

## 1.73 - Microbial Molecular Ecology Lab

**MISSION STATEMENT:** To investigate the molecular interactions, functions, and roles of microorganisms and viruses within diverse environments and hosts. Our focus is on leveraging advanced techniques such as DNA and RNA sequencing, metagenomics, and other 'omics technologies to develop innovative diagnostic tools and practical applications for environmental and health sustainability

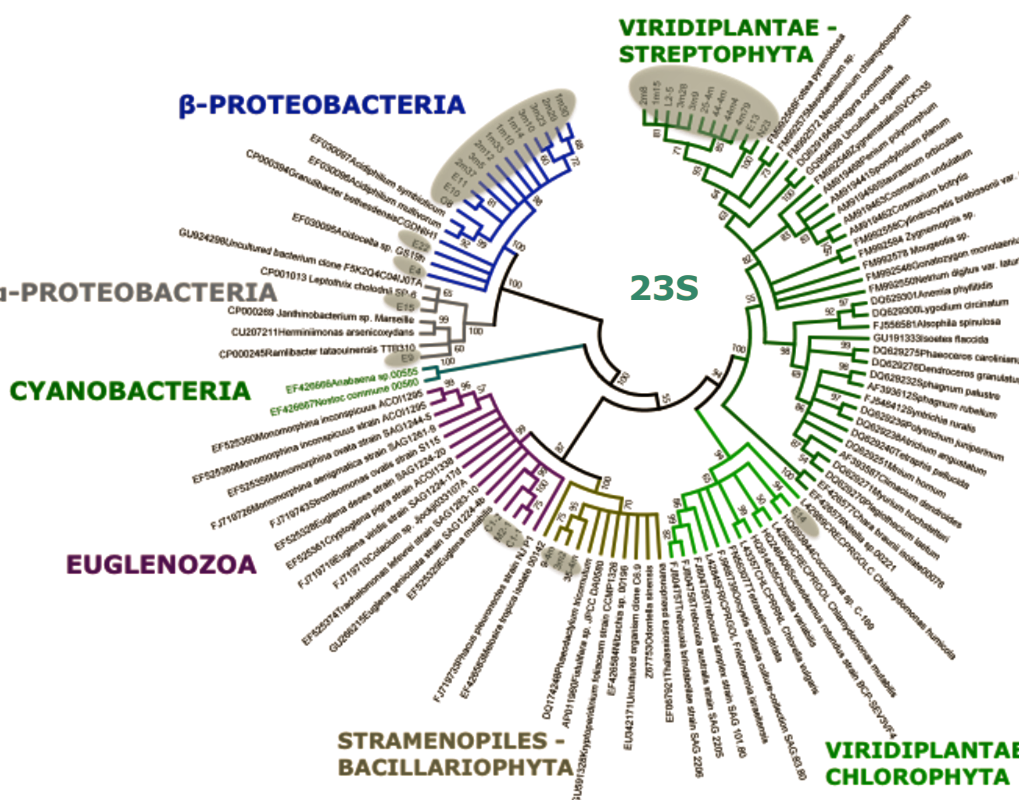
### Overview & highlights

#### Microbial Diversity and Community Structure:

Investigate microbial community diversity and composition in various environments (soil and water) using techniques such as metagenomics, 23S and 16S rRNA gene sequencing, and other high-throughput sequencing methods to identify and classify microorganisms.



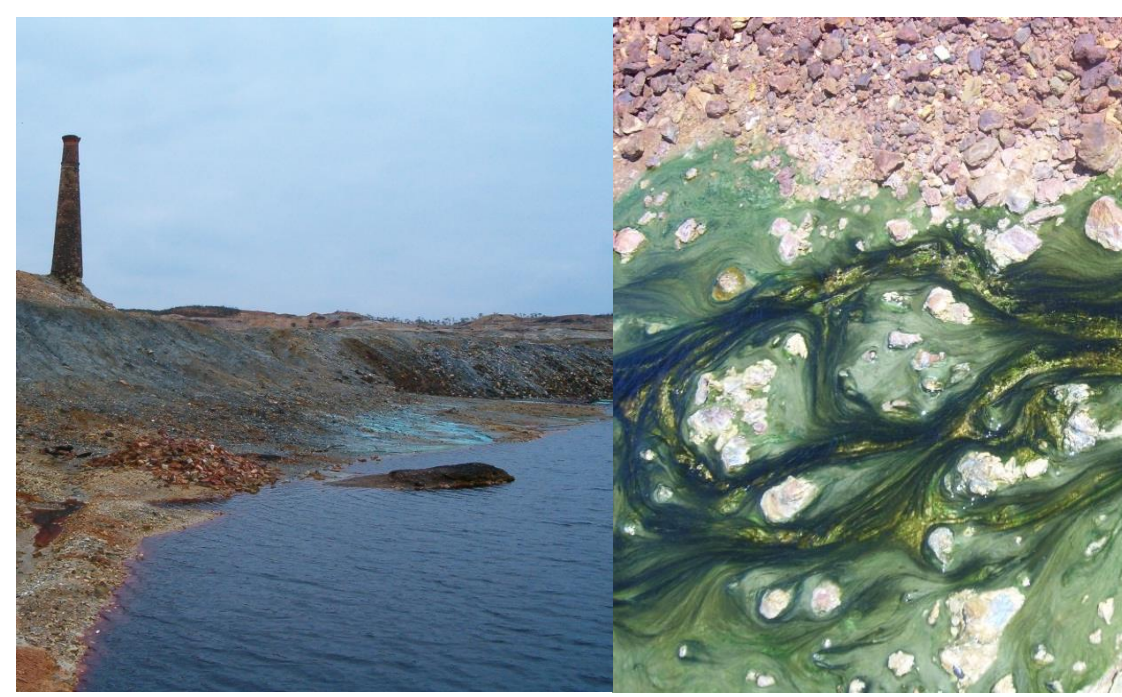
Acid Mine Drainage (pH<3) from S. Domingos open-pit mine (Iberian Pyrite Belt).



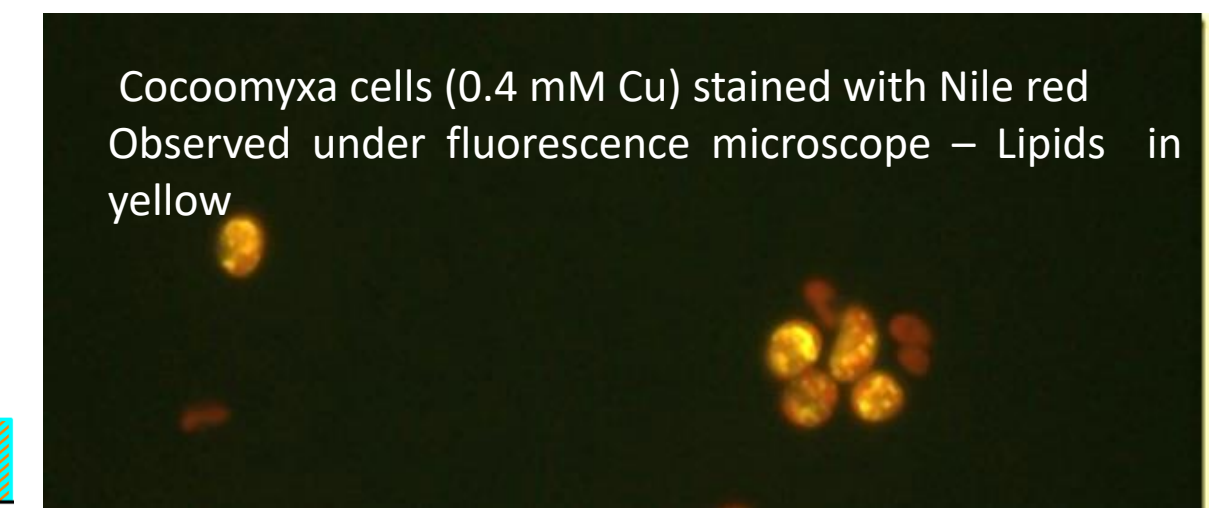
Microorganisms (gray) in the Acid Mine Drainage (pH<3) of S. Domingos .

#### Environmental and Applied Microbiology:

Study microbial processes in natural and engineered environments (wastewater treatment, bioremediation, agriculture) to develop and assess the use of microorganisms and microbial consortia for environmental sustainability.



Biofilm in water drainage contaminated with copper (S. Domingos abandoned mine).



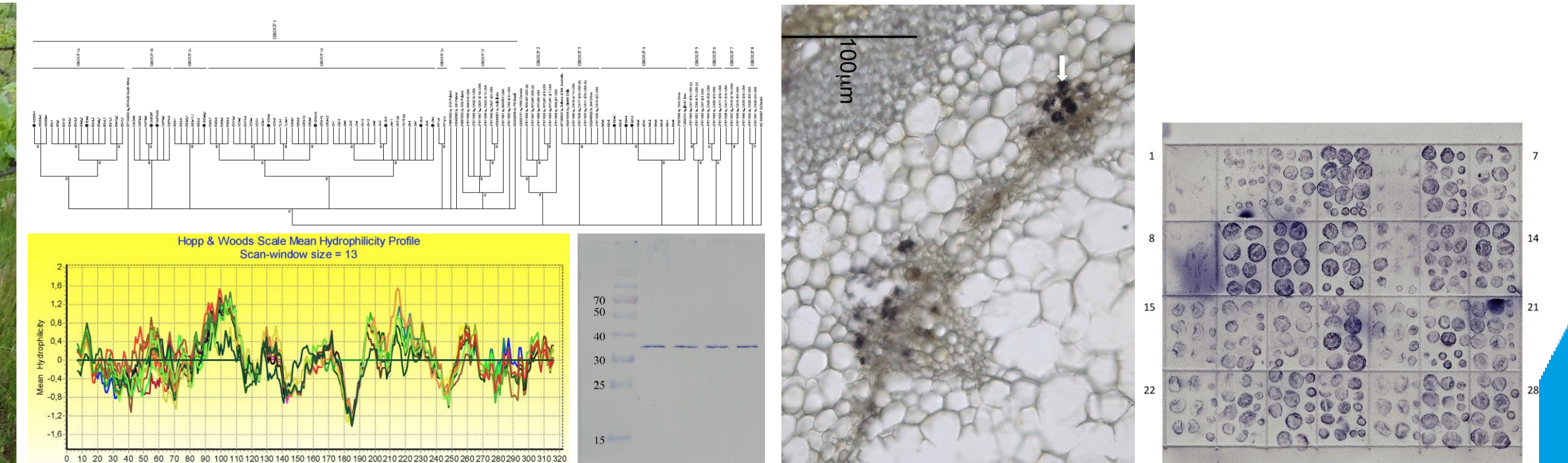
Performance of *Coccoomyxa* sp., isolated from S. Domingos, under copper exposure, showing neutral lipids accumulation.

#### Improvement of molecular tools:

Utilize *in silico* analyses and bioinformatics models to analyse large-scale viral and microbial multi-omics data, and design advanced diagnostic tools for crop management.



Viral disease symptoms in *Vitis vinifera* plants, in a commercial vineyard (Port.).



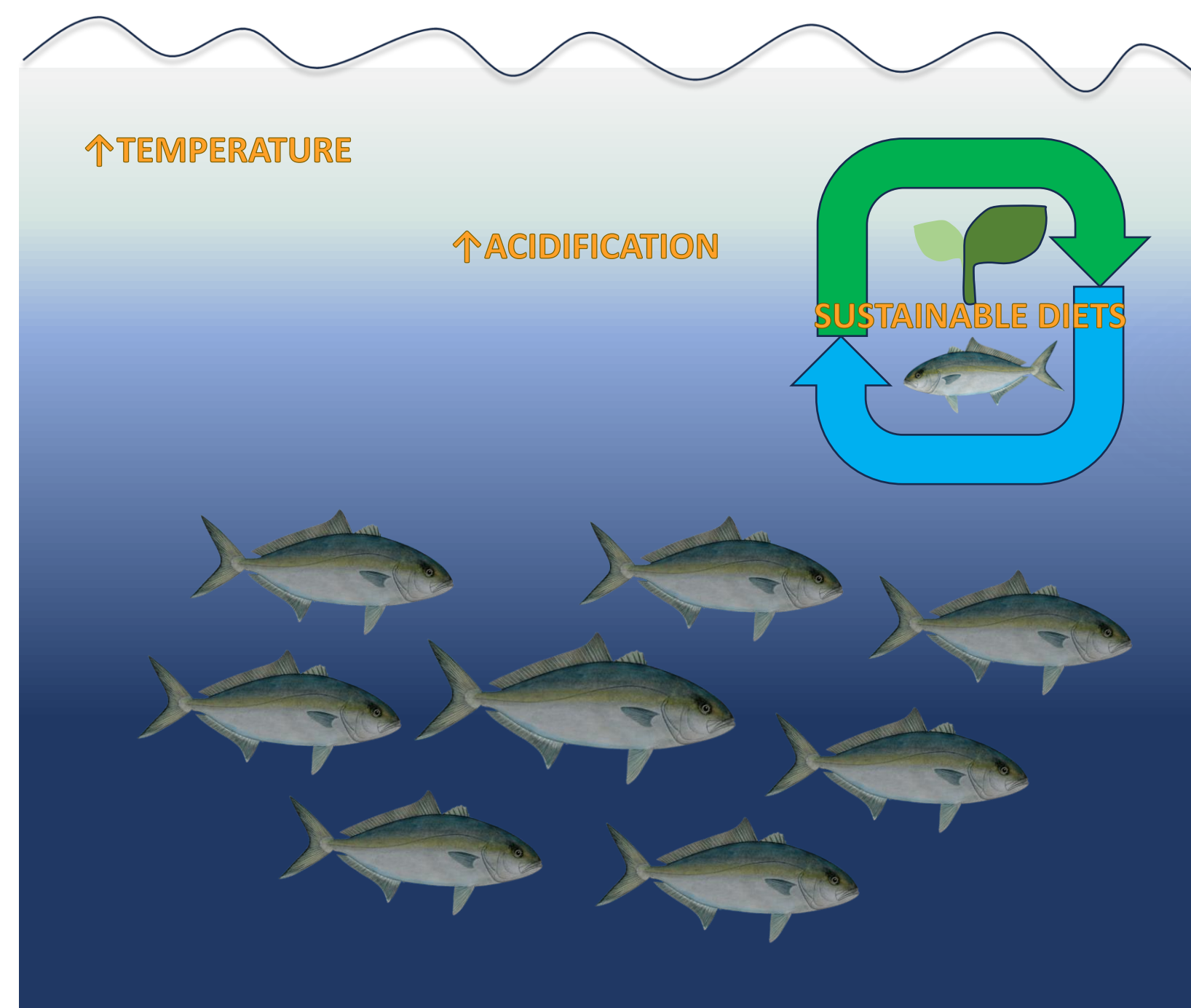
Molecular identification of viral strains; selection of conserved immunogenic amino acid motifs for antibody production; verification of antibody specificity through western blot and *in situ* immune assay. Development of a Tissue print immunoblotting detection assay for stakeholders, allowing for widespread screening of plants in a vineyard.

### current Research focus

#### Functional Genomics of

#### Host-Microbiome Interactions in Fish:

Investigate the composition and function of the microbiome in aquaculture fish. Characterise dysbiosis under alternative protein sources, test additives for aquafeeds' improvement, quantify microbiota impact on gut integrity and function. Identify molecular markers of host health, disease, and recovery.



### Appreciation and funding

Over the years, the Molecular Microbial Ecology Lab has hosted project grant holders and degree, MSc, and PhD students who have contributed significantly to its research output.

The lab's research is much more than a series of projects, it is a continuous journey, made possible by the support from our team and our close collaborators from other R&D units and universities (INIAV, University of Huelva, ICMAN-CSIC, University of Cádiz, University of Almería), as well as the funding from various institutions and organisations (FCT, CEIMAR; Fundación Carolina).