Antoni Mateu Vera Vives | Curriculum Vitae

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Education

Ph.D. in Biosciences **Università degli Studi di Padova, IT**
Ph.D. Programme in Biosciences, 36th cycle – With honors (*cum laude*) October 2020 – March 2024
Curriculum Biochemistry and Biotechnology
Supervisor: Prof. Tomas Morosinotto

Thesis: *Deciphering the role of respiration in bioenergetics and metabolism of plants using the model Physcomitrium patens*

Main project: Generation of a set of knockout mutant lines of the moss *Physcomitrium patens* with altered levels of mitochondrial respiratory complexes (complex I, IV, V or AOX), some of them previously unavailable in other plant models. Characterization of their physiology, photosynthetic performance, transcriptome and metabolome, in collaboration with research groups in Padova (IT), Bologna (IT) and Düsseldorf (DE). Generation of stable fluorescent ATP reporter lines in *P. patens* and monitoring of *in vivo* ATP dynamics during dark-to-light transitions, in collaboration with prof. M. Schwarzländer in Münster (DE).

Relevant side projects: Characterization of mitochondrial respiratory capacity in *gun1* mutant Arabidopsis seedlings, in collaboration with prof. M. Zottini in Padova (publication in preparation). Study of photosynthesis of microalgae in photobioreactor-like conditions, aimed to optimize microalgae cultures for biomass production.

(Thesis available at https://tesidottorato.depositolegale.it/handle/20.500.14242/97156)

Master's Degree **Università degli Studi di Padova, IT**
M.S. in Molecular Biology – Final mark: 108/110 21/09/2020
Supervisor: Prof. Tomas Morosinotto

Thesis*: Characterization of complex IV-deficient mutants in the model organism* Physcomitrella patens

Bachelor's degree **Università degli Studi di Padova, IT**
B.S. in Biologia Molecolare – Final mark: 102/110 26/09/2018
2017-2018: Università degli Studi di Padova (Padova, IT)
2015-2017: Universitat Rovira i Virgili (Tarragona, ES)
Supervisor: Prof. Paola Costantini

Scholarships, funding and awards

- **Research fellowship** by the Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali (INSTM) – 8,000€/6 months (October 2023-April 2024)
- **FESPB travel grant** to attend the PBE23 International Congress
- **Seed Grant 2021** by the Italian Society of Plant Biology (SIBV) – 4 awardees in Italy
- **PhD scholarship** by the Department of Biology (UniPD), 46,029 €/3 years – 9 admitted out of 162 applicants
- **Veneto Regional undergraduate scholarship** 2017-18, 2018-19 and 2019-20
- **Spanish national undergraduate scholarship** 2015-16 and 2016-17

Research experience

Research internship – Ph.D. project **Università degli Studi di Padova, IT**
Lab Morosinotto, Dep. of Biology October 2020 – March 2024
Project title: *Deciphering the role of respiration in bioenergetics and metabolism of plants using the model Physcomitrium patens*
Supervisor: Prof. Tomas Morosinotto

Visiting internship **Alma Mater Studiorum, University of Bologna, IT**
Department of Pharmacy and Biotechnology (FABIT) June 2022
Main topic: *In vitro activity quantification of metabolic enzymes in P. patens*
Supervisor: Prof. Francesca Sparla

Visiting internship **WWU University, Münster, DE**
Lab of Plant Energy Biology at IBBP November 2021
Main topic: *In-vivo dynamics of cytosolic ATP using fluorescent reporter lines of P. patens*
Supervisor: Prof. Markus Schwarzländer

Research internship – Master's Degree Thesis **Università degli Studi di Padova, IT**
Lab Morosinotto, Dep. of Biology October 2019 - October 2020
Thesis title: *Characterization of complex IV-deficient mutants in the model organism Physcomitrella patens*.
Supervisor: Prof. Tomas Morosinotto

Summer internship **EDAR Alcúdia, ES**
EDAR Alcúdia (water treatment plant in Alcúdia, Mallorca) July - August 2019
Main tasks:
- Sampling and physical-chemical and microbiological analysis of the waters of the municipal beaches.
- Wastewater quality analysis in the different phases of treatment.
- Environmental inspection and reporting.

Supervisor: Pilar Silvente.

Research internship **Università degli Studi di Padova, IT**

Lab Martello, Dep. of Medical Sciences

Main topics: July - August 2018

- Immunofluorescence microscopy images acquisition and analysis.
- Human and murine stem cells culture.

Supervisor: Prof. Graziano Martello

Bachelor's Degree Thesis **Università degli Studi di Padova, IT**

Lab Costantini, Dep. of Biology May 2018

Thesis title: *Friedreich ataxia-induced pluripotent stem cell-derived neurons show a cellular phenotype that is corrected by a benzamide HDAC inhibitor.*

Supervisor: Prof. Paola Costantini

Publications

- Antoni M Vera-Vives, Edoardo Bizzotto, Philipp Westhoff, Stefano Campanaro, Andreas P. M. Weber, Alessandro Alboresi, Tomas Morosinotto. **Genetic inactivation of complex I in *Physcomitrium patens* induces mitochondrial retrograde signaling particularly during night**. *In preparation*.

- Shun-ling Tan, Antoni M. Vera-Vives, Xing Huang, Alessandro Alboresi, Tomas Morosinotto. **Alternative oxidase enhances metabolic flexibility in bioenergetic metabolism of *Physcomitrium patens***. *Under review*.
  Preprint available with DOI 10.22541/au.175152257.75470323/v1.

- Shun-ling Tan, Antoni M. Vera-Vives, Alessandro Alboresi, Tomas Morosinotto. **Light intensity activation of alternative electron transport mechanisms in the moss *Physcomitrium patens***. Plant Physiology and Biochemistry (2025). DOI: 10.1016/j.plaphy.2025.109904

- Antoni M Vera-Vives, Marco Mellon, Libero Gurrieri, Philipp Westhoff, Anna Segalla, Shun-ling Tan, Edoardo Bizzotto, Stefano Campanaro, Francesca Sparla, Andreas P. M. Weber, Alessandro Alboresi, Tomas Morosinotto. **Inactivation of mitochondrial complex IV in *Physcomitrium patens* reveals the essential role of respiration in plants metabolism**. *The Plant Cell* (2025). DOI: 10.1093/plcell/koaf101

- Antoni M Vera-Vives, Piero Novel, Ke Zheng, Shun-ling Tan, Maruks Schwarzländer, Alessandro Alboresi, Tomas Morosinotto. **Mitochondrial respiration is essential for photosynthesis-dependent ATP supply of the plant cytosol**. *New Phytologist* 243: 2175-2186 (2024). DOI: 10.1111/nph.19989

- Antoni M Vera-Vives, Tim Michelberger, Tomas Morosinotto, Giorgio Perin. **Assessment of photosynthetic activity in dense microalgae cultures using oxygen production**. *Plant Physiology and Biochemistry* (2024). DOI: 10.1016/j.plaphy.2024.108510

- Antoni M Vera-Vives, Giorgio Perin, Tomas Morosinotto. **High-resolution photosynthesis-irradiance curves in microalgae**. *Bioenergetic Communications* 2022.19 (2022). DOI: 10.26124/BEC:2022-0019

- Nicolò Fattore, Simone Savio, Antoni M Vera-Vives, Mariano Battistuzzi, Isabella Moro, Nicoletta La Rocca, Tomas Morosinotto. **Acclimation of photosynthetic apparatus in the mesophilic red alga *Dixoniella giordanoi*.** *Physiologia Plantarum* 173: 805–17 (2021). DOI: 10.1111/ppl.13489

- Marco Mellon, Mattia Storti, Antoni M Vera-Vives, David M Kramer, Alessandro Alboresi, Tomas Morosinotto. **Inactivation of mitochondrial Complex I stimulates chloroplast ATPase in *Physcomitrium patens***. *Plant Physiology* 187: 931–946 (2021). DOI: 10.1093/plphys/kiab276

Presentations

Oral

- "Genetic inactivation of mitochondrial complex IV in *Physcomitrium patens*".
  3rd-6th July 2023 (Marseille, FR)
  Plant Biology Europe (PBE) 2023, organized by the Federation of European Societies of Plant Biology (FESPB)

- "Healthy mitochondria are needed for plants optimal photosynthetic performance: the role of respiration in plant bioenergetics and primary metabolism"
  22nd-24th February 2023 (Bertinoro, IT)
  Workshop on Plant Biology 2023, organized by the Italian Society of Plant Biology (SIBV)

- *"*The role of respiration in cell bioenergetics of photosynthetic organisms*"*
  20th September 2021 (Bologna, IT)
  Photosynthesis Meeting, hosted by Prof. Mirko Zaffagnini

- "Oxygraphy in photosynthetic organisms. Hansatech vs. Oroboros"
  26th February 2021 (Padova, IT)
  Green Seminar, a series of monthly seminars organized by the Department of Biology of the University of Padova.

- "First applications of the NextGen-O2k PhotoBiology Module"
  15th-16th July 2020 (Innsbruck, AT)
  NextGen-O2k Event Photobiology: Algal bioenergetics, organized by the company Oroboros Instruments.

Posters

- *An integrated view of early land plant evolution (EMBO workshop). Bhubaneswar, India.* "Regulation of photosynthesis under fluctuating light conditions in the moss *Physcomitrium patens*". Alboresi A, Beraldo C, Traverso E, Tan S, Vera-Vives AM, Storti M, Morosinotto T.

- *12th International Conference for Plant Mitochondrial Biology (ICPMB), Malmö, Sweden.* "Healthy mitochondria are needed for optimal photosynthetic performance of plants: the role of respiration in plant bioenergetics". Vera-Vives AM, Mellon M, Novél P, Zheng K, Gurrieri L, Sparla F, Schwarzländer M, Alboresi A, Morosinotto T.

- *Bioblast 2022, Inaugural Conference of Bioenergetics Communications. Innsbruck, Austria. "*Consequences of the inactivation of Complex I and Complex IV in the plant model *Physcomitrium patens*". Vera-Vives AM, Mellon M, Novél P, Zheng K, Gurrieri L, Sparla F, Schwarzländer M, Alboresi A, Morosinotto T

Teaching and outreach

Teaching **Università degli Studi di Padova, IT**

- *Tutor Didattico at Department of Chemical Sciences* 2021-2023

  Organization and teaching of a course (18 h) for master students enrolled to the *Master's Degree in Sustainable Chemistry and Technologies for Circular Economy*.

  Main topics: Generalities and properties of biological macromolecules; Cell structure and essentials of cell biology; Introduction to bioenergetics and metabolism; Replication, transcription and translation; Microbiology and virology; Biotechnology.

- *Teaching assistant at Department of Biology* 2021

  Design, prepare and teach practical activities to undergraduate students enrolled in the course "Plant physiology" held by prof. Michela Zottini.

  Main topics: photosynthesis, carbon and nitrogen metabolism, phytohormones.

- *Teaching assistant at Department of Biology* 2021

  Organization of the workshop "Cellular systems for studying animal and vegetal organisms", hosted by the Department of Biology in Padova and targeted to high school students.

  Main topics: Biological models, instruments and techniques used in plant science research.

Tutoring and mentoring **Università degli Studi di Padova, IT**

- *Tutor per l'Inclusione* 2022

  Assist and help students with handicaps to successfully pass their studies.

- *Tutor Informativo at Department of Biology* 2021-2023

  Mentoring Italian and foreign students enrolled on the Master's Degree in Molecular Biology, helping them with both scientific and non-scientific aspects.

- *Scientific mentoring* 2021-2023

  Mentoring and supervise bachelor students, master students or research assistants, through their projects and thesis writing.

Research skills

- Genomic DNA extraction and quantification
- Total RNA extraction and quantification
- Protein extraction and quantification
- PCR and nucleic acid electrophoresis
- Protein electrophoresis in native (BN-PAGE) or denaturing (SDS-PAGE, Urea-PAGE) conditions
- Western blotting
- In-gel biochemical assays
- Spectrophotometric enzymatic assays
- Subcellular fractionation e.g. thylakoid and mitochondria isolation
- Monitoring of fluorescence-based photosynthetic parameters (PAM, DUAL-PAM)
- Quantification of oxygen consumption and evolution on intact plants, plant tissues, microalgal cultures or organelle preparations, e.g. isolated mitochondria (Clark type electrode, Oroboros O2k). Substrate-inhibitor titrations, assay of respiratory pathways capacities
- Monitoring of CO_2 consumption and evolution
- Growth of plants in lab conditions
- General techniques of microbiology
- Propagation of biological material under sterile conditions
- Transformation and mutagenesis of bacteria, microalgae and plants.
- Plasmid cloning and assembly
- Kit-based quantification of elements or compounds in biological or non-biological samples
- Optical, fluorescence and confocal microscopy
- Transmission electron microscopy
- Analysis of omics and multiomics data using open software e.g. MetaboAnalyst, ShinyGO, KEGG, PlantCyc
- General bioinformatics: BLAST, ClustalW, use of JGI genomic databases (e.g. Phytozome, BioMart)
- Computing: SnapGene, ImageJ, Gimp, Origin Pro, SPSS, FigTree

Languages and IT

- **Languages**
  - **Catalan** – Native speaker, certificate C1
  - **Spanish** – Native speaker
  - **Italian** – Proficient level, certificate C1
  - **English** – Advanced level
- **IT**
  - Proficient level of MS Office (Word, Excel, PowerPoint, Access, Publisher)
  - Intermediate level of Python and R languages
  - Experience working under UNIX environments e.g. Linux Ubuntu
  - Good level of image editing and graphical design (Adobe Illustrator, Inkscape, Gimp)
  - Knowledge and experience designing and maintaining webpages and managing social networks