

Description of Funded Research Projects  
1<sup>st</sup> Call for H.F.R.I. Research Projects  
to support Post-Doctoral Researchers



**H.F.R.I.**  
Hellenic Foundation for  
Research & Innovation

Research Project Title:  
**RNA Silencing in Diatoms (RADIO)**

**Principal Investigator:**

**Frédéric Verret**

**Popular Title:**

**Control of gene expression and genome integrity in  
marine phytoplankton**

**Scientific Field:**

**Molecular Biology and Marine Sciences**

**Host Institution:**

**Hellenic Centre for Marine Research (HCMR), Institute of Marine  
Biology, Biotechnology and Aquaculture (IMBBC)**



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RNA silencing is a conserved mechanism of regulation of gene expression mediated by small RNAs (sRNAs) and key proteins including DCR, AGO and RdRP. RNA silencing has been shown to play pivotal roles in growth and development, maintenance of genome integrity via repression of transposable elements and transgenes, defense against virus, and response to abiotic stressors. Diatoms are unicellular microalgae belonging to the eukaryotic supergroups of Chromalveolata playing a pivotal role in the marine environment and global carbon cycle, and presenting promising biotechnological applications. To date, no diatom DCL, AGO and RdRP homologue has been cloned and direct evidences for their contribution and mode of action in RNA silencing as well as for the importance of RNA silencing in diatom physiology is still lacking.

We propose to characterize the function of DCL, AGO and RdRP and unveil the physiological role of RNA silencing in the model diatom species *Phaeodactylum tricornutum*. For the first time, gene encoding putative DCL, AGO and RdRP will be cloned in diatoms. Ectopic expression of fluorophore-tagged DCL, AGO and RdRP will enable their subcellular localization. Biochemical activity of recombinant DCL will be characterized in vitro. AGO immunoprecipitation followed by high throughput sequencing of bound sRNAs and mass spectrometry analysis of interacting proteins will unravel the composition and targets of the RISC complex. In addition, CRISPR-mediated mutagenesis will be carried out to characterize the role of DCL, AGO and RdRP in controlling gene and TE expression. The proposed research work will provide unprecedented insights into key molecular mechanisms controlling endogenous gene and transgene expression in diatom contributing to better understand their acclimatory responses in the marine environment and facilitate their utilization in blue biotechnology.

a) Evolution of RNA silencing in eukaryotes: founding characterization of RNA silencing mechanisms in diatoms will significantly increase our understanding on the evolution of RNA silencing in eukaryotes; b) Response of pivotal marine primary producer to environmental stress: documentation of the role of RNA will provide a better insight into the (epi)genetic mechanisms involved in the diatom response to changes in environmental condition; c) Mechanisms controlling (trans)gene expression in microalgae with promising biotechnological applications: a better understanding of RNA silencing genes and mechanism in diatoms will empower their utilization in biotechnological applications by offering approaches to engineer stable transgenic lines or epigenetically modified lines with improved traits; and d) Establish novel research thematic at the national level: the implementation of the research proposal will initiate research in a thematic still underexplored in Greece.

To me, H.F.R.I. funding  
would mean...

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Independence in research thematic and its implementation.

*The Principal Investigator,  
Frédéric Verret*

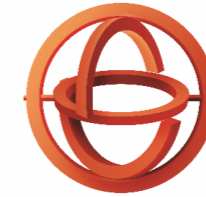
## Funding

Amount: **200,000 €**

Duration: **36 months**

Foundation: **H.F.R.I.**





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## CONTACT

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