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

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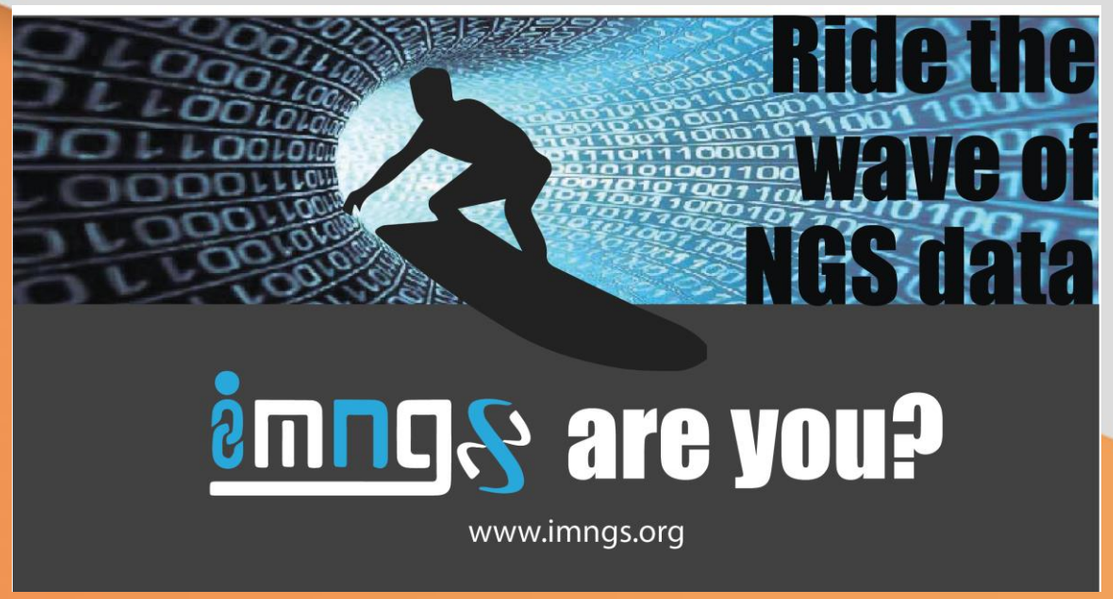
Research Project Title:

Large-scale bioinformatic integration of sequence data for novel insights into microbial diversity and ecology

Principal Investigator:

Ilias Lagkouvardos



Popular Title:

Estimation of global microbial diversity and production of novel computational tools for the analysis of microbial communities

Scientific Field:

Environment and Energy

Host Institution:

Hellenic Center for Marine Research (HCMR)

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Research Project Summary

Studying microbial diversity and ecology allows the discovery of novel microbial functions and the design of innovative strategies, towards targeted manipulation of microbial communities for the sake of biotechnological, environmental, or health-related issues. However, this process is slowed down by the currently limited description of microbial diversity and poor understanding of community dynamics, amplified by the lack of data integration and utilization tools. I propose to tackle this issue by means of innovative bioinformatic approaches. Thanks to our past efforts in integration of microbial data into the web-based platform IMNGS (www.imngs.org), we are now able to utilize the universal pool of sequence-based knowledge to address several important microbial ecological questions. I plan to utilize this resource to provide answers to ‘what’ is the sequence supported global prokaryotic diversity and ‘where’ future microbial isolation efforts should focus for environments rich in undescribed taxa. Furthermore, by clustering thousands of microbial composition profiles available in IMNGS, we will provide evidence for the existence of persistent composition states (attractors) in different environments, identify their core species based on co-occurrence networks, and explore their functional basis. This will effectively answer ‘why’ microbes assemble in robust communities and, help to model, and predict their dynamics. Finally, we will expand our resource with new capabilities to broaden the range of questions that can be effectively addressed by IMNGS, thus enhancing the utilization of existing data.

These new tools include the query of users’ own profiles for identification of similar samples in the database and the extraction of core species and taxa from a group of selected samples. Overall, this proposal based on ultra-large-scale data integration will address key questions in microbial ecology and empower researchers with access and control over the accumulated wealth of microbial sequence data.

#BrainGain #strongergreece

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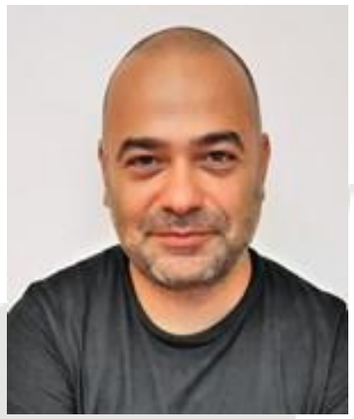
Project Impact on Society

The pool of yet unknown microbial diversity, referred to as “dark matter” in microbiology, is tremendous and represents a unique reservoir of functions to be discovered for the design of novel applications; for instance, in the field of biotechnology, health improvement, enhancement of agricultural production or environment preservation.

In my proposal, via the identification of microbial groups representing novel taxa, combined with metagenomic information delivering insights into the functional potential of target organisms, we will illuminate the relevance of important, yet unknown species and help in their isolation. Furthermore, by studying the microbial attractor states, we will enhance our capacity for the manipulation of microbial communities, through insights on their organization and processes with important implications in applied microbiology.

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



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Getting funded by H.F.R.I. gave me the opportunity to pursue my scientific goals independently in Greece.

The Principal Investigator,
Ilias Lagkouvardos

Funding

Amount: **155,000 €**

Duration: **36 months**

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

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