Characterization of high-value compounds from thermal cyanobacteria and evaluation of their anti-inflammatory and anti-oxidant efficacy in animal models.
(curriculum in Biochemistry and Biotechnology).
Contact: Prof. Nicoletta La Rocca, e-mail: nicoletta.larocca@unipd.it

The PhD project will concern the investigation of therapeutic properties of high-value molecules released by the cyanobacteria growing on the Euganean Thermal Spring muds, whose beneficial effects are documented since Roman times. The first part of the research will be focused on the isolation and biochemical characterization of microbial bioactive molecules such as pigments, galactolipids (MGDG and DGDG) and exopolysaccharides, that could account for the mud beneficial properties due to their generally recognized antioxidant and anti-inflammatory activities. The second part of the project aims to define the dose-effect relationship and the effectiveness of these compounds and to dissect the molecular pathways involved in their activities by using wild-type and transgenic lines of the model organism zebrafish as well as human cell lines.

Algae Genetic Engineering to improve lipids content.
(curriculum in Biochemistry and Biotechnology).
Contact: Prof. Tomas Morosinotto, e-mail: tomas.morosinotto@unipd.it

The aim of this PhD project (supported by TMCI Padovan spa) is to improve the lipids content and profile of algae to make them more suitable for specific industrial applications. The main task of this PhD project will be to identify potentially interesting genes involved in lipids biosynthesis in algae by genomic analyses and use this information to generate modified strains with improved lipid content and profile.

Evaluation of effects of new antifouling systems, alternative to organotin compounds, on benthic marine invertebrates at ecosystem, organismal and cellular level.
(curriculum in Cell Biology and Physiology)
Contact: Prof. Francesca Cima, e-mail: francesca.cima@unipd.it

The antifouling paints are used for protecting boat hulls and sunken artefacts from the undesirable settlement of micro-organisms, plants, and animals on artificial surfaces (marine biofouling). After the widespread ban of TBT, due to its severe impact on coastal biocoenoses, alternative biocides as new products or previously used in agriculture have been massively introduced in combined formulations against a wide spectrum of fouling organisms constituting a potential risk for the marine environment. Therefore, the research of new environment-friendly antifouling systems represents an urgent priority together with a long-term validation of their mechanism of action at three biological levels, i.e., 1) ecosystem (evaluation of ecological succession by means of biodiversity indexes), 2) individual (evaluation of embryotoxicity and alteration of settlement capability), and 3) cell (evaluation of subcellular targets at sublethal concentrations).

Exploring novel molecular mechanisms in neurodegeneration.
(curriculum in Cell Biology and Physiology)
Contact: Prof. Elisa Greggio, e-mail: elisa.greggio@unipd.it

Parkinson's disease (PD) is a common, severe neurodegenerative disorder (ND) with unknown etiology and without cure. It occurs as hereditary or ‘sporadic’ condition that impairs the functionality of dopaminergic neurons of the substantia nigra pars compacta, and, at later stages, of other brain regions, causing motor and autonomic dysfunctions. Recently, glial cells have been shown to contribute to the neurodegenerative process. In this scenario, the study of genes mutated in familial forms of PD with pathological and clinical overlap with the sporadic syndrome gives us the opportunity to unravel novel molecular mechanisms of such a complex disorder. By studying PD-linked proteins and the related signalling pathways in neurons and glial cells, we identified a number of aberrantly regulated targets both in PD cellular systems and in PD mouse models. The PhD student will investigate the activation status of these molecules in human

biological samples from PD patients with the aim of validating a set of possible biomarkers useful for PD diagnosis and the scanning of PD progression and treatment efficacy. The project falls within a broader program in collaboration with the San Camillo Hospital, Venice and in the context of a project funded by the Ministry of Health (Ricerca Finalizzata).

Enhancing OPA1-dependent cristae structure to combat mitochondrial diseases.
(curriculum in Cell Biology and Physiology).
Contact: Prof. Luca Scorrano, e-mail: luca.scorrano@unipd.it

The Scorrano lab works on mitochondrial dynamics & interorganellar contact sites, from their basic tenets (e.g. Frezza et al., Cell 2006; deBrito&Scorrano, Nature 2008; Gomes et al., Nat Cell Biol 2011; Cogliati et al., Cell 2013; Quintana-Cabrera et al., Nat. Commun 2018), to their role in disease (e.g. Costa et al., EMBO Mol. Med 2010; Kasahara et al., Science 2013; Varanita et al, Cell Metab 2015; Civiletto, Varanita et al., Cell Metab 2015; Pernas et al., Cell Metab 2018). Thanks to a project funded by Muscular Dystrophy Association USA, we now wish to epigenetically modulate Opa1 levels in cellular and mouse models of mitochondrial disorders to elucidate if this approach can correct mitochondrial dysfunction in vitro and muscle atrophy in vivo. In this framework, a 3-year fully funded PhD student position is available to exploit Opa1 overexpression in experimental therapy of mitochondrial disorders.

Topics "Biological Signals"

The topic of these projects will coincide with one of the topics presented in each Curriculum.