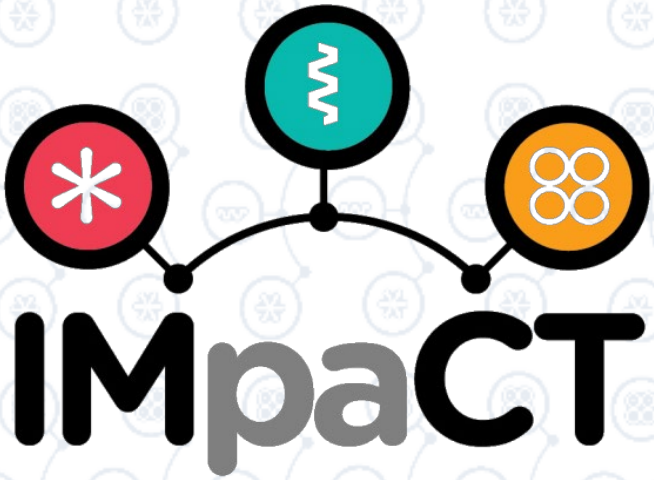
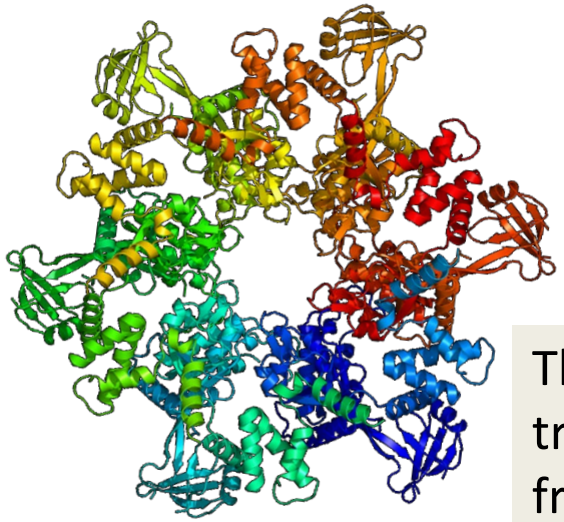


Imaging life from Molecules to cells - building knowledge on Cryo-electron microscopy methodologies at ITQB NOVA

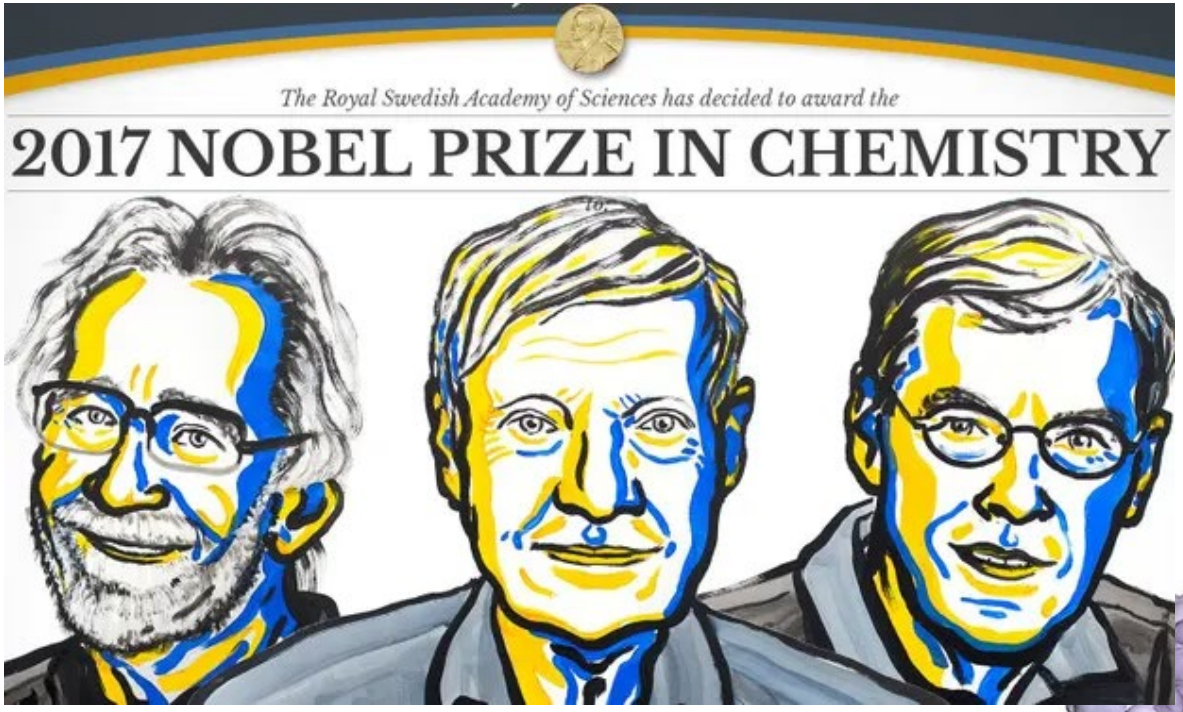
Building knowledge on Cryo-EM

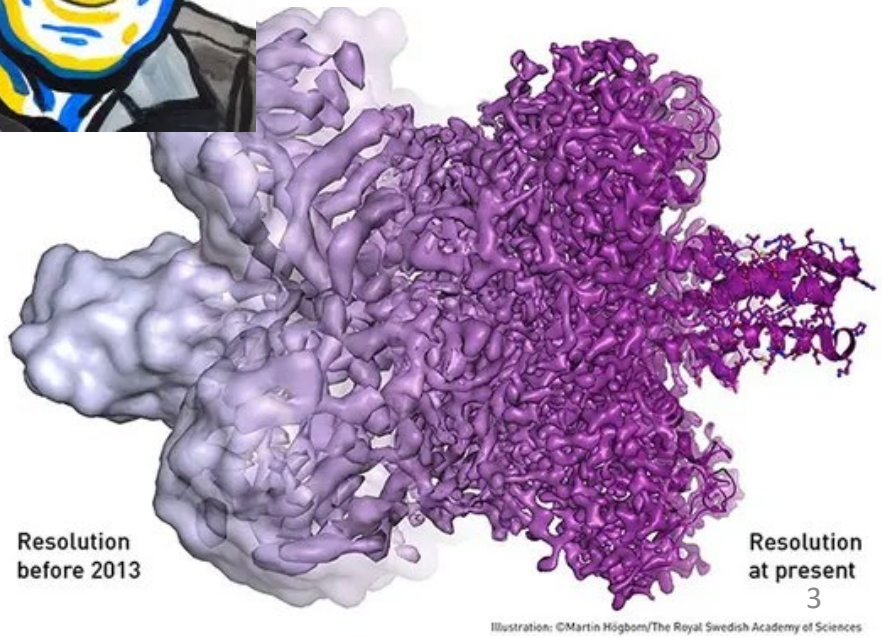


The main goal of the project is to promote knowledge transfer in Cryo-Electron Microscopy methodologies from the partners to ITQB NOVA researchers to acquire expertise in:

- Sample preparation
- Image acquisition to high resolution
- Data processing both for Single Particle Analysis and Cryo-Tomography

Building knowledge on Cryo-EM





Status of CryoEM in Portugal

- There are no high-end CryoEm instruments in Portugal.
- Portugal contributes to EU funds that support European CryoEM infrastructures.
- However, there is presently no mid-range CryoEM instrument in Portugal that can produce the preliminary data required for access to those centres.

In 2017, ITQB NOVA launched a National Initiative to seek funding for the purchase of a modern Cryo-electron microscope.

When such an instrument is obtained, it is essential to have the right know-how so that its potential can be fully exploited.

Therefore, ITQB NOVA researchers approached several leading research groups in Europe and Israel towards the formation of a Consortium to apply for a Twinning Project to bring the necessary know-how to Portugal through ITQB NOVA.

IMpaCT is the successful outcome of these contacts.

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National Advanced Microscopy Network for Health and Life Sciences

Part of the Portuguese National Infrastructure Roadmap since 2019
- under implementation

Phase 1

Braga
Central node (INL)
-microscope, sample preparation, data processing

Braga
University of Minho node
- sample preparation, data processing

Porto
IBMC/I3S/University of Porto node
- sample preparation, data processing

Coimbra
University of Coimbra node
- sample preparation, data processing, data center

Oeiras
Oeiras I node (ITQB NOVA)
- sample preparation, data processing
Oeiras II node (IGC)
- sample preparation, data processing

Phase 2

Covilhã
University of Beira Interior node
- sample preparation, data processing

Lisbon
University of Lisbon node (iMM)
- sample preparation, data processing

Évora
University of Évora node (ICAAM)
- sample preparation, data processing

Faro
University of Algarve node (CCMAR)
- sample preparation, data processing

- Following a successful grant application to the North Regional Development Coordination Commission (CCDR-N) in 2020, a call for tender will be launched soon for the implementation of the Central Node at the International Iberian Nanotechnology Laboratory (INL) with the purchase of a *200 keV Cryo-TEM.*

- The implementation of the Phase 1 and Phase 2 nodes will be done as more funding opportunities emerge.

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CRYO EM PT

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Weizmann Institute of Science

Building knowledge on Cryo-EM

IMpaCT
IMAGING LIFE FROM MOLECULES TO CELLS

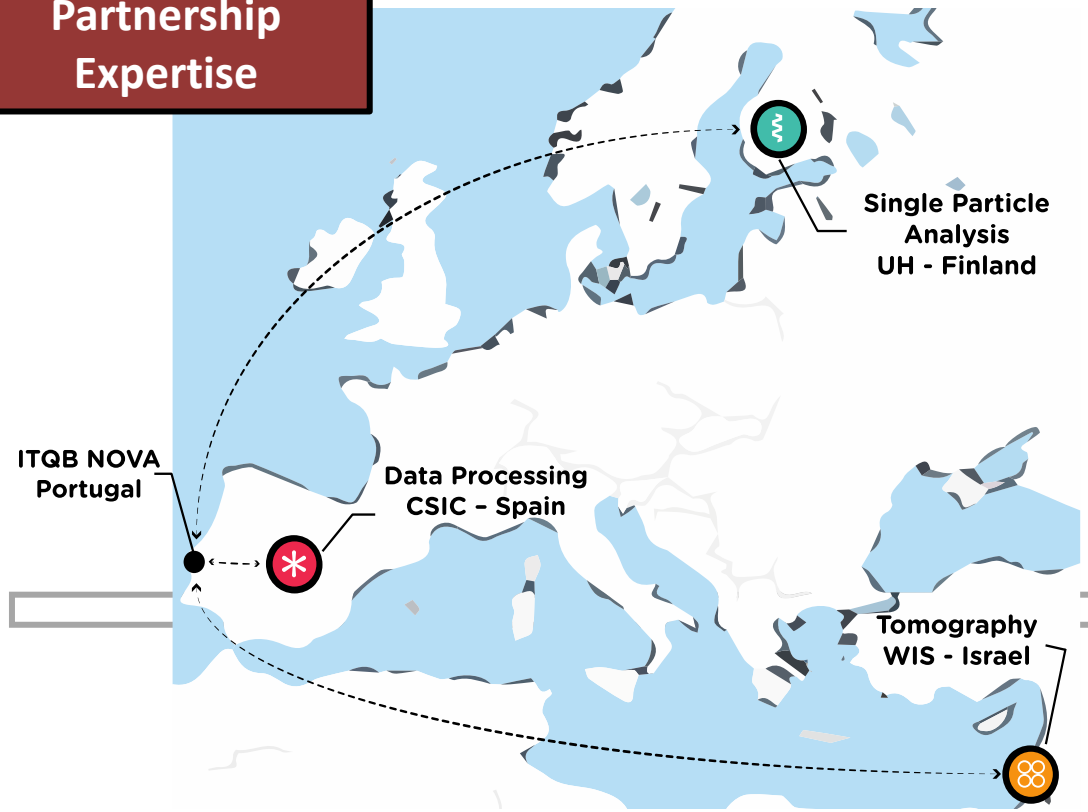
Scientific AXES

Macromolecular Complexes

Cellular Substructures

CryoEM Knowledge

Partnership Expertise



CAREER DEVELOPMENT

DISSEMINATION & OUTREACH

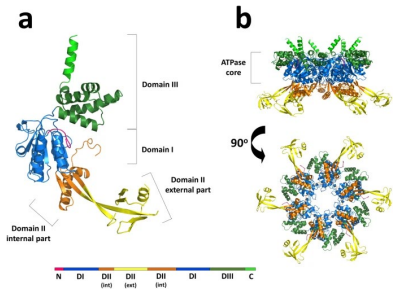
TRAINING

RESEARCH VISITS

Coordinators

Pedro M. Matias

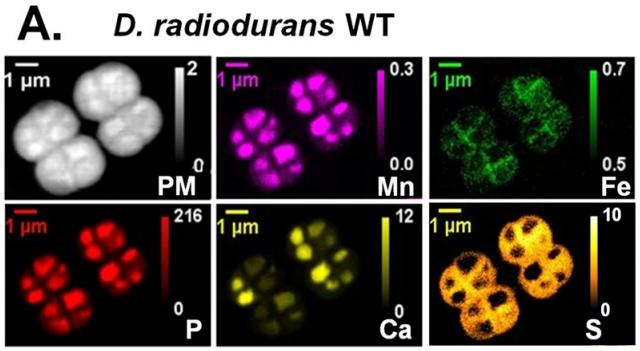
X-ray crystallography of biological macromolecules with emphasis on drug targets and industrial applications.



Silva, S.T.N., et al. X-ray structure of full-length human RuvB-Like 2 – mechanistic insights into coupling between ATP binding and mechanical action. Sci Rep 8, 13726 (2018).

Celia V. Romão

Oxidative stress in prokaryotes, structure and function of metalloproteins Dps and ferritin. Synchrotron-based X-ray fluorescence for elemental mapping.

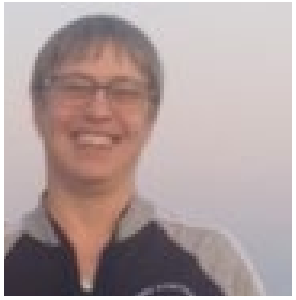


Santos, S.P., et al. The interplay between Mn and Fe in Deinococcus radiodurans triggers cellular protection during paraquat-induced oxidative stress. Sci Rep 9, 17217 (2019).

Our partners

Spanish National Research Council (CSIC)
National Centre for Biotechnology (CNB)-SPAIN
Jose Maria Carazo Garcia, Carlos Oscar Sanchez, Marta Martinez

Development of new image processing methods for Electron Microscopy, having pioneered some of the most widely used approaches in the Cryo-EM field.



University of Helsinki (UH)– FINLAND
Sarah Butcher, Pasi Laurinmäki, Lauri Pulkkinen,
Benita Löflund, Justin Flatt, Ausra Domanska

Specialized in the characterisation of macromolecular complexes and nanoparticles using single particle analysis Cryo-EM.

Weizmann Institute of Science (WIS) – ISRAEL
Michael Elbaum, **Sharon Wolf,**
Nadav Elad, Katya Rechav, Tali Dadosh

Are considered a landmark for cryo-electron tomography (CET), a method used for probing the 3D structure of vitrified, intact cells.

Our main tasks

TRAINING

- Workshop in Data Processing, Single Particle Sample Preparation, and Cryo-Electron Tomography

RESEARCH VISITS

- Early career research exchange visits from ITQB NOVA to the Partners
- Experts visits to ITQB NOVA
- Supporting staff visit from ITQB NOVA to the Partners' offices

CAREER DEVELOPMENT

- Career Development short-courses in scientific writing, communication and tech transfer

DISSEMINATION & OUTREACH

- Seminars with International experts
- Mini-symposium on Pharmaceutical Cryo-EM applications
- Outreach activities to scientific and lay audiences
- Participation at scientific meetings

Our incentives as Israelis

TRAINING

- Participation in training sessions of other partners
- Widening perspectives at the state of the art
- Improvement of our own training protocol & development of a workshop

RESEARCH VISITS

- Cross-fertilization on projects of common interest at ITQB
- Generation of new projects with the other partners
- Opportunities to promote our original developments at early stage

CAREER DEVELOPMENT

- Very useful courses for students, e.g., scientific writing
- International exposure and networking

DISSEMINATION & OUTREACH

- Seminars with International experts
- Mini-symposium on Pharmaceutical Cryo-EM applications
- Outreach activities to scientific and lay audiences
- Participation at scientific meetings

Project Consortium team at the Kick-off meeting

Our team members at the Kick-off meeting

IMpaCT
IMAGING LIFE FROM MOLECULES TO CELLS

Funding Acknowlegement:

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European Commission

Horizon 2020
European Union funding
for Research & Innovation