have the chance to use and enjoy the city with respect to the development prospects chosen for each-ones own life and action projects, especially for all those categories of "disadvantaged" inhabitants to whom the city is hostile and inaccessible.

Dottore di Ricerca/Ph.D.: **Paola Bazzu**

Data di Discussione della Tesi/Date of Thesis Defense: **1.03.2019**

Titolo della Tesi/Thesis Title: **Urbanismo tattico e strategie per l'abitare: nuovi strumenti per integrare la visione dei cittadini nei processi di trasformazione della città**

Tutor/Adviser: **prof. Arnaldo Cecchini**

### **Abstract**

The aim of the work is to find new tools to integrate citizen participation in urban transformation processes: this would mean working for a shared and truly democratic city project, based on a shared understanding - and not suffered or passive acceptance – of the administrative choices made through the involvement of the citizens in the choice processes, and on an the openness of public administrations to new bottom-up visions based on urban practices.

The work analyzes two themes: Tactical Urbanism (an approach to city project based on short-term, low-cost and small-scale actions, capable, thanks to the tactical aspect, of obtaining not only short-term results but also long-term benefits) and Social Housing strategy (an integrated model that provide not only housing but also services, because the key goal is the construction of a cohesive and supportive community, not the real estate project).

The themes have similar macro objectives: to show citizens centrality in urban transformations and to reactivate the legitimate role that they have as actors capable of supervising this type of process. For this reason the work developed a theoretical experimentation that, starting from an existing housing strategy (the “Piano integrato per la rigenerazione urbana del centro storico di Sassari”), want to hypothesize its application and development according to the Tactical Urbanism approach, analyzing possible effects and potential advantages of an integration of tactics and strategy.

Dottore di Ricerca/Ph.D.: **Laura Callea**

Data di Discussione della Tesi/Date of Thesis Defense: **1.03.2019**

Titolo della Tesi/Thesis Title: **Asmara: analisi degli aspetti compositivi e cromatici dell'architettura per la conservazione del centro storico**

Tutor/Adviser: **prof. Bruno Billeci**

### **Abstract**

The research field in which this study is inserted is inherent in the transformations of the historical center in light of the strong pressures of various kinds that currently affect its modification.

Specifically, the case study of Asmara, in Eritrea, completely similar to the Italian context for its architectural history but less compromised by changes and additions for various contingent reasons to the specific history of the Country, allowed to contextualize the general questions to concentrate the attention on some fundamental themes concerning the modification - and, positively, the conservation - of the compositional and chromatic characteristics of the modernist architecture.

The study produced an overall reading of the historical urban context regarding the treated aspects that allowed to deepen the understanding of some formal characteristics of the twentieth-century architectural production functional and extensible to the knowledge and protection of local heritage as well as the Italian one and to define a methodological approach to the problem of the conservation of colors starting from the reconstruction of the successive architectural phases and the urban setting in which they were inserted, considering in parallel the theoretical and conceptual bases that at the international and local level have given rise to Eritrean production, examining its technical, ideological and social aspects.

In this sense, the path of analysis carried out, together with the direct examination of the buildings and the specific stratigraphic analyzes, is proposed as a useful cognitive contribution to support the hypotheses and the final conservative choices.

Dottore di Ricerca/Ph.D.: **Calosci Alfredo**

Data di Discussione della Tesi/Date of Thesis Defense: **1.03.2019**

Titolo della Tesi/Thesis Title: **Luoghi, Comunità e Conoscenza: gli eventi espositivi tra partecipazione e Design**

Tutor/Adviser: **prof. Nicolás Ceccarelli**

### **Abstract**

La presente ricerca tratta di come comunità e conoscenze trovano modo di dare vita a spazi fisici e di come il design può contribuire a questo fenomeno intervenendo sia nella definizione funzionale degli spazi che nelle dinamiche di questi processi di aggregazione.

Nonostante l'enfasi con cui oggi sempre più spesso si sottolinea la natura impersonale ed intangibile del sapere – e la crescente immaterialità dei supporti con cui se ne distribuiscono le codificazioni – gli spazi specificamente attrezzati per la divulgazione e per la creazione di esperienze culturali continuano ad essere vivaci luoghi di incontro e di dialogo.

Secondo Z. Bauman, viviamo una epoca in cui la società si caratterizza per rappresentare i propri membri come individui e dove l'appartenenza ad una determinata comunità non è data dal luogo, dalla genealogia o dalla tradizione ma è il frutto di una scelta personale, spesso di carattere transitorio. In questo contesto l'esistenza di dinamiche di aggregazione sociale – intorno a progetti di lungo periodo e con una marcata dimensione locale – rappresenta un interessante fenomeno in controtendenza e sta generando interessanti sperimentazioni anche nelle contemporanee modalità di gestione culturale, sollecitando la creazione di nuovi spazi attrezzati per la condivisione del sapere. Sempre secondo Bauman, la Cultura contemporanea è orientata alla soddisfazione di esigenze individuali, agendo spesso come tranquillante per sedare le ansie personali più che come stimolante collettivo. Alcune delle sperimentazioni in atto nel campo della gestione culturale cercano di contrastare questa tendenza dominante attraverso dinamiche di carattere partecipativo. Queste iniziative, che attraversano le diverse tipologie di istituzioni tradizionalmente destinate alla cultura ed all'istruzione come Musei, Archivi, Biblioteche, Teatri ... sembrano condividere un approccio comune, quello di considerare la partecipazione a processi ed eventi culturali come parte della costruzione di una critica del presente, adottando in questo modo una prospettiva gramsciana nella quale anche lo sguardo al passato ha senso nella misura in cui ci consente di "evitare di credere che tutto ciò che esiste è naturale esista".[quaderni del

carcere] La ricerca si centra specificamente su una delle molte modalità attraverso le quali i processi di partecipazione, che coinvolgono comunità locali, stanno generando una nuova domanda di spazi per la condivisione del sapere. Ci riferiamo alle iniziative che contemplan la realizzazione di un evento espositivo. Si tratta di un fenomeno relativamente recente nel panorama della gestione culturale che pur mantenendo un carattere marginale si sta progressivamente consolidando. Queste esperienze, in grado di esprimere un enorme potenziale comunicativo, presentano spesso forti elementi di criticità quando vengono inserite in un processo di carattere partecipativo. Gli eventi espositivi rappresentano in questo senso un campo di osservazione privilegiato per poter analizzare il contributo dei progettisti coinvolti professionalmente in una iniziativa culturale di questa natura. Il quadro di riferimento adottato per questa analisi è quello suggerito in varie occasioni da Ezio Manzini; in un contesto in cui i processi di progettazione tendono a coinvolgere un sempre maggiore numero di soggetti diventa cruciale analizzare le relazioni che si instaurano tra i designer esperti ed il resto dei portatori di interesse implicati in questa progettualità diffusa.

Lo scopo della ricerca è mettere in evidenza le peculiarità delle iniziative legate ad un evento espositivo rispetto alle esperienze di co-design, e design aperto, che si sono sviluppate in altri contesti e, in termini più generali, in relazione con altri processi di tipo collaborativo nati nell'ambito delle dinamiche di innovazione sociale. Il nostro contributo riguarda quindi la natura delle relazioni tra luoghi comunità e conoscenze nel contesto delle iniziative culturali che hanno come obiettivo la valorizzazione dei beni comuni ed il processo di apprendimento sociale necessario per imparare (di nuovo) a gestirli.

Dottore di Ricerca/Ph.D.: **Giuseppina Grazia Lai**

Data di Discussione della Tesi/Date of Thesis Defense: **1.03.2019**

Titolo della Tesi/Thesis Title: **Ecological surveys for the valorization of spring environments of Sardinia: implications for their fruition and environmental protection**

Tutor/Adviser: **dott. Bachisio Mario Padedda**, Co-Tutor/Co-Adviser: **prof.ssa Antonella Gesuina Laura Lugliè**

### **Abstract**

Springs are ecosystems with unique features and great ecological value. In the Mediterranean area they are more exposed to the risks of alteration of their structure and natural functioning because of direct and indirect human pressures and climate change. Despite this, springs remain poorly studied and specific approaches of management and protection are still missing. The main purpose of this PhD was to acquire knowledge on ecology of karst and thermo-mineral springs of Sardinia, traditionally neglected. The research activities focused on diatom microflora from different substrates in 17 springs of the Island. The results indicated a high diatom biodiversity, also highlighted by the presence of *Sellaphora gologonica* sp. nov. and *Chamaepinnularia thermophila*, the latter observed only in very few sites in the world so far. The analysis of the relationships between species and environmental variables, confirmed that diatoms can reflect the effects of important factors related to the vulnerability of these ecosystems, such as hydrological stability (flow permanence), discharge, climate change (extreme flash floods) and nutrient enrichment. This thesis offer food for thought on the importance of enhancing and preserving these environments so important from an ecological point of view and of so large interests for human uses. The information collected may represent a starting point for the development of strategies aimed at their proper management.

Dottore di Ricerca/Ph.D.: **Silvia Marchinu**

Data di Discussione della Tesi/Date of Thesis Defense: **1.03.2019**

Titolo della Tesi/Thesis Title: **La Conoscenza nel progetto di restauro: un'applicazione sull'architettura dei castelli in Sardegna tra analisi del costruito e storia dei restauri**

Tutor/Adviser: **prof. Bruno Billeci**

### **Abstract**

The restoration project of a good finds its scientific basis during the learning initial phase, which provides information about the condition of the monument and the previous events which had led to the last physiognomy. In relation to the first phase of knowledge, is helpful to edit a methodological protocol that provides valuable tools to plan available resources, both economic and cognitive, in order to achieve the best intervention in relation to the specific context conditions that characterize each protected good. The path of knowledge, functional to the restoration, makes use of different disciplines, each directed to the cases examined. Among these, the stratigraphy of the highs, a discipline inherited from archeology, is able to know in a detailed and accurate manner the material of which the architectural artifact is composed. The latter, in fact, if appropriately investigated in a "direct" way, represents the first document of himself, the most "authentic", the testimony of an important page of history, by definition, unique and unrepeatable. From historical and evolutionary analysis, knowledge is defined, aimed not only at the historical reconstruction of the facts but also at a reading of the architectural, technical and technological features, as well as the identification of alterations to the original structure. For these reasons, the choice on the field of application of this research fell on medieval castellan architecture in Sardinia. These, in fact, built in a defined and circumscribed territorial context, are not immediately over the course of time transformations dictated by a pressing reuse, which still allows today to have highs yet to be read. The study was conducted through three research phases:

1. Construction of the state of the art on castellan architecture in Sardinia: bibliographic and archival research and field survey; technical reading of the wall faces with respect to the sources; methods of construction, materials, construction techniques; current physical condition and state of conservation;
2. Analysis of the archival documentation kept in the archives of the Superintendencies concerning the restorations carried out between the 19th and 20th centuries;

3. Identification of cultural bodies and practice in the exercise of time, more efficient interventions, related problems and outcomes of these operations.

The objective of the present study is to support a critical intervention for critical intervention, I mean a technical and cultural operation, guided by intervention choices that respect the material consistency and aimed at enhancing and recovering the architectural heritage.

# Corso di Dottorato in Scienze della vita e Biotecnologie

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## Ph.D. Program in Life Sciences and Biotechnologies

Coordinatore/Coordinator: Prof. Leonardo A. Sechi

### Dottori di Ricerca/Ph.D.

Avitabile Elisabetta

Caggiu Elisa

Donadu Matthew Gavino

Lecis Roberta

Liu Yisu

Marchetti Giuseppe

Thao Tien Nguyen Phuong

Phan Thang

Wu Lu

Sotgiu Elisabetta

Dottore di Ricerca/Ph.D.: **Elisabetta Avitabile**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **Nanotechnology: development of nanotools to counteract human diseases**

Tutor/Adviser: **prof.ssa Antonella Pantaleo**

### **Abstract**

Recent advances in technology and engineering have led to the application of nanotechnology in medicine with the development of new nanoscale biomedical systems. Despite the still limited results on the non-toxic effect of nanomaterials, the main step before any biological application is represented by their safety assessment. For these reasons, scientists are researching new less toxic nanotools for new diagnostic strategies. In this context, the research work consists of three parts that include several innovative nanotechnology applications to counteract three types of serious human diseases. At first, a critical review has been performed to understand how nanotechnology has helped the fight of breast cancer in the last nine years. It was highlighted that the purpose of scientists is to identify new nanomaterials that can be tolerated by biological environments displaying no toxic effects and their biocompatibility on cells. Moreover, in the first part of this work, a novel material with nano-mineralization is presented as a bone regeneration application to counteract the bone loss dysfunction under microgravity simulation. In the second part, a novel nanomaterial is presented as an anti-malarial application in order to evaluate its anti-protozoal activity. Data collected in vitro open a new path for further studies to investigate the potential of these nanomaterials as a possible new nanotechnological strategy against bone loss dysfunction and malaria diseases.

Dottore di Ricerca/Ph.D.: **Elisa Caggiu**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **Parkinson's disease: Immune System, infections and Alpha-synuclein protein**

Tutor/Adviser: **prof. Leonardo Antonio Sechi**

### **Abstract**

Parkinson's disease (PD) is a neurodegenerative disorder and its etiology is unknown, but environmental factors are implicated in the development of this disease. In this project we want to analyze different roles played by  $\alpha$ -syn, HSV-1 and Immune System in PD. We have investigated autoimmunity in PD through ELISA and a specific immune-stimulation using homologous peptides of HSV-1 and  $\alpha$ -syn in PD patients VS HCs. Moreover with in vitro study we have investigated the potential role of  $\alpha$ -syn as a antimicrobial peptide and could therefore contribute to  $\alpha$ -syn aggregation, neuroinflammation, and widespread dopaminergic neuron death. Lastly we have analyzed the potential of circulating miRNAs as noninvasive diagnostic candidate biomarkers of PD patients and neuroinflammation. The obtained results are in line with the hypothesis of a possible involvement of the immune system, in particular autoimmunity, in the pathogenesis of Parkinson's disease, and that HSV-1 infections may lead to a progression of the disease. Concerning  $\alpha$ -syn as a potential antimicrobial peptides further studies are needed to clarify the complexity of the functions of this protein. Regarding identification of miRNA we have highlighted different levels of expression of some miRNA, 155 and 146a, between patients with PD and healthy controls.

Dottore di Ricerca/Ph.D.: **Matthew Gavino Donadu**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **Studio di alcuni oli essenziali nella pratica clinica**

Tutor/Adviser: **prof.ssa Stefania Anna Lucia Zanetti**; Co-Tutor/Co-Adviser: **dott.ssa Donatella Usai**

### **Abstract**

During the Ph.D. period, mastery of several traditional microbiology techniques, such as bacteriology and cytology, and molecular techniques was acquired, with application on randomized clinical trials.

The research activity has focused mainly on in vitro antibacterial, antioxidant and cytotoxic activity with subsequent application of some essential oils in vivo on animals and on humans.

Considering the results obtained, it is clear that *Thymus vulgaris* - red thyme geraniol sel and *L. grosso* oils have shown good antimicrobial activity, compared to *L. angustifolia* and *L. sumian* on multi-drug clinical strains of *P. aeruginosa*. While *L. angustifolia* Miller presented a cytotoxic action on CaCo-2 cells (Colon-carcinoma Carcinoma Cells) probably due to the action of terpenes.

The oleolites of *Helichrysum microphyllum* Cambess. subsp. *tyrrhenicum* Bacch., Brullo & Giusso and *Hypericum perforatum* subsp. *Angustifolium* were tested against 30 strains of *Candida* spp.: the oleolite of *H. microphyllum* showed greater antifungal activity compared to *H. perforatum*.

Finally, the antifungal action of *Mirtus communis* was studied against 86 strains of *Malassezia* spp.: the obtained data showed a remarkable activity against *M. furfur* and *M. sympodialis*.

Furthermore, an in vivo study was performed and we present here the preliminary data.

The topic developed is part of a research area aimed at the use of essential oils with antibacterial activity in the problem of drug resistance.

Dottore di Ricerca/Ph.D.: **Yisu Liu**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **T Cell repertoire and autoimmunity in multiple sclerosis patients in Sardinia**

Tutor/Adviser: **prof. Leonardo Antonio Sechi**, Co-Tutor/Co-Adviser: **prof. David Kelvin**

### **Abstract**

Multiple sclerosis (MS) is an autoimmune disease characterized by destruction of the myelin sheath and axon loss within the central nervous system. Sardinia is a high-risk area of MS (multiple sclerosis). A genetically homogeneous population resulting from geographical isolation may be a critical factor that contributes to the high prevalence of the MS in Sardinia. It has been found that specific HLA genotypes in the Sardinian population are highly correlated with MS. The mechanism of how HLA impacts the adaptive immune response and triggers autoimmunity in the MS patient remains unknown. The total clonotypes of TCRs in one individual at a given time point is known as the T-Cell Receptor repertoire. By using next-generation sequencing, we have identified the TCR repertoire of MS patients in Sardinia, Italy. We found that MS patients have different TCR repertoires compared to those of healthy controls. MS-associated CDR3 sequences have been screened out in this study. BMLF-1 associated CDR3 are screened out in the MS-associated CDR3, indicating a higher activity of EBV in MS patients. TRBV20.1\$TRBJ2.1 and TRBV20.1\$TRBJ1.5 and other V-J recombinations show significant increases in MS individuals. These results suggest that the TCR repertoire may be a promising diagnostic method for disease status in MS patients. V-J recombination may be a biomarker for MS, especially in Sardinian people.

Dottore di Ricerca/Ph.D.: **Giuseppe Marchetti**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **In vitro and in silico studies of Syk inhibitors as new antimalarial drugs**

Tutor/Adviser: **prof.ssa Antonella Pantaleo**

### **Abstract**

Malaria remains one of the most devastating infectious diseases and despite the current therapies are efficient, the WHO recommends Artemisinin Combination Therapies (ACTs) as the treatments against *P. falciparum* malaria to limit the artemisinin resistance. Unfortunately, in the Greater Mekong subregion, their efficacy has recently questioned. A new mechanism of action based on the release of denatured haemoglobin products (haemichromes) bound to erythrocyte membrane through the Band 3 protein has recently characterized. This process, mediated by erythrocytic spleen tyrosine kinase (Syk), entails the Tyr phosphorylation of band 3. The consequent membrane destabilization could be essential for *P. falciparum* egress, since inhibitors of Syk block these events. The aim of this study was to examine the effects of the Syk inhibitors during parasite growth within the human erythrocyte through in vitro experiments and to explore current molecular docking strategies used in drug discovery and medicinal chemistry. In vitro studies have involved the treatment of parasitized erythrocytes with different concentrations of Syk inhibitors and the Tyr phosphorylation levels in Band 3 residues by proteomic approach was evaluated. In silico studies were based on different approaches of molecular modelling. In presence of Syk inhibitors we observed both in silico and in vitro experiments a marked decrease of band 3 phosphorylation which is proportional to the increase of drug dosage. These studies enabled us to better analyse the structure of different compounds and to possibly discover new Syk inhibitors through virtual screening analysis.

Dottore di Ricerca/Ph.D.: **Phuong Thao Tien Nguyen**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **HER2 status and molecular subtypes of breast carcinoma in Central Vietnam**

Tutor/Adviser: **prof. Francesco Tanda**; CoTutor/CoAdviser: **prof. Cong Thuan Dang**

### **Abstract**

Background. Breast cancer is the most commonly occurring cancer in the females and the leading cause of cancer deaths in Vietnamese women. Beside the traditional histopathological classification according to the WHO, the genetic and molecular findings in the last decades have introduced a new nomenclature to identify of breast cancers oriented mostly to the functional characteristics of the neoplastic cells and the needs of therapy. Based on these criteria, breast cancers are divided into five main groups according to the expression levels of biomarkers such as estrogen (ER), progesterone receptors (PR), proliferation index (Ki67) and human epidermal growth factor receptor 2 (HER2). Among them, HER2 protein overexpression and gene amplification have a particularly important role to play in the classification of molecular subtypes. It is also a significant biomarker which has prognostic and predictive value and is a goal of targeted therapy. The aim of this study was to identify the prevalence rate of HER2 gene amplification or overexpression in the local Vietnamese population, and determine the molecular subtypes of breast cancer.

Materials and methods. Paraffin tissue blocks from 88 Vietnamese women diagnosed consecutively with invasive primary breast carcinoma during a period of 12 months, from April 2016 to April 2017. These blocks underwent immunohistochemistry (IHC) and fluorescence in situ hybridization (FISH) and dual in situ hybridization (DISH) for the assessment of HER2 status. HER2 positive includes the HER2 (3+) score in IHC or the HER2 gene amplification in FISH. The IHC for ER, PR and Ki67 were also evaluated to determine molecular subtypes. The analyses were based on the guideline of ASCO/CAP 2013.

Results. The median age of patients was 52.5. By using IHC, 30.7 % of tumours were strongly expressed in (3+) score the HER2 protein. The HER2 equivocal results occupied 9.1%. Gene amplification by FISH was found in 25% of tumours with an equivocal score in IHC. The prevalence rate of HER2 positive was 32.9%. The concordance between IHC and DISH assay were 100% in case of IHC positive or negative. In case HER2 results by using immunohistochemistry technique were equivocal, DISH was able to identify 2 cases (25% of cases) as positive. The concordance between FISH and DISH in the

equivocal cases was 100%. Luminal B subtype accounted for the highest proportion, at 37.5% whereas luminal A was the lowest, at 18.2%. The HER2 enriched and triple negative subtype occupied 22.7% and 21.6%, respectively. A significant relationship was found between HER2 status as well as molecular subtypes and some clinicopathological characteristics and biomarkers. Conclusion. HER2 gene amplification was found in 32.9% of Vietnamese breast cancers. This prevalence was considerably higher than in published studies on women from Western countries. Luminal B subtype was the most frequent, at 37.5% while the uncommon belonged to luminal A, at 18.2%. The HER2 enrich and triple negative subtypes were fairly higher than that in literature. HER2 status as well as molecular classification had prognostic and therapeutical significance.

Dottore di Ricerca/Ph.D.: **Thang Phan**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **Molecular approach to early diagnosis of colonizing or invasive *Candida* in critically ill ventilated patients**

Tutor/Adviser: **dott.ssa Antonella Santona**, Cotutor/CoAdviser: **proff. Salvatore Rubino, Phuong Anh Ton Nu**

### **Abstract**

*Candida* colonization is a frequent event in respiratory tract of non-immunocompromised intensive care unit (ICU) ventilated patients. From 5 to 30% of *Candida* colonization patients will develop Invasive Candidiasis (IC), which is usually a late-onset ICU acquired infection. Until now, a lot of data highlight the necessity for new IC noninvasive diagnostic in high risk patients. IC is a serious complication in the ICU patients, around 35% mortality and up to 90% in patients with septic shock. How to diagnosis IC early and give appropriate antifungal therapy are the key for a remarkable reduction in mortality. The overall objective of this study was to identify the etiology of *Candida* and bacteria species in lower respiratory tract in the central of Vietnam, and to discriminate invasive or colonizing *Candida* by indirect ELISA (Enzyme-linked immunosorbent assay). Ninety six critically ill ventilated patients from 2 hospital in Hue (central Vietnam) were followed in this study. The 3 main isolated fungal pathogens were *C. albicans* (42%), *C. tropicalis* (37%) and *C. glabrata* (16%). The fluconazole resistance of *Candida* species was 21.11% and caspofungin was 4.44%. *C. tropicalis*, that is becoming a predominant opportunistic in nosocomial fungal infections of ICU in developing country, showed highest fluconazole resistance (34.29%) and caspofungin resistance (5.71%). In ICU, 3 main bacteria resulted in ventilator-associated pneumonia (VAP) were *A. baumannii* (43.2%), *K. pneumoniae* (28.4%) and *S. aureus* (14.8%), with high levels of antimicrobial resistance. *A. baumannii* showed resistance to all cephalosporin 2, 3, 4 generation (100%) and carbapenem (94%). A 50% of *K. pneumoniae* was carbapenem-resistant while 100% *S. aureus* was resistant to methicillin. To discriminate invasive or colonizing *Candida*, we chose 2 proteins, ECE1, present in *C. albicans* and *C. dubliniensis*, and HWP1, present in almost *Candida* species, selecting specific epitopes to develop indirect ELISA. ELISA results showed that 47.4% of patients with *C. albicans* had IC and 28.9% had invasive *C. albicans pneumonia*. In 19.23% of patients with *Candida* species had IC and 2.56% had invasive *Candida* species *pneumonia*. The sensitivity and specificity of ECE1 and HWP1

antibody detecting were 80% and 96% and 60% and 77% respectively, indicating the selected ECE1 epitope as a good marker for IC due to *C. albicans* and *C. dubliniensis*. A correlation between the ELISA results and 4 clinical parameters (*Candida* score, procalcitonin, length of ICU stay, ventilation day) was also investigated, that should help physicians to decide early antifungal therapy waiting for a new IC test that include all *Candida* species.

Dottore di Ricerca/Ph.D.: **Lu Wu**

Data di Discussione della Tesi/Date of Thesis Defense: **20.02.2019**

Titolo della Tesi/Thesis Title: **A Cross-sectional study of diverse bacterial and fungal communities in different body habitats in Sardinian centenarians**

Tutor/Adviser: **prof. Ciriaco Carru**, CoTutor/CoAdvisor: **proff. Salvatore Rubino, David J. Kelvin**

### **Abstract**

Microbes in the human body co-evolved with the host during the aging process, adapting to the aging-related niche alternation, however, the full view of the human microbiota variation related to aging is still unknown. Besides, the gut microbiota has been proposed as a promising determinant for human health. Using centenarians as a model for extreme aging may help to understand the correlation of gut microbiota with healthy-aging and longevity. By recruiting the young, elderly and centenarians in Sardinia, Italy, we obtained an integrated view of the spatial distribution of microbiota in the human body across a wide age range and determined the compositional and functional differences in gut microbiota associated with populations of different age in Sardinia. We found that the distribution and correlation of bacteria and fungi community in Sardinians were driven by body sites. In each different age groups, both the bacterial and fungal communities in the skin were significantly different in structure, but not in the oral. The gut bacterial communities in the centenarians clustered separately from the young and elderly which had overlapped clustering, while the fungal communities in gut can't be separated by the age groups. Moreover, our data revealed that gut microbiota of the healthy elderly and young Sardinians also shared similar metabolic functional profiles, while a distinct cluster is found in centenarians. Within the centenarian group, the gut microbiota is correlated with health status of the host. The centenarians have higher diversity of core microbiota species and microbes genes compared with that in young and elderly. The enrichment of *Methanobrevibacter* and *Bifidobacterium* were detected in Sardinian centenarians, which were also verified in a bigger centenarian cohort in Bologna, Italy. Moreover, potential metabolic functional analysis revealed that the gut microbiota in the centenarian group had significantly lower capability to digest complex carbohydrates but had enhanced fermentation capability via glycolysis. Gene pathways involved in amino acid biosynthesis are lower abundance, while menaquinol biosynthesis is higher abundance in the centenarians compared with that of the young and elderly. Our study indicates that the critical role aging plays in shaping human microbiota is habitat

dependent, further suggesting the diverse degree of niche alternation caused by aging in different body habitats, emphasizing the importance of integrating the potential confounding factors into the microbiota studies. Sardinian centenarians' specific gut microbiota may hold promising clues for the future research to identify the possible causative relationship between gut microbiota and longevity in human.

Dottore di Ricerca/Ph.D.: **Elisabetta Sotgiu**

Data di Discussione della Tesi/Date of Thesis Defense: **17.04.2019**

Titolo della Tesi/Thesis Title: **Oxidative stress in early stages of Chronic Obstructive Pulmonary Disease**

Tutor/Adviser: **prof. Ciriaco Carru**

### **Abstract**

Chronic obstructive pulmonary disease (COPD) is a common respiratory condition characterized by an irreversible or partial irreversible airway obstruction. Since oxidative stress and inflammation play an important role in the pathophysiology of the disease, our target was to evaluate biomarkers index of these conditions in order to find out one or more biomarkers that can predict the onset and the progression of the pathology.

We analyzed oxidative stress and inflammation biomarkers in 29 mild COPD, 14 moderate COPD and in 43 healthy controls. Results obtained show the decrease of PSH levels in COPD patients from the early stage of COPD and the increase is higher with COPD progression. Furthermore, COPD patients presented high ADMA/arginine ratio, low levels of global DNA methylation, high levels of kynurenine and kyn/trp ratio and low levels of tryptophan compared to healthy controls. In addition, the alterations of these biomarkers are further greater with the progression of the disease.

Concluding, our results underline the importance of oxidative stress in COPD presence and severity. Indeed, our data show the alteration of the pathways analyzed due principally to oxidative stress. So, it might be interesting to increase the number of subjects of the study and to include patients with severe form of COPD to fully characterized the impact of oxidative stress in this pathology.

Corso di Dottorato in  
Lingue, Letterature e Culture dell'età  
moderna e contemporanea

-

Ph.D. Program in  
Languages, Literatures and Cultures of the  
modern and contemporary age

Coordinatore/Coordinator: Prof. Massimo Onofri

Dottori di Ricerca/Ph.D.

Cutzu Luisa

Forgetta Emanuela

Murtinu Francesca

Piras Laura Antonella

Dottore di Ricerca/Ph.D.: **Luisa Cutzu**

Data di Discussione della Tesi/Date of Thesis Defense: **01.04.2019**

Titolo della Tesi/Thesis Title: **Ritratto di un'autrice: il cinema di Gabriella Rosaleva**

Tutor/Adviser: **prof.ssa Lucia Cardone**

### **Abstract**

This dissertation is an expression of my interest for the role of women in film and media, which I have started to develop when I was working on my MA thesis. As is well known, the work of women is often underestimated in - and sometimes even completely erased from - the history of cinema. More specifically, I have decided to focus on Gabriella Rosaleva, an Italian filmmaker who has worked in film and television mainly during the 1980s and the 1990s. After an introductory chapter, I have focused on the reconstruction of Rosaleva's biography and, subsequently, on the social and cultural context on which she has worked. In the central part of my dissertation I have extensively analysed her films. Starting from the description of the materials I have gathered during my research, I have examined the structural (narrative and stylistic) elements of Rosaleva's cinema, outlining the recurrent motives and the most original and "personal" traits of her production - which I have further investigated in the conclusive chapter. Besides her cinematic oeuvre, I have also analysed in-depth a series of different texts, including her novel and a number of subjects, screenplays, and treatments for films that never got made.

The second volume of the thesis presents an ample iconographic appendix and gathers a selection of her cinematic writings, which have been preserved from the decay of time through digitization.

Dottore di Ricerca/Ph.D.: **Emanuela Forgetta**

Data di Discussione della Tesi/Date of Thesis Defense: **01.04.2019**

Titolo della Tesi/Thesis Title: **La Città e la casa: spazi urbani e domestici in Maria Aurèlia Capmany, Natalia Ginzburg, Elsa Morante e Mercè Rodoreda**

Tutor/Adviser: prof.ssa **Monica Farnetti**

### **Abstract**

This research collects texts from Maria Aurèlia Capmany, Natalia Ginzburg, Elsa Morante and Mercè Rodoreda, four great female authors of the twentieth century, with the aim of reconstructing the physical spaces they described in their books. These texts offer several cues to reflect on the representation of space in female literature. The study starts from the canonical contrast between the internal space, linked to the primary perception, and the external space, regulated by social dynamics. More specifically, the effects of the caused by the prevarication of the former on the latter. The goal is not to draft an exhaustive history of theories of space in literature but, once the distinctive features are highlighted, to investigate through the novel the depths of individual feeling that, in the case of female subjectivity, shows several critical issues.

Dottore di Ricerca/Ph.D.: **Francesca Murtinu**

Data di Discussione della Tesi/Date of Thesis Defense: **01.04.2019**

Titolo della Tesi/Thesis Title: **Destinazioni 2.0 prospettive e pianificazione: il caso di Alghero**

Tutor/Adviser: **prof. Gavino Mariotti**, CoTutor/CoAdvisor: **prof. Federico Rotondo**

### **Abstract**

The Information and Communications Technology has revolutionised the paradigms of our everyday life, modifying the social relationships that develop both in the private field and in the professional one. The birth of this great network has permitted the redesign of the concept of geography and with it, the concepts of space-time, breaking down the distances and creating a social network without borders. The research work explores the transformations experienced by the tourism industry, with the arrival of new technologies, from the 1.0 web to the 4.0 industry, and investigates the drivers for both efficient and intelligent territorial planning in the digital age.

Dottore di Ricerca/Ph.D.: **Laura Antonella Piras**

Data di Discussione della Tesi/Date of Thesis Defense: **01.02.2019**

Titolo della Tesi/Thesis Title: **L'Epistolario di Petrarca fra ars poetica e interpretazione**

Tutor/Adviser: **prof.ssa Monica Farnetti**

### **Abstract**

This study of Petrarch's epistolary (including Familiares, Seniles, Epystole, Sine nomine and Disperse) intends to select, analyse and comment upon the letters in which the writer dealt with some principles of ars poetica, such as writing and interpretation, in order to realize a thematic anthology. After an overall examination of the letters, it has been possible to identify some of the fundamental thematic units of Petrarchan literary thought: the interpretation and study of the text (Fam., XXIV 1, Sen., IV 5, Fam., X 4, Disp., 7, Disp., 11, Disp., 61, Sen., XVII 3 and Sen., XVII 4), the defence of poetry and the study of the liberal arts (Fam., I 7, Fam., I 12, Sen., II 1), the importance of the exemplum (Fam., IV 4), the relationships between classical and Christian models (Fam., XXII 10) as well as between Latin and vulgar eloquences (Fam., XXI 15, Fam., I 1) and the criticism of the auctoritates (Disp., 16). I have also examined the letters that analyse some principles and rhetorical institutes such as the imitatio (Fam., I 8, Fam., XXII 2, Fam., XXIII 19) and the theory of re-writing (Fam., XIII 12). Particular attention has been devoted to Petrarch as a critic and master, constantly active in the evaluation of his friends' and acquaintances' works and ready to dispense advices about writing techniques (Disp., 55). Finally, I have attempted to clarify how voluptas scribendi and voluptas legendi, incurable diseases that vex Petrarch, are actually considered by the writer as unique characteristics that distinguish the real writer and the real intellectual from the populace and the Sunday poets (Fam., III 18 and Fam., XIII 7).

# Corso di Dottorato in Scienze Agrarie

## Ph.D. Program in Agricultural Sciences

Coordinatore/Coordinator: Prof. Ignazio Floris

### Dottori di Ricerca/Ph.D.

Marrosu Roberto - *Curriculum* Monitoraggio e controllo degli ecosistemi agrari e forestali in ambiente mediterraneo

Cocco Massimiliano - *Curriculum* Produttività delle piante coltivate

Saliba Lea Cadi - *Curriculum* Biotecnologie microbiche agroalimentari

Diquattro Stefania - *Curriculum* Biotecnologie microbiche agroalimentari

Del Giudice Liliana - *Curriculum* Agrometeorologia ed ecofisiologia dei sistemi agrari e forestali

Buffa Giovanna - *Curriculum* Scienze e Tecnologie Zootecniche

Cesarani Alberto - *Curriculum* Scienze e Tecnologie Zootecniche

Cossu Rossella - *Curriculum* Scienze e Tecnologie Zootecniche

Kchour Hiba - *Curriculum* Scienze e Tecnologie Zootecniche

Seoni Eleonora - *Curriculum* Agrometeorologia ed ecofisiologia dei sistemi agrari e forestali

Dottore di Ricerca/Ph.D.: **Roberto Marrosu**

Data di Discussione della Tesi/Date of Thesis Defense: **25.02.2019**

Titolo della Tesi/Thesis Title: **Investigation on lateral saturated soil hydraulic conductivity evaluated at different spatial scales in a Mediterranean hillslope**

Tutor/Adviser: **dott. Mario Pirastru**, Co-Tutor/Co-Adviser: **prof. Marcello Niedda, dott. Mirko Castellini**

### **Abstract**

Lateral saturated hydraulic conductivity,  $K_{s,l}$ , is the soil property that mostly governs subsurface flow in shallow soils of steep hills. Hence,  $K_{s,l}$  characterizing is crucial for understanding and modelling the hydrological processes at the hillslope and catchment scales. Although several methods have been developed so far to measure  $K_{s,l}$ , reliable determinations of this property is challenging due to anisotropy and scaling effects of spatio-temporally variable soil heterogeneities on  $K_{s,l}$  measuring. The thesis investigates the changes of  $K_{s,l}$  estimations as a function of soil volume sampled with a given measurement technique based on drainage experiments carried out by a drain, large volume monoliths and on small soil cubes, representative for hillslope, plot and point spatial scales, respectively. The observed discrepancies between the considered scales were mainly attributed to macropore flow and the difficulty in adequately embodying the macropore network on smaller sampled soil volumes. However, at the plot-scale, the sampled volume was sufficient to effectively represent the large-scale hydrological effects of the macropore network. This suggests that performing drainage experiments at this scale is a promising method for routinely characterizing lateral conductivities over large spatial scales. Overall, the thesis provided useful information for the hydrological characterization of soils in semiarid Mediterranean regions, where water management and conservation are critical.

Dottore di Ricerca/Ph.D.: **Massimiliano Cocco**

Data di Discussione della Tesi/Date of Thesis Defense: **26.02.2019**

Titolo della Tesi/Thesis Title: **Different vineyard management practices: agronomic responses and consequences on must quality**

Tutor/Adviser: **dott. Luca Mercenaro**

## **Abstract**

### Background and Aims

Global warming has repercussions on vine phenology and physiology, with consequences affecting yield and berry composition. In order to counteract negative effects, it is necessary to improve the knowledge on genetic aspects as well as vineyard management.

The aim of this study was to evaluate the responses of different *Vitis* genotypes to several agronomic practices, such as water management, the application of exogenous abscisic acid (ABA) as well as leaf removal, all of which influence the ripening process.

### Methods and Results

Two experiments were carried out. In the first one, conducted in Sardinia (Italy), different strategies of water stress and exogenous ABA application were tested on three red grapevine cultivars. In the second trial, carried out in Australia, a leaf removal treatment, performed post-veraison, was compared with no defoliation treatment on two grapevine cultivars.

### Conclusions

Water stress response is cultivar-dependent. No significant effect or interactions were observed by applying exogenous ABA.

Leaf defoliation above the bunch zone reduced sugar accumulation rate in the berries, causing a delay in harvest of 24 days, although observed only in one of the two investigated varieties.

### Significant of study

This study points out the importance of the deep knowledge of the genetic background of each specific cultivar, highlighting how the different cultivation techniques can play a fundamental role in influencing the berry maturation.

Dottore di Ricerca/Ph.D.: **Lea Cadi Saliba**

Data di Discussione della Tesi/Date of Thesis Defense: **28.02.2019**

Titolo della Tesi/Thesis Title: **Safety aspects and beneficial features of lactobacilli isolated from Lebanese Baladi goat milk**

Tutor/Adviser: **prof. Luigi Montanari**, CoTutor/CoAdvisor: **dott.ssa Nicoletta Pasqualina Mangia, dott. Georges Hassoun**

### **Abstract**

The microbiological and physicochemical parameters of Lebanese goat milk from the "Baladi" breed were evaluated and twenty-eight lactobacilli were isolated and examined in vitro for their probiotic potential. Initially, Lactobacillus isolates were examined for safety issues and exhibited diverse susceptibility to commonly used antibiotics while none was hemolytic. Subsequently, Isolates showed variable antimicrobial activity towards a range of spoilage and pathogenic bacteria. Regarding their performance in conditions simulating the human gastrointestinal tract, all isolates remained unaffected at pH 3 and in the presence of bile salts (0.5% (w/v)) for 3 hours. Based on their survival at pH 2.5 for 3 hours, 10 isolates were selected for the adhesion assay. Low adhesion was observed to HT-29 and Caco-2 cells. Co-cultivation of THP-1 cells with specific isolates indicated a tendency for anti-inflammatory modulation shown by an increase in IL10 mRNA levels. Further analysis for probiotic properties indicated partial bile salt hydrolase activity for all isolates (n=28). Isolates were identified by 16S rRNA sequence and were affiliated to the Lactobacillus casei group. Overall, by applying in vitro tests, a select number of presumptive Lactobacillus rhamnosus strains showed promising probiotic features from the Lebanese Baladi goat milk. This is the first report about safety and beneficial characterization of Lactobacillus strains isolated from Baladi goat milk from Lebanon.

Dottore di Ricerca/Ph.D.: **Stefania Diquattro**

Data di Discussione della Tesi/Date of Thesis Defense: **28.02.2019**

Titolo della Tesi/Thesis Title: **Chemical and biological recovery of soils contaminated with antimony using eco-friendly materials**

Tutor/Adviser: **dott. Severino Zara**, CoTutor/coADvisor: **dott. Giovanni Garau**

### **Abstract**

Antimony (Sb), a non-essential plant element, can be present in soils and waters in very high concentrations often due to a variety of anthropogenic activities. Though antimony is classified as a pollutant of priority interest, very little is known about its environmental behaviour and soil speciation.

In recent years, different sorbents for the in-situ remediation of metalloids-polluted soils were proposed and tested with variable success. In a search for alternative, low-cost and environmental friendly Sb sorbents, drinking water treatment residuals (WTRs), the waste material resulting from the treatment of surface or ground water, and municipal solid waste compost (MSWC) were identified as potential good candidates.

In this PhD thesis we showed that the Sb mobility, and its impact on the microbial and biochemical features of two soils artificially contaminated, were highly influenced by selected soil properties such as pH and organic matter content. Both WTRs and MSWC were able to act as effective Sb(V)-immobilizing agents in aqueous solutions especially at acidic pH (i.e. 4.5). Moreover, when added to a contaminated mine soil, the combination of both sorbents significantly reduced the mobility of antimony, alleviated its impact on soil microbiota and promoted a recovery of soil biochemical functioning. Plant growth (*Helichrysum italicum* L.) in the amended soil was finally enhanced while the Sb uptake was definitively reduced.

Dottore di Ricerca/Ph.D.: **Liliana Del Giudice**

Data di Discussione della Tesi/Date of Thesis Defense: **28.02.2019**

Titolo della Tesi/Thesis Title: **Wildfire spread simulation modeling for risk assessment and management in Mediterranean areas**

Tutor/Adviser: **prof.ssa Donatella Emma Ignazia Spano**, CoTutor/CoAdvisor: **dott. Michele Salis**

### **Abstract**

Wildfires are a key problem in many terrestrial ecosystems, particularly in the Mediterranean Basin, and climate change will likely cause their increase in future years. Wildfire behavior simulator models are very useful to characterize wildfire risk, identify the valued resources more exposed to wildfires and to plan the best strategies to mitigate risk. In this work, we first carried out a review of wildfire spread and behavior modelling, and then focusing on FLAMMAP model. Then, we evaluated the effects of diverse strategies of fuel treatments on wildfire risk in an agro-pastoral area of the North-central Sardinia (Italy) that has been affected by the largest Sardinian wildfire of recent years (Bonorva wildfire, about 10,500 ha burned, on July 2009). Finally we analyzed the combined effects of fuel treatments and post-fire treatments with the aim to mitigate wildfire and erosion risk, linking the minimum travel time algorithm with the Ermit modeling approach in a study area located in Northern Sardinia (Italy), mostly classified as European Site of Community Importance. Overall, the results obtained showed that wildfire behavior simulator models can support forest fire management and planning and can provide key spatial information and data that can be helpful to policy makers and land managers.

Dottore di Ricerca/Ph.D.: **Giovanna Buffa**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Use of by-products in dairy sheep nutrition**

Tutor/Adviser: **prof.ssa Anna Nudda**

### **Abstract**

This thesis aimed to evaluate the effects of the dietary inclusion of three by-products in sheep diets: Tomato pomace (TP) is the by-product derived from process of tomato juice, grape marc (GM) derived from winemaking and exhausted myrtle berries (EMB) derived from production of liqueur called Mirto rosso (red myrtle).

This study is divided in 4 main chapters.

Chapter 1 reports the literature on amounts, chemical composition and fatty acid profile of by-products from tomato, wine and myrtle industries. Their use in ruminant nutrition and the effects on milk yield and composition and the biological effects have been discussed. Furthermore, the bioactive compounds, as polyphenol, identified in these by-products have been reported.

In the others chapters of the thesis are reported: the study of the effects of use of small amounts of dried tomato pomace, grape pomace and exhausted myrtle berries on milk yield and composition, and blood biochemical parameters (Chapter 2); the additional information on nutrient and polyphenol composition of the by-products from tomato, wine and myrtle industries in order to supplement existing feedstuff tables (Chapter 2); the effects of tomato pomace, grape pomace and exhausted myrtle berries on oxidative status of animals and milk (Chapter 3); the effects of these by-products on milk fatty acid profile (Chapter 3); and, finally, the effects of by-products on rumen microbiome and fermentation parameters (Chapter 4).

Dottore di Ricerca/Ph.D.: **Alberto Cesarani**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Application of genomic tools to breeding and to genetic structure studies in livestock populations**

Tutor/Adviser: **prof. Nicolò Pietro Paolo Macciotta**, CoTutor/CoAdvisor: **dott. Giustino Gaspa**

### **Abstract**

This work is organized into a general introduction, four chapters of experimental contributions and general conclusions. Chapter 1 contains the general introduction, aiming to provide a synopsis about genetic application in animal science. Two main topics were debated in this thesis, modern genomic tools applied in animal breeding and animal biodiversity. The first two experimental contributions (Chapters 2 and 3) concerned animal breeding programs, particularly the first and the last step: variance components and breeding values estimation, respectively. The contribution about variance components estimation was the result of my abroad period at the University of Georgia (USA). Chapter 3 deals with the estimation of heritability and genomic breeding values for milk fatty acid profile. Regarding the animal biodiversity, two researches were carried out analyzing both cattle and sheep breeds farmed in Italy. Several statistical approaches were used to identify selection signatures in livestock. Chapter 4 analyzed genetic diversity among five cattle breeds: two purebreds and three crossbreeds raised in Sardinia. In the Chapter 5, in order to highlight genome regions that can differentiate livestock production, selection signatures were investigated among different productive aptitudes in the Italian ovine stock. Finally, the general conclusions reported in Chapter 6 offered a short overview of the main results obtained during the PhD.

Dottore di Ricerca/Ph.D.: **Rossella Cossu**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Utilization of information and communication technologies to monitor grazing behaviour in sheep**

Tutor/Adviser: **Prof. Salvatore Pier Giacomo Rassu**

### **Abstract**

This thesis is a contribution on the study of feeding behaviour of grazing sheep and its general goal was to evaluate the effectiveness of a tri-axial accelerometer based sensor in the discrimination of the main activities of sheep at pasture, the quantification of the number of bites and the estimation of intake per bite.

Based on the literature, it has been observed that feed intake at pasture is a difficult parameter to measure with direct observation, for this reason automated systems for monitoring the activities of free-ranging animals have become increasingly important and common. Among these systems, tri-axial accelerometers showed a good precision and accuracy in the classification of behavioural activities of herbivores, but they do not yet seem able to discriminate jaw movements, which are of great importance for evaluating animal grazing strategies in different pastures and for estimating the daily herbage intake.

Thus, the main objective of this research was to develop and test a tri-axial accelerometer based sensor (BEHARUM) for the study of the feeding behaviour of sheep and for the estimation of the bite rate (number of bites per min of grazing) on the basis of acceleration variables. The thesis is organized in 4 main chapters.

Chapter 1. This introduction section reports a literature review on the importance of studying the feeding behaviour of ruminants and on the measuring techniques developed over the years for its detection, with specific emphasis on accelerometer based sensors, which showed a good precision and accuracy in the classification of behavioural activities of herbivores. Chapter 2. This chapter describes the results of short tests performed in grazing conditions to discriminate three behavioural activities of sheep (grazing, ruminating and resting) on the base of acceleration data collected with the BEHARUM device. The multivariate statistical analysis correctly assigned 93.0% of minutes to behavioural activities.

Chapter 3. This part evaluates the effectiveness of the BEHARUM in discriminating between the main behaviours (grazing, ruminating and other activities) of sheep at

pasture and to identify the epoch setting (5, 10, 30, 60, 120, 180 and 300 s) with the best performance. Results show that a discriminant analysis can accurately classify important behaviours such as grazing, ruminating and other activities in sheep at pasture, with a better performance in classifying grazing behaviour than ruminating and other activities for all epochs; the most accurate classification in terms of accuracy and Coehn's k coefficient was achieved with the 30 s epoch length. Chapter 4. This section illustrates the results of a study that aimed to derive a model to predict sheep behavioural variables like number of bites, bite mass, intake and intake rate, on the basis of variables calculated from acceleration data recorded by the BEHARUM. The experiment was carried out using micro-swards of Italian ryegrass (*Lolium multiflorum* L.), alfalfa (*Medicago sativa* L.), oat (*Avena sativa* L.), chicory (*Cichorium intibus* L.) and a mixture (Italian ryegrass and alfalfa). The sheep were allowed to graze the micro-swards for 6 minutes and the results show that the BEHARUM can accurately estimate with high to moderate precision ( $r^2=0.86$  and RMSEP=3%) the number of bites and the herbage intake of sheep short term grazing Mediterranean forages.

Finally, the dissertation ends with a summary of the main implications and findings, and a general discussion and conclusions.

Dottore di Ricerca/Ph.D.: **Hiba Kchour**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Agriculture pollution in Lebanese rivers: influence of soil and sediment properties on pesticide persistence**

Tutor/Adviser: **prof. Antonello Cannas**

### **Abstract**

The Beqaa region, crossed by Litani river, represents 47% of Lebanon's agricultural economy. The Litani, the largest river of Lebanon, suffers from different kinds of pollution including that caused by widely used pesticides in Beqaa valley. The herbicides fluazifop (FLP), terbuthylazine (TBZ) and triclopyr (TCP) are the most frequently used in Litani basin, therefore their sorption on sediment and soil samples taken from four sites along Litani river Berdaouni, Joub Jannine, Ammiq and Qaraoun, respectively, was investigated. The sorption data obtained for the three herbicides fitted well to Freundlich logarithmic equation both on sediment and soil samples, showing very low sorption coefficient ( $K_{ads}$ ) values. At pH values of sediments and soils, their colloidal component is negatively charged similarly to the FLP and TCP herbicides, therefore the very low sorption measured is attributable to negative sorption due to the repulsion between species with the same charge. TBZ instead at measured pH values of sediments and soils is in neutral form, therefore, the greatest adsorption observed for TBZ is probably due to a lipophilic effect that is more active for TBZ than for the other two herbicides. This agrees with the higher  $K_{ads}$  values observed on samples more rich in organic matter. The low sorption and FLP, TBZ and TCP low degradability make them herbicides at high risk of leaching. The addition of biochar (BC) from coppiced woodlands, to soils and sediments increased considerably  $K_{ads}$  values for all three herbicides. The BC effect was more evident on poorer samples in organic matter. These findings suggest that BC addition to Litani basin soil may be considered as an useful tool to prevent FLP, TBZ and TCP leaching in water.

Dottore di Ricerca/Ph.D.: **Eleonora Seoni**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Potential use of tannin containing legumes in ruminant and monogastric nutrition**

Tutor/Adviser: **prof. Gianni Battacone**, CoTutor/CoAdvisor: **Prof. Giuseppe Bee, prof. Frigga Dohme-Meier**

### **Abstract**

Recent studies have demonstrated that forage legumes with moderate levels of condensed tannins (CT) can be favourable for animal nutrition. The nutritional benefits included faster growth rates, higher milk production, increased fertility, improved nitrogen (N) utilization and reducing greenhouse gas and N emissions. The main objective of the present thesis was to investigate how CT from legumes, in particular Birdsfoot trefoil (BT) and Sainfoin (SF) can improve protein utilization of ruminant and monogastric and by that improve their performance and the quality of the final product. The effects of CT from BT was first investigated in Chapter 2. In particular, we focused on the potential of CT to reduce the formation of the compounds responsible of the “pastoral flavour” on lamb meat as well as their ability to protect dietary PUFA from ruminal biohydrogenation enhancing their availability in the small intestine. The influence of BT on intake, digestibility and N balance of lambs fed diets differing in CP level was investigated in the Chapter 3. In this study, special emphasis has been given to the fate of CT by monitoring possible changes in CT concentrations as well as soluble, protein and fibre bound CT fractions after the passage through the digestive tract. Finally, in the Chapter 4 we investigated the impact of increasing levels of CT from SF on growth performance, carcass characteristics and meat quality of 48 entire male (EM) with special focus on the potential of CT to reduce the formation of the boar taint related compounds.

# Corso di Dottorato in Scienze Biomediche

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## Ph.D. Program in Biomedical Sciences

Coordinatore/Coordinator: Prof. Andrea Piana

### Dottori di Ricerca/Ph.D.

Fancello Silvia - *Curriculum* Neuroscienze

Ginatempo Francesca - *Curriculum* Neuroscienze

Musu Ester - *Curriculum* Genetica Medica

Onano Stefano - *Curriculum* Genetica Medica

Crivelli Paola - *Curriculum* Medicina di genere, dell'uomo, della donna e  
del bambino

Bontà Giuliana - *Curriculum* Odontostomatologia estetica adesiva e  
preventiva

Dottore di Ricerca/Ph.D.: **Silvia Fancello**

Data di Discussione della Tesi/Date of Thesis Defense: **15.02.2019**

Titolo della Tesi/Thesis Title: **Sviluppo di strategie per nuovi approcci terapeutici nelle malattie neurodegenerative**

Tutor/Adviser: **dott.ssa Rossana Migheli**

### **Abstract**

Development of strategies for new therapeutic approaches in neurodegenerative diseases

Nowadays the causes of the onset of neurodegenerative diseases are not completely yet known, but it is confirmed that environmental, metabolic and nutritional factors contribute to their development. Among the involved mechanisms in neurodegeneration, the oxidative stress has been extensively studied in recent decades. In this regard in the present work, various drug delivery systems have been tested, as such or containing drugs, to evaluate their pharmacological effect in different cell models. Molecules of different nature, loaded to transferosomes or chitosan particles, protected PC12 cells from oxidative damage induced by hydrogen peroxide and from parkinsonism induced by the neurotoxin MPTP. A further study on MPTP damage was performed to measure glucose and lactate levels involved in the energy metabolism of cells using enzymatic biosensors. The cells were exposed to insulin, hormone known in literature to promote glucose internalization, which was able to restore aerobic metabolism interrupted by the damage induced by neurotoxin. The promising results obtained in this research allows to hypothesize new therapeutic approaches, based on drug delivery systems and drugs already known in several roles, able to protect as co-therapeutics in neurodegenerative diseases, such as Parkinson.

Dottore di Ricerca/Ph.D.: **Francesca Ginatempo**

Data di Discussione della Tesi/Date of Thesis Defense: **15.02.2019**

Titolo della Tesi/Thesis Title: **Facial motor system: voluntary and emotional control**

Tutor/Adviser: **prof.ssa Franca Deriu**

### **Abstract**

Face expressions have a crucial role in human nonverbal behaviour and can be either voluntarily or emotionally controlled. The variety of functions of facial muscles, is reflected in their anatomical and histological characteristics. Face muscles present a peculiar coordination, in fact also during voluntary movements, facial muscles' groups are always recruited together to produce a facial posture, but how and at which level they are coordinated and controlled by the emotional system is still unknown. For long time was impossible to study the motor control of facial muscle in humans. Only recently several studies have demonstrated that it is possible to probe it using transcranial magnetic stimulation (TMS).

This work thesis attempted to investigate: 1) the interhemispheric connections between facial motor cortices (fM1); 2) the cerebellar-fM1 connectivity; and 3) the influence of emotional stimuli over fM1 and pre-motor cortices, using TMS protocols. Results provided the first demonstration that : 1) the corpus callosum plays a minor role in the coordination of bilateral face movements; 2) A clear cerebellar-fM1 connectivity operates in the facial motor system; 3) fM1 is directly connected with the emotional system and specifically modulated by stimuli with positive connotation.

Dottore di Ricerca/Ph.D.: **Ester Musu**

Data di Discussione della Tesi/Date of Thesis Defense: **21.02.2019**

Titolo della Tesi/Thesis Title: **Comparison of effects on immunity and autoimmunity of impairment of SH2B3 gene function in human and mice**

Tutor/Adviser: **prof. Francesco Cucca**, CoTutor/CoAdvisor: **dott.ssa Maria Francesca Manchinu, dott.ssa Valeria Orrù**

### **Abstract**

**Aim:** The genetic and physiological similarities between mice and humans have led to dedicate a remarkable attention on murine models in the biomedical research. Our objective is to identify the molecular origins of autoimmunity diseases and immunosenescence by the analysis of a knock-out (KO) mouse model, SH2B3 deficient mouse, as model of autoimmunity. The study includes the comparison of SH2B3 KO mouse immune traits with those of human carriers of a specific genetic variant localized in the SH2B3 gene, the nsSNP rs3184504-T, that is associated with the significant increase of specific cell (Orrù, 2013) and with several autoimmune diseases; moreover the impact of ageing on immune trait levels is considered. To this aim we measured specific immune traits in SH2B3 KO mouse at 2/3, 6/7, 10/11, 14/15 and 18 months.

**Methods:** To detect immune traits we examined SH2B3 KO and wild-type (WT) blood mice by flow cytometry, complete blood count and immunoassay.

**Results:** At 2/3 and 6/7 months, we noted a significant increment of leukocytes, granulocytes, monocytes, platelets, immunoglobulins, B cells and subtypes, T cell and subtypes in SH2B3 KO mice compared to WT. At 10/11, 14/15 and 18 months, the increment in SH2B3 KO mice compared to WT mice was maintained for all immune traits, except for T cell and their subtypes.

**Conclusions:** Considering the obtained data from mouse and the comparison with human data, we believe that the KO model helps us to define the role of the SH2B3 gene, but not to clarify the specific effect of the allelic variant rs3184504-T.

Dottore di Ricerca/Ph.D.: **Stefano Onano**

Data di Discussione della Tesi/Date of Thesis Defense: **21.02.2019**

Titolo della Tesi/Thesis Title: **The eQTLs Catalog and LinDA browser: a platform for determining the effects on transcription of GWAS variants**

Tutor/Adviser: **prof. Francesco Cucca**, CoTutor/CoAdvisor: **dott. Mauro Pala**

### **Abstract**

The expression Quantitative Traits Locus (eQTL) is a genetic polymorphism associated with changes in gene expression levels. They have been successfully used to prioritize the target genes of the variants associated with complex traits and diseases (GWAS variants). Existing eQTLs databases collect only a small portion of the available datasets. We planned to build the largest publically available catalog of eQTLs, coupled with a browser, to optimize and simplify their interrogation. We collected and manually curated 51 eQTL public studies ranging from 2007 to date, corresponding to more than 94 tissues/cells/conditions and 15 human populations for a total of 275,727 cis-eQTLs and 33,241 genes with at least one cis-eQTL (cis-eGenes). We found that for 93% of the known protein-coding genes were eGenes, 22% of them intersecting ( $r^2 \geq 0.8$ ) with the NHGRI-EBI GWAS Catalog and 26% of whom considered as druggable. Furthermore, for those GWAS variants for which at least an eGene was known, we found that the NHGRI-EBI GWAS Catalog proposed at least one of the same genes as candidate target only for the 70% of the times. Our eQTL-Catalog can be used as a reference to measure the degree of novelty for future eQTLs studies; it is provided within a platform with the web-browser LinDA (<http://linda.irgb.cnr.it>) implemented with other types of quantitative traits (i.e. epigenetic, proteomic) to better dissect the pleiotropy of the GWAS variants.

Dottore di Ricerca/Ph.D.: **Paola Crivelli**

Data di Discussione della Tesi/Date of Thesis Defense: **25.02.2019**

Titolo della Tesi/Thesis Title: **Aspetti radiomici del tumore mammario: studio di associazione tra *signature* radiomica ed istotipo**

Tutor/Adviser: **prof. Giampiero Capobianco**

### **Abstract**

Aim of this study is to assess the role of radiomics in breast cancer, focusing on its ability to predict histological phenotypes.

Methods: It was carried out a retrospective study including all breast cancer patients who referred to the Diagnostic Imaging 2 Institute to perform a breast MRI prior to surgery. Histologic confirmation on surgical specimen was obtained in all patients. Results: All patients underwent a high-field (1,5 T) breast MRI (T2-weight sequences with fat suppression, T1-weight sequences and T1 after IV contrast administration). MRI enhanced sequences were contoured and first-order radiomics features were extracted through dedicated software, called 3DSlicer. Taking into account the current literature, three features were selected: entropy, 90° percentile and skewness. The association between the selected features and the histological patterns were explored.

Conclusion: A possible integration of quantitative data, provided by a radiomics analysis, with clinical and histological data could enable clinicians to provide an early and accurate diagnosis as well as personalized treatments for breast cancer patients. Current limitations of a routinely application of radiomics seem both the limited knowledge among physicians of this quantitative radiological tool and the lack of standardized systems of feature extraction and data sharing.

Dottore di Ricerca/Ph.D.: **Giuliana Bontà**

Data di Discussione della Tesi/Date of Thesis Defense: **26.02.2019**

Titolo della Tesi/Thesis Title: **Are standardized caries risk assessment models effective in assessing caries risk?**

Tutor/Adviser: **prof.ssa Laura Strohmer**

### **Abstract**

The aim of this thesis was to evaluate the effectiveness of the methods used to identify people with an increased risk of developing carious lesions.

**MATERIALS AND METHODS:** Scientific literature on methods used to identify individuals with an increased risk for caries development was critically evaluated through a systematic literature review. Two pilot studies were carried out, one comparing the standardized models Cariogram, Cambra and PreViser on 68 adults and a second proposing a new simplified model derived from the National Guidelines for the Promotion of Oral Health and Prevention of Oral Diseases in Children (n=71) and comparing this new model with the Cariogram and Cambra models. **RESULTS:** The Cariogram is the most studied model used to evaluate the caries risk with 31 out of 32 papers selected.

Only in 29 subjects out of 68 there was a perfect agreement among results obtained through the three models. In the comparison between the new model and Cambra, 55 children out of 71 were classified with the same risk level, while comparing the new method with Cariogram model, the subjects were 44. Comparing Cambra and Cariogram results, only 45 subjects were classified coherently.

**CONCLUSION:** The evidence on the validity for existing CRA models in assessing and predicting caries lesion is limited. There is an urgent need to develop valid and reliable methods for caries risk assessment that are based on best evidence for caries prediction and disease management.

# Corso di Dottorato in Scienze Giuridiche

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## Ph.D. Program in Juridical Sciences

Coordinatore/Coordinator:

Prof. Michele Maria Comenale Pinto

Dottori di Ricerca/Ph.D.

Bussu Paola

Nicotra Angelo Francesco

Erba Laura Rosella

Genovese Rachele

Muggianu Alessandra

Rosato Giuseppina

Dottore di Ricerca/Ph.D.: **Paola Bussu**

Data di Discussione della Tesi/Date of Thesis Defense: **16.01.2019**

Titolo della Tesi/Thesis Title: **La Tutela penale dei beni culturali**

Tutor/Adviser: **prof. Gian Paolo Demuro**

### **Abstract**

The constitutional and supranational importance of cultural objects imposes the use of criminal law as necessary instrument to guarantee adequate protection for their rank.

The subject of the present study is the protection provided by the Italian legal system to the offenses caused to the historical and artistic heritage, also considering the international and European sources of law.

The study aims to analyze the critical aspects of the Italian legislation with regard to fundamental issues of criminal law, also in the light of the position of the legal literature and the judicial interpretation.

The current system, composed by the Criminal Code and the Code of Cultural Heritage and Landscape, is fragmented and inadequate and it requires an urgent and substantial legislative reform.

As a matter of fact, it is severe when there is no damage at the good and the danger is only abstract, while the severity vanishes when the type of offense is the injury.

Finally the study focuses on the most recent proposal for reform of the criminal law system for the protection of cultural heritage (submitted during the 17<sup>th</sup> parliamentary term) which, however, doesn't solve the major flaws of the discipline.

Dottore di Ricerca/Ph.D.: **Angelo Francesco Nicotra**

Data di Discussione della Tesi/Date of Thesis Defense: **16.01.2019**

Titolo della Tesi/Thesis Title: **Lo Statuto giuridico dell'impresa innovativa nell'ordinamento italiano**

Tutor/Adviser: **prof.ssa Monica Cossu**

### **Abstract**

Starting from the analysis of the Italian innovative business model introduced by the law decree n° 179/2012 (better known as «decreto sviluppo»), the author aims to clarify which relevant meaning, from a legal stand of view, can be attributed to the concept of «technological innovation» (taking into account European law and the legislation regarding inventions), reaching the conclusion that the only kind of innovation that is juridically substantial is the one born from research and development activities.

Focusing therefore on innovative start-ups, regulated in the above-mentioned decree, the author comes to the conclusion that, among those listed by the legislator, the only element truly adequate to be used as a legal selection parameter in this case is the innovative corporate purpose, or better, the innovative activity that it implies (where technological innovation, lacking in itself an autonomous meaning, becomes a «second level prerequisite» of the economic activity conducted by the company).

For this reason, it is necessary that it carries out the productive cycle that connotes the innovative companies, as it is not permissible that the inclusion in the special section of the Italian Business Register dedicated to the innovative start-ups could be sufficient on its own to justify the applicability of the favourable legal regime.

Having said this, the author lingers on the problematics regarding the mandatory public disclosure related to the start-ups and on the relevant influences on internal organization coming from the clause on the innovative corporate purpose, which can be exemplified, among the others, by the possibility of its members to retire from the company under certain conditions, the potential winding up of the company caused by the impossibility of accomplishing the innovative corporate purpose and the exemption of start-ups from the bankruptcy proceedings. Lastly, after a brief analysis of the possible funding solutions for innovative start-ups, he wishes for the introduction of a European common framework and a specific legislation for research and development companies.

Dottore di Ricerca/Ph.D.: **Laura Rosella Erba**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Il confronto della tutela della persona disabile e a mobilità ridotta nel trasporto aereo, marittimo e terrestre**

Tutor/Adviser: **prof. Michele Maria Comenale Pinto**

### **Abstract**

COMPARISON OF THE PROTECTION PROVIDED FOR THE DISABLED AND PERSONS WITH REDUCED MOBILITY IN AIR, MARITIME AND LAND TRANSPORT

The research on real means of protection for the disabled in order to guarantee their right to mobility and access to means of transport has received growing attention of the international and national regulations in the last 20 years. The measures that have derived, both in the EU legal system and in the national legislation, aim at guaranteeing not only to the disabled but also to the "persons with reduced mobility" (p.r.m.) a full exercise of their right to mobility and free movement on conditions comparable to those granted to the other users.

The object of the present dissertation is, therefore, the comparison of the different sector-specific regulations that regulate the transport of all the persons that can be counted within the vast "p.r.m." category. Upon careful evaluation of the points of contact as well as of the ongoing differences among the applicable regulations, we shall try to identify proposals, modifications and solutions (also of a practical nature) that are appropriate, at least, to foster (if not to attain yet) the level of uniformity desired by the EU institutions with the aim of achieving greater protection for the p.r.m.

Dottore di Ricerca/Ph.D.: **Rachele Genovese**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **La Wreck Removal Convention 2007: quadro normativo attuale e prospettive future**

Tutor/Adviser: **prof.ssa Monica Brignardello**

### **Abstract**

Even though sea wrecks represented subject of interest and several attempts to regulatory at international level since ancient time, it has reached the drafting of a legal text specifically devoted to them only recently. This is the Wreck Removal Convention 2007 (WRC), entered into force on 14th April 2015, but not in Italy. This study – quickly flowing previous rules – firstly has the purpose to understand the international legislator's reasons to adopt a specific regulation in this matter. Secondly, it analyze WRC provisions and their relations with other international conventions related to marine pollution prevention in order to understand if there is an overlap or integration between these.

Finally, this study also deal with some consequences of the possible entry into force of WRC in Italy that actually apply the Navigation Code 1942.

Dottore di Ricerca/Ph.D.: **Alessandra Muggianu**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Partenariato pubblico-privato e patrimonio culturale**

Tutor/Adviser: **prof. Domenico D'Orsogna**

### **Abstract**

The role of private citizens in fostering the development of culture has been encouraged by the most recent legislative reforms with the introduction of tax credits for those who make donations, known under the name of Art bonus, and by streamlining the sponsorship procedure. However, such grant cannot remain confined to a mere financial support; only by allowing the enterprises and local communities to actively participate in the management and enhancement of cultural heritage, will it be possible to bridge organisational and functional deficiencies of the administrative machinery, with the effect of ensuring an adequate response to the needs of the society, as concerns a satisfactory fruition of cultural heritage. Greater accessibility and availability of such assets constitutes, therefore, in the light of the evolutionary interpretation of Art. 9 Italian Constitution, a means of growth and development of each individual's personality. Also supranational sources encourage the participation of the local communities in the design and implementation of the cultural policies, also as regards the intangible heritage. With respect to the latter, emphasis is placed on the fact that Italian legislation is incomplete, which inevitably affects the effective use of the instruments of public-private partnership, whose object is intangible heritage. The implementation laws of international conventions - excessively general - do not at present provide certainties in terms of application.

Dottore di Ricerca/Ph.D.: **Giuseppina Rosato**

Data di Discussione della Tesi/Date of Thesis Defense: **01.03.2019**

Titolo della Tesi/Thesis Title: **Profili giuridici delle piattaforme marine e delle operazioni offshore**

Tutor/Adviser: **prof. Michele Maria Comenale Pinto**

### **Abstract**

The thesis is based on the observation that in the exploration and exploitation of the marine subsoil the legal framework is not always sufficiently harmonised, starting from the legal status of the marine platforms, with respect to which the problem is to understand whether or not these structures can be identified as a ship or as other manmade structures such as the artificial islands.

Another topic faced in this work concerns the marine location of the structures because the operations in the field of hydrocarbons have caused important incidents, which have produced serious repercussions, for the loss of human life and in terms of marine pollution. From this point of view the research provides an overview of the role played by international, european and national legislation in the development of the regulatory system for the introduction of minimum safety requirements to prevent accidents and limit their consequences.

The activities under consideration also include the final operational phase, relating to the end of life of the installation, during which the international law require the removal of the structure.

For this purpose, the thesis addresses the study of the Italian draft decree containing the guidelines for the decommissioning of mining marine platforms and related infrastructures which is expected to be adopted in accordance with the European legislation on this subject.

# Corso di Dottorato in Scienze Politiche e Sociali

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## Ph.D. Program in Political and Social Sciences

Dottori di Ricerca/Ph.D.

Piazza Milena

Dottore di Ricerca/Ph.D.: **Milena Piazza**

Data di Discussione della Tesi/Date of Thesis Defense: **22 febbraio 2019**

Titolo della Tesi/Thesis Title: **Una Ricerca Grounded Theory sul senso di appartenenza alla comunità professionale: la solitudine degli assistenti sociali**

Tutor/Adviser: **prof. Andrea Vargiu**

### **Abstract**

A Grounded Theory research about the sense of belonging to the professional community. The loneliness of social workers

This Ph.D thesis focuses on the theme of the sense of belonging of social workers to their professional community. We chose to use the methodology of Grounded Theory that, for premises, paradigms, characteristics, techniques adopted, seemed to respond to the need to investigate the topic starting from the point of view of colleagues. The embryonic “sensitizing concept” of the sense of belonging has gradually been defined in more precise research questions: What factors affect the sense of belonging to the professional community? What is the role of the professional Order? Following the Grounded Theory approach, the research is characterized by a spiral process that starts from the collection of data through individual interviews, processes two different levels of codification and analysis, then returns to the field through the focus group and, by a further level of codification, identifies in the loneliness of social workers the main core category. The comparison to the scientific literature has allowed to delimit the emerging theory, anchoring the loneliness of social workers to the paradox of the Public New Management which describes characteristics and implications of the daily job of social workers. It is highlighted what has emerged in connection to the relationship between the professional community and the social workers Order and, finally, another possible investigation trail is showed.

# Corso di Dottorato in Scienze Veterinarie

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## Ph.D. Program in Veterinary Sciences

Coordinatore/Coordinator:

Prof. Fiammetta Berlinguer

### Dottori di Ricerca/Ph.D.

Esposito Giuseppe - *Curriculum* Qualità e Sicurezza alimentare

Nieddu Gavino - *Curriculum* Qualità e Sicurezza alimentare

Tamponi Claudia - *Curriculum* Qualità e Sicurezza alimentare

Frongia Gian Nicola - *Curriculum* Riproduzione, Patologia,  
Allevamento e Benessere Animale

Nieddu Stefano Mario - *Curriculum* Riproduzione, Patologia,  
Allevamento e Benessere Animale

Piras Anna Rita - *Curriculum* Riproduzione, Patologia,  
Allevamento e Benessere Animale

Dottore di Ricerca/Ph.D.: **Giuseppe Esposito**

Data di Discussione della Tesi/Date of Thesis Defense: **27.02.2019**

Titolo della Tesi/Thesis Title: **Detection of trace elements in the bivalve *Ruditapes decussatus* from Sardinian coastal lagoons: effects on food safety and pathological findings in target organs**

Tutor/Adviser: **prof. Domenico Meloni**

### **Abstract**

Shellfish can bioaccumulate toxic metals due to their ability to concentrate inorganic contaminants. Since biomonitoring by using bivalve molluscs is currently considered one of the most effective approaches for assessing the degree of pollution of brackish environments, the aims of this PhD thesis were: a) to detect the content of trace elements in the Grooved carpet shell *Ruditapes decussatus* collected in Sardinian coastal lagoons (Italy) and their effects on food safety; b) to evaluate the pathological findings in its target organs. The concentration of 16 trace elements (Al, Ag, As, Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb, Se, Sn, Tl and Zn) was quantified. The legal limits set by European Regulations for Cd, Hg and Pb were never exceeded. Unexpectedly high values for Al and Fe were found. A total of six histopathological alterations were analysed in the digestive gland, gills and kidney following a weighted condition indices approach. Gills show the highest prevalence of lesions than digestive gland, followed by kidney. The clam *R. decussatus* confirmed the capacity of bivalves as suitable bioindicators of trace elements pollution.

The determination of trace elements combined with histopathological analysis, should be a powerful tool in environmental monitoring plans. It is useful for understanding directly the health status of the marine organisms and indirectly the impact which different anthropogenic activities have on shellfish harvested in coastal environments.

Dottore di Ricerca/Ph.D.: **Gavino Nieddu**

Data di Discussione della Tesi/Date of Thesis Defense: **27.02.2019**

Titolo della Tesi/Thesis Title: **Traditional foods towards product innovation: strategies to improve food safety and shelf-life of ricotta cheese**

Tutor/Adviser: **prof. Enrico Pietro Luigi De Santis**, CoTutor/CoAdvisor: **dott. Carlo Spanu**

### **Abstract**

The main objective of the present thesis was to innovate the traditional ricotta cheeses produced in Sardinia (Italy). Innovation of traditional products can be obtained changing the manufacturing process through the introduction of production steps, ingredients or packaging. The purpose of this modernization process is to maintain the greater perceived quality and positive attitude of consumers toward traditional products, which include sensory properties and cultural heritage linked to the place of origin. At the same time there is the need to gain a competitive advantage on large scale market seeking to meet consumers' demand of food safety and convenience. Therefore, the studies illustrated in the present thesis demonstrate the feasibility of introducing innovation strategies in the production of traditional ovine ricotta cheese. In particular are discussed four scientific studies dealing with several aspects of food quality: determination of durability based on evolution of spoilage and pathogen microorganism during the shelf-life; modification of product composition in order to take into account consumers' special dietary needs (i.e. intolerance or allergies); use of protective cultures to control food spoilage during shelf-life.

Dottore di Ricerca/Ph.D.: **Claudia Tamponi**

Data di Discussione della Tesi/Date of Thesis Defense: **27.02.2019**

Titolo della Tesi/Thesis Title: **Aggiornamenti sulle infezioni da protozoi negli ovini della Sardegna**

Tutor/Adviser: **prof. Antonio Varcasia**

### **Abstract**

The aim of the present study was to deepened knowledge on epidemiology and taxonomy of Cryptosporidiosis, Sarcocystosis and Giardiosis in Sardinian dairy sheep.

Cryptosporidiosis was evaluated with microscopical and biomolecular methods in faecal samples from three different categories of sheep (lambs, pregnant sheep, post-partum sheep). Oocysts were found in 10.1% of examined animals, in 16.4% of lambs, in 7.2% of pregnant sheep and in 6.6% of post-partum sheep. Molecular characterization revealed the presence of two different species, *Cryptosporidium parvum* and *C. ubiquitum*. Within *C. parvum* were found the subtypes IIaA15G2R1 and IIaA20G1 while the subtype XIIa was isolated for *C. ubiquitum*.

Giardiosis was evaluated in the same sheep population, and *Giardia* cyst were microscopically detected in 6.6% of monitored farms, only in lambs. Molecular characterization of samples allow to identify the Assemblage AI of *Giardia duodenalis*.

Sarcosporidiosis was investigated with a cross sectional study on macroscopic and microscopic sarcocysts in Sardinian sheep at abattoirs. Macroscopic *Sarcocystis* spp. were found in 23.3% of examined muscles. Two different morphotypes were identified: large oval cysts, identified as *Sarcocystis gigantea* by molecular characterization, and slender fusiform cysts, identified as *S. medusiformis*. Microscopic cysts were detected in 77.7% of examined heart samples, molecular analysis allow to identify the species *S. tenella* (95.5%) and *S. arieticanis* (17.8%).

Dottore di Ricerca/Ph.D.: **Gian Nicola Frongia**

Data di Discussione della Tesi/Date of Thesis Defense: **27.02.2019**

Titolo della Tesi/Thesis Title: **Caratteristiche del volo, condizione genetica, aspetti etologici-riproduttivi e condizione di stress nel grifone(Gyps fulvus) in Sardegna**

Tutor/Adviser: **prof. Salvatore Naitana**

### **Abstract**

The present Ph.D. thesis was focused on an animal species of high ecological value, the griffon vulture (*Gyps fulvus*), presents in Sardinia in an area of great naturalistic importance and included in the Natura 2000 network. The research has a multidisciplinary approach with the combination of ethology, genetics, endocrinology, anatomy and physiology aspects.

First, we conducted a field study, analysing the ethology and the reproductive characteristics. The differences observed in the reproductive success among the six colonies examined led us to undertake a study on the feathers concentrations of Cortisol and DHEA to assess the animal health stress condition. This approach could represent an additional non-invasive model to investigate the well-being of the colonies.

This large body size species, moves only through a static flight, and only exceptionally can it be observed in beating its wings. This interesting aspect has led us to perform both a study on the structural characteristics of the bones of the wing and a genetic survey of the population. In fact, due to the type of flight, the griffon has difficulty in crossing the stretches of seas. Therefore, it is consequently genetically subjected to the phenomena of isolation. We conducted an analysis of genetic characterization of griffon populations in Sardinia and two other islands of the Mediterranean (Cyprus and Crete) and studied the frequency variations of haplotypes in Sardinia before and after 1986, when through repopulation actions, griffons were introduced coming from the European continent.

Dottore di Ricerca/Ph.D.: **Stefano Mario Nieddu**

Data di Discussione della Tesi/Date of Thesis Defense: **27.02.2019**

Titolo della Tesi/Thesis Title: **Metodologie innovative per la crioconservazione del germoplasma nella specie ovina**

Tutor/Adviser: **prof. Sergio Ledda**

### **Abstract**

Aim of this work was to develop new methods for germplasm cryopreservation in the ovine species. The research was focused on new techniques and devices for the conservation of semen, tissues and embryos in an effective and cost-saving manner. The research was divided into three main experiments. In the former, the possibility of semen conservation after partial freeze-drying was tested; such approach would avoid the use of nitrogen and of the entire cold chain, with enormous advantages in terms of costs and feasibility. In the second and third experiments, a new micro-device (E.Vit), consisting of a 0.25 mm diameter straw with a 50 µm pore polycarbonate grid at one end, was used to create two protocols for vitrification of prepubertal animal testicular tissue and blastocyst stage embryos. The first experiment showed that ram semen maintains a good vitality after cryopreservation with low-toxic cryoprotectants and the partial freeze-drying technique suggest lyophilization as an alternative technique to classical freezing. E-Vit was successfully applied in both second and third experiments. Cell vitality and gene expression were evaluated in the vitrified-warmed testicular tissues, while the validity of the protocol for embryo cryopreservation was assessed in terms of post-warming survival and DNA fragmentation (TUNEL test). These new cryopreservation methodologies may significantly contribute to the improvement of reproductive technologies in both animal and human field.

Dottore di Ricerca/Ph.D.: **Anna Rita Piras**

Data di Discussione della Tesi/Date of Thesis Defense: **27.02.2019**

Titolo della Tesi/Thesis Title: **Resveratrol supplementation during in vitro maturation: effect on the quality of oocyte in species of veterinary interest**

Tutor/Adviser: **prof.ssa Luisa Bogliolo**, CoTutor/CoAdvisor: **prof.ssa Maria Teresa Paramio Nieto**

### **Abstract**

The oocyte quality represents a crucial factor in the outcomes of in vitro embryo production. However, different intrinsic and extrinsic conditions can impair the quality of mammalian oocytes, decreasing their developmental competence. The general aim of this thesis was to evaluate the effect of supplementation of resveratrol (resv), a natural antioxidant, during in vitro maturation on the quality of oocytes, in species of veterinary interest (domestic cat, prepubertal goats and sheep).

The research includes three different studies which were performed to test the potential beneficial influence of resveratrol to improve the in vitro developmental competence of poor-quality oocytes such as oocytes under sub-optimal condition (oocytes retrieved from domestic cat cold stored ovaries study I, and ovine oocytes exposed to environmental contaminants, study III) and with low developmental competence (oocytes from prepubertal goats, study II). In the three studies the addition of resv during IVM allowed to improve fertilization and development to the blastocyst stage compared to control groups.

The mechanism underlying resv effect included regulation of bioenergetic / redox status of the oocytes by the modulation of mitochondrial activity and intra-cytoplasmic levels of reactive oxygen species and glutathione. Resveratrol also promoted normal cortical granules and mitochondria distribution, essential for correct cytoplasmic maturation.

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