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Description of the funded research project

2nd Call for H.F.R.I. Research Projects to Support Post-Doctoral Researchers

Title	**SystEms Biology Modelling of Key LIFe History Traits for Sustainable Aquaculture Production in the Mediterranean Region**
Reader-friendly title	**Improvement of Fisheries Production by Resolving the Genomic Architecture of Growth Cohorts of Mediterranean Fish Species**
Principal Investigator	**Spiros Papakostas Ph.D.**
Scientific Area	**Agricultural Sciences and Food**
Institution and Country	**Department of Biology, University of Turku, Finland**
Host Institution	**Department of Biology, Aristotle University of Thessaloniki**
Collaborating Institution	**PLAGTON SA**

Budget

170.000 €

Duration

3 χρόνια

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The gilt-head sea bream (*Sparus aurata*) and the European sea bass (*Dicentrarchus labrax*) are amongst the most commercially important fish species of the Mediterranean region. This proposal will shed light on the genetic mechanisms of growth cohorts in these species, and will also develop a simple genotyping tool to screen for important genetic variation behind these cohorts. Half-sib families for each of these two fish species will be developed and growth traits, such as weight and length, will be monitored. These phenotypic measurements will then be investigated with regard to the genetic variation of known large effect loci for growth and age at maturity in teleosts (candidate gene approach). Genome scans and gene expression analyses will also be performed to further our understanding of the genomic architecture of growth in these fishes. A reliable, cost-effective and high-throughput genotyping method will be developed to help the fast and versatile screening of the key genomic regions for growth. We anticipate that such a tool will be suitable for many applied purposes, for example, for the implementation of gene-centric management practices in fisheries.

This proposal will produce new knowledge of the genetic basis and the genomic architecture of growth and maturation in the gilt-head sea bream (*Sparus aurata*) and the European sea bass (*Dicentrarchus labrax*). Cutting-edge research on candidate genes will be combined with state-of-the-art methodologies of genome scans and gene expression profiling to provide unparalleled insights on the genomic regions, and their interaction, behind growth phenotypes in these two fish species. New molecular tools will further be developed to allow the high-throughput and cost-efficient genotyping of identified key genomic regions for growth in the gilt-head sea bream and the European sea bass, in order to fit both basic research and applied purposes.

The results of this proposal will help further our understanding on the genomic architecture of growth traits in the commercially important gilt-head sea bream (Sparus aurata) and European sea bass (Dicentrarchus labrax) fish species. The results will also shed light on the evolutionary conservation of function of key growth genes and/or genomic regions in teleosts. Amongst scientific output, an easy-to-use genotyping tool will also be developed to allow the flexible and reproducible genotyping of key growth regions. These results are anticipated to have a profound impact on many facets of basic and applied research that involve the study growth phenotypes in the gilt-head sea bream and the European sea bass, and perhaps in other teleosts. For example, genomic regions with an evolutionary conserved role in growth cohorts from Atlantic salmon to gilt-head sea bream and European sea bass may be prime targets for growth in other fish species. Gene-centric management practices by fisheries may also become possible either by selecting breeders with favorable genotypes on key growth genomic regions in gilt-head sea bream and European sea bass or by gene editing techniques across a range of species. As such, the goals of sustainable fisheries management, sustainable blue economy, protection of natural biodiversity, and circular economy may become a reality.

This funding by H.F.R.I. is having a multi-level positive influence in the advancement of my academic career. It fuels leading edge personal research that I am confident it will produce breakthrough knowledge and thus published in high-profile international journals in research fields such as Molecular Ecology, Evolutionary and Population Genetics, and Aquaculture. This funding allows me to also start my own research team based in Greece, which I intend to use as a springboard to build an independent research laboratory that will extent beyond the lifespan of this project. This funding further allows me to return and conduct research in my home country, Greece, after 12 years of active research career abroad, in Finland and The Netherlands. As such, it enables me to integrate my existing network of international collaborators with new collaborators from Greece, which will almost certainly lead to the development of exciting new research ideas and project proposals to address both international and local problems.

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