Progetto di Ricerca:

**Development of a biotechnological process for the microbial production of polyunsaturated fatty acids**

Piano di Attività:

The production of dietary **long-chain polyunsaturated fatty acids** (**LC-PUFA**) is based on overfishing of lower trophic species in marine ecosystems. However, PUFA production is scarcely sustainable (Aquaculture 2015,449: 94-107). Marine bacteria from cold marine environments can have the ability to accumulate PUFAs when fed with conventional substrates.

A collection of bacterial isolates available at UNIBO will be screened for their ability to produce PUFAs when grown in media enriched in volatile fatty acids (VFAs) as major carbon source. In a first step, the screening for PUFAs synthesis will be performed using mineral media supplemented with commercially available VFAs. Selection of PUFAs-producing isolates will be initially done by colorimetric methods followed by GC analysis to define the PUFA composition. After bacterial growth, the bacterial biomass will be recovered, lyophilized and used for the extraction of total lipids to be subject to GC analysis (Romano et al., (2020)). The selected isolates capable of producing PUFAs in mineral media supplemented with VFAs as major carbon source will be tested for their ability to grow and produce the PUFA on VFA-enriched whey provided by project partners. The growth tests will first be conducted in shake flasks followed by cultivation in 3-L bioreactor. A first stage of fermentation dynamics characterization and of process optimization will be carried out in bench-scale, by changing parameters such as carbon source feeding regime to avoid substrate inhibition, the optimum dissolved oxygen profile and the best trigger of PUFA accumulation (ex. nitrogen vs. phosphate depletion).