

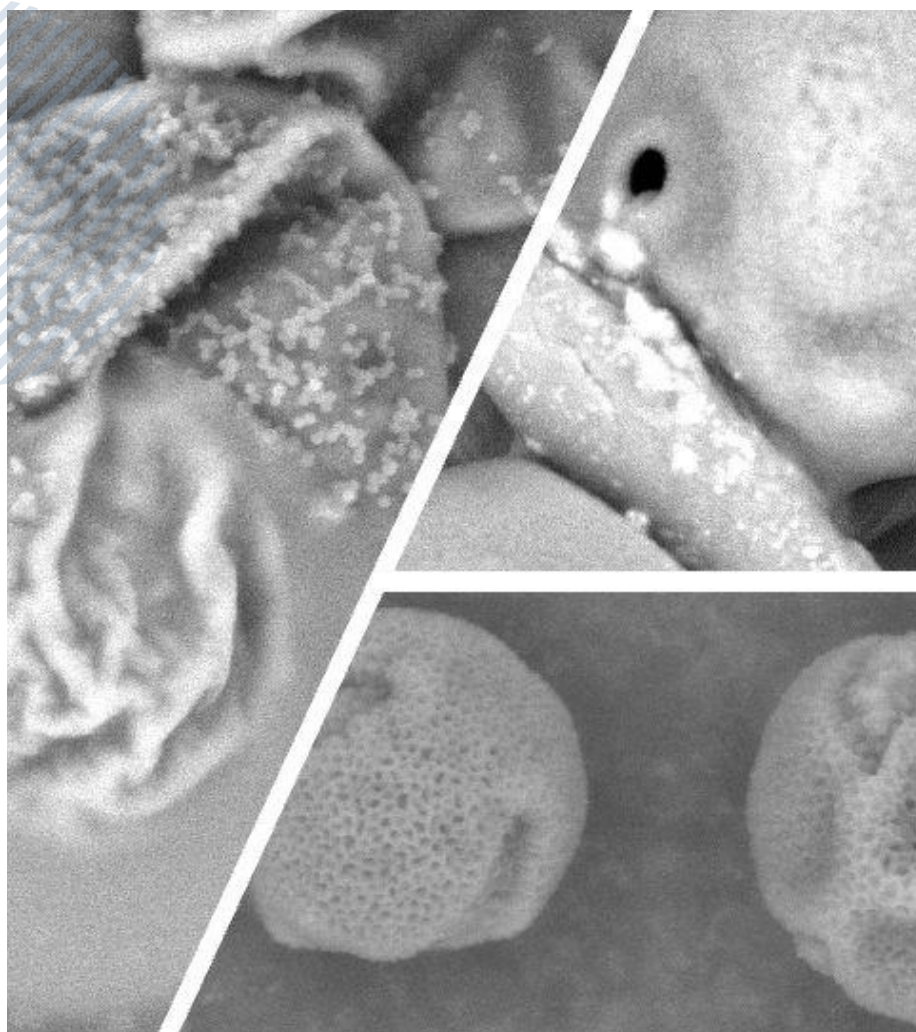
NEWSLETTER

SOCIEDADE PORTUGUESA DE BIOQUÍMICA



September 2024

Edition 4



Pollen grains under Scanning Electron Microscope

Ana Catarina Galveias
University of Évora

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4th Edition

In this Edition:

The fourth issue of the SPB Newsletter highlights notable achievements of SPB members at the FEBS Congress, including awards received and the election of three members to FEBS Committees.

Manuel Santos, from the Multidisciplinary Institute of Ageing (MIA) in Coimbra, shares insights into his research, academic journey, the challenges in founding iBiMED and MIA, and his contributions to SPB and other scientific societies.

Additionally, Isabel Pereira-Castro and Alexandra Moreira from the University of Porto focuses on mRNA research and vaccine development.

The newsletter also features upcoming events and opportunities, including the SPB meeting.

We look forward to seeing you in Aveiro!



Expression pattern of the smad2 gene in the early stages of Gallus gallus lung development.

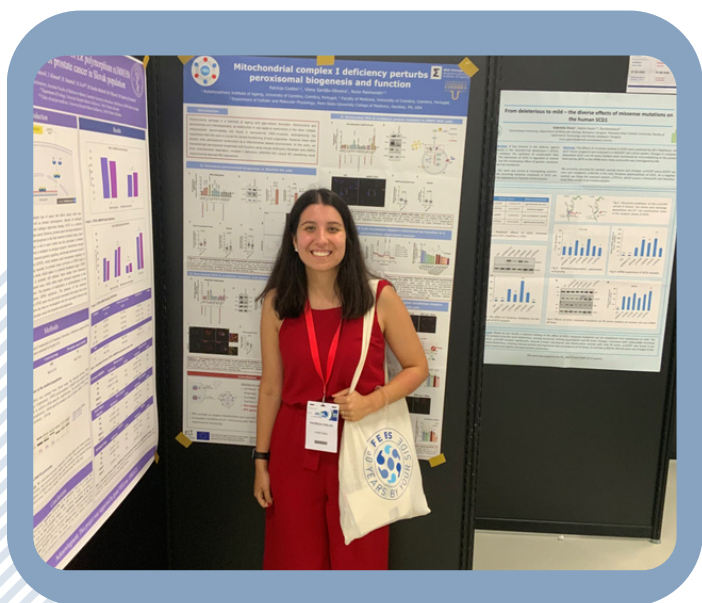
The SPB Directive Committee

Daniela Costa
University of Minho



Awards & Distinctions

Patrícia Coelho, a PhD student at the University of Coimbra, received a **FEBS Open Bio Poster Prize** at the 23rd FEBS Young Scientists Forum, in Pavia, Italy (June 26th-29th, 2024), and a **FEBS Letter Poster Daily Prize** at the 48th FEBS Congress, in Milan, Italy (June 29th - July 3rd, 2024), for her work titled "Mitochondrial complex I deficiency perturbs peroxisomal biogenesis and function".



3 SPB members were elected member of FEBS Committees:

Carlos Farinha (Faculty of Sciences, University of Lisbon) - Excellence awards and fellowships Committee - Molecular Medicine.

Salomé Veiga (School of Medicine, University of Lisbon) - Excellence awards and fellowships Committee - host-pathogen interactions.

Margarida Gama Carvalho (Faculty of Sciences, University of Lisbon) - FEBS Working group - Science and Society.

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Brains, like hearts, go where they are appreciated.

Robert McNamara”



Interview

Manuel Santos

Margarida Fardilha (University of Aveiro) talked with Manuel Santos, Director of the Multidisciplinary Institute of Ageing (MIA), University of Coimbra.



In brief, can you tell us what are your research interests and what are the most important achievements in your scientific career?

I am interested in ribosome translational accuracy, specifically whether all mRNAs are translated with the same accuracy.

Key questions include: Does the ribosome translate all mRNAs with the same accuracy? Do mRNAs have specific codons or codon regions where the ribosome tends to misincorporate amino acids? What genetic, biochemical, physiological, and environmental variables influence mRNA translational accuracy? Can translational accuracy be programmed or modulated? Does the regulation of translational accuracy play any functional or evolutionary role?

My significant discovery was that codon translational accuracy can be programmed to expand proteome diversity. In 1995, my postdoctoral research in UK uncovered ambiguous decoding of the CUG codon in *Candida albicans*, where leucine and serine were incorporated at CUG sites, leading to phenotypic diversity.

This led to the concept of adaptive translation, where mistranslation can diversify the proteome and enhance adaptation. Our studies later showed that codon identity can be altered and mistranslation in cancer cells accelerates drug resistance, suggesting that protein diversification through mistranslation can drive adaptation and evolution.

You created iBiMED some years ago and now you are the coordinator of MIA? Why do you like to step in this type of challenges? What are your main goals as the coordinator of MIA?

My passion is laboratory science. The creation of the Aveiro Institute of Biomedicine (iBiMED) arose from the necessity to establish suitable laboratory conditions for biomedical research in Aveiro. In 2014, the local biomedical community faced challenges due to inadequate labs and equipment, with researchers scattered across buildings dedicated to other fields like environmental biology and chemistry.

Professor Manuel Assunção invited me to restructure the Health Sciences Programme, leading to the creation of the Medical Sciences Department, iBiMED, and an Academic Clinical Centre with local hospitals. Despite a change in leadership, the new Rector Paulo Jorge Ferreira, and Vice-Rector Artur Silva continued to support the vision, enabling the consolidation of biomedical sciences in Aveiro.

By 2016, research conditions had greatly improved, and by 2021, we established a biobank to support translational research with the Egas Moniz Academic Clinical Centre.

Creating iBiMED was a demanding period that limited my personal research, but I viewed it as a contribution to building Aveiro's biomedical community. I also had the privilege of leading the National Consortium of Genome Sequencing (GenomePT).

With Gabriela Moura's collaboration and funding, we established a genome and transcriptome sequencing lab at iBiMED, serving both local and national research communities.

Despite the hard work and limited research time, creating iBiMED, DCM, and laying the foundation for the Egas Moniz Academic Clinical Centre was highly rewarding. We overcame lab challenges, acquired scientific instruments, and created many jobs for young scientists.

When I left Aveiro in 2022, I felt our goals were achieved, and the biomedical community could look to the future with confidence.

The opportunity to lead MIA-Portugal was unexpected. In 2022, I received two invitations from European institutes to apply for the position of Scientific Director. Feeling that my work in Aveiro was complete, I was considering a new challenge to conclude my career. The MIA-Portugal opportunity emerged during this period, and I was drawn to the strong institutional commitment in Coimbra to create an institute of excellence dedicated to Aging Biology.

The freedom to hire the best scientists globally and bring them to Coimbra was particularly appealing.

MIA-Portugal is a fantastic project located on a Health Campus alongside key research institutes, a university hospital, and a biobank, forming a robust research ecosystem. My goal is to elevate existing research dynamics to a new level, transforming Coimbra into a major international centre for research on aging. We aim to explore crucial questions about aging, from its pace and reversibility to its link with chronic diseases.

Though much is still unknown, the potential for young researchers to advance their careers in this dynamic environment is immense.

What do you see as the main challenges in the research culture/landscape for bioscience researchers/educators in the coming years?

Despite significant investment in people and training over the past decade, funding for research projects, scientific instruments, and lab upgrades has been inadequate. Maintaining current funding levels is unsustainable. We need a national consensus to increase science funding to about 3% of GDP and stabilize the system with annual project funding calls of 20-25% and regular calls for maintenance of scientific equipment. Without these measures, we risk losing competitiveness and driving young scientists away. With decreasing European structural funds, a national plan to fund science through the national budget is crucial to prevent the collapse of our scientific system. Funding constraints often push young researchers to diversify their work to secure funding, but to truly enjoy science, one needs to feel that the work we do is important and that we are pushing the frontiers of knowledge.

A major challenge is staying focused on motivating questions, as scattered interests can lead to poor science, decreased competitiveness, and diminished enthusiasm. What seems advantageous short-term can be problematic long-term.

The rapidly evolving biosciences landscape requires young researchers to receive multidisciplinary training in biology, statistics, computational biology, data science, and artificial intelligence from early on in their education.

As biosciences increasingly intersect with data science, expertise in both biological and computational fields is crucial. Currently, there is a shortage of specialists skilled in both areas. Preparing future researchers with a blend of lab techniques and computational skills is essential for the interdisciplinary future of biological sciences.

Biosciences, like other sciences, are undergoing a transformation due to the internet, social media, and artificial intelligence, which are reshaping teaching, learning, and knowledge production.

To adapt, universities should pilot new teaching methods and scientific approaches, including AI-driven research. Establishing pilot laboratories and creating multidisciplinary teams that work together daily on concrete questions is essential.

Current multidisciplinary projects often involve temporary collaboration, but true innovation requires integrated teams with diverse expertise working together consistently.

Departments should have the freedom to hire and promote researchers from various fields to enhance the quality of scientific research.

What about your contributions to scientific societies, namely to SPB?

I have been involved with several Portuguese scientific societies, including those for Microbiology, Biochemistry, Genetics, and Human Genetics. Currently, I am active in the Genetics and Human Genetics societies, as our research aligns with their missions.

My key contributions include serving on management boards and organizing scientific meetings, such as the XV Biochemistry Society Meeting (2006), the International tRNA Meeting (2010), and events for the Genetics Society.

What SPB opportunities would you recommend to scientists at your or an earlier career stage?

SPB meetings provide a valuable platform for young researchers to showcase their work, establish collaborations, and network. Strong ties with FEBS, PABMB, and IUBMB offer additional opportunities for global engagement.

FEBS meetings, in particular, are prestigious and widely attended. SPB's thematic groups also organize specialized events, fostering collaborations and enriching the research environment.

News & Views

RNA on the spotlight: new tricks of an old molecule

Isabel Pereira-Castro, i3S - Institute for Research and Innovation in Health

Alexandra Moreira, ICBAS - Abel Salazar Biomedical Sciences Institute and i3S - Institute for Research and Innovation in Health; University of Porto

Messenger RNA (mRNA) was found more than 60 years ago and its discovery marked a crucial milestone in Molecular Biology. Decades of fundamental research on this molecule by many outstanding scientists, including several Nobel laureates, have recently allowed the development of the first approved mRNA-based vaccine - against COVID-19 - finally bringing the mRNA molecule to the public spotlight.

The development of the mRNA vaccine against COVID-19 was remarkably swift. While the society hailed the speed of this process as a ground breaking scientific achievement, scientists were not surprised. They knew that this was possible due to a comprehensive understanding of the mRNA mode of work, which has been achieved by knowledge obtained by fundamental research that enabled the pharmaceutical industry to quickly harness mRNA as a therapeutic tool.

One of the advantages of mRNA vaccines over conventional vaccine technology, is that they can be rapidly tailored to different diseases by changing the mRNA to be immunized. Additionally, mRNA vaccines allow multiplexing of different antigenic molecules, holding great promise to efficiently deliver multiple antigens with a single immunization.

Yet, the mRNA to be used as a vaccine must be carefully designed to include the antigen's genetic code, flanked by important untranslated regions (UTRs).

These regions contain regulatory sequences with a vital role in enhancing the stability and translation efficiency of the mRNA, such as [iPLUS](#). The mRNA is further refined with a 5' cap modification and a 3' polyadenine (polyA) tail, which ensure the mRNA's effectiveness.

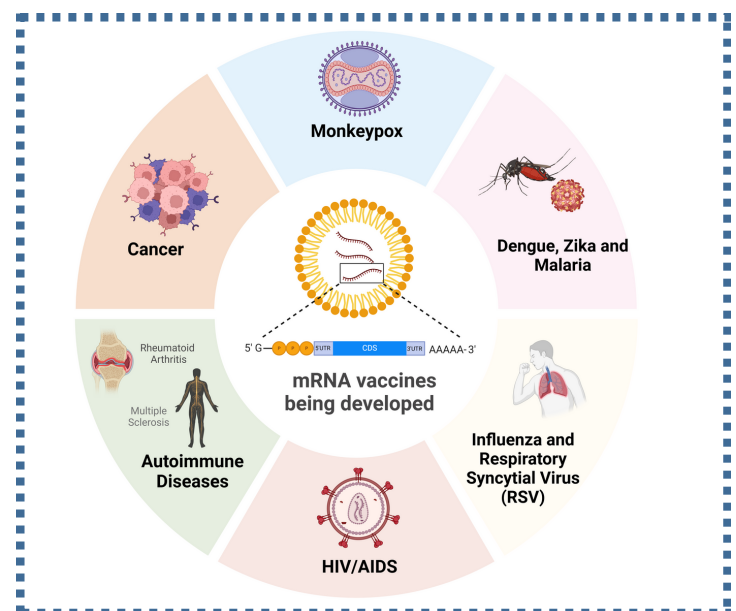


Figure 1: mRNA vaccines currently under development will provide protection against a variety of life-threatening diseases, including cancer, infectious and autoimmune diseases. The mRNA contained in these vaccines have five structural elements: a 5' cap, a coding sequence (CDS), flanking 5' and 3' untranslated regions (UTR) and a poly(A) tail, and is encapsulated into a lipid nanoparticle for delivery.

Created with BioRender.com

The success of mRNA vaccines against COVID-19 has prompted research into their potential applications beyond infectious diseases. Researchers are exploring RNA vaccines for other viral infections, such as influenza, Zika, dengue, malaria and cytomegalovirus. Moreover, there is an increasing interest in using mRNA technology for therapeutic purposes, including cancer vaccines, which could train the immune system to target and destroy cancer cells.

Recent cutting-edge advances in the field of RNA vaccine technology include the use of other RNA molecules, such as self-amplifying RNA (saRNA) and circular RNA (circRNA), than mRNA. saRNA vaccines are genetically engineered replicons derived from self-replicating single-stranded RNA viruses that allow mRNA replication within the host cells, amplifying the amount of antigen produced from a single dose.

Although found many years ago, there has been a reviving interest in circular RNA (circRNA), which has a unique covalently-closed circular structure that lacks the typical 5'cap and 3' polyA tail in mRNA. Because it is circular, it has an increased stability and resistance to degradation by exonucleases in comparison to mRNA, which may enable circRNA vaccine candidates to be more stable and durable than current linear-based mRNA candidates.

Indeed, circRNA vaccines are currently being developed for infectious diseases and show great promise against monkeypox virus.

As the scientific community continues to explore the many facets of RNA, this fascinating molecule holds great promise to be used as a therapeutic tool in the near future, to prevent and treat a wide range of diseases.

Calendar & Events

01/10

IUBMB Wood-Whelan Research Fellowships

[LINK](#)

Until
15/10

SPB action grants

SPB accepts applications for grants for the organization of students Meetings, Workshops, Congresses or SPB Conferences

[LINK](#)

18 - 19/10

ATHENS: Approaches in Transformative and Holistic Education for Novel Science

Athens, Greece

[LINK](#)

24 - 26/10

XXII SPB National Congress of Biochemistry

Aveiro, Portugal

[LINK](#)

Until
02/12

IUBMB Focused Meetings

IUBMB accepts applications for the organization of a IUBMB Focused Meeting

[LINK](#)

04-06/12

FEBS-IUBMB-ENABLE Conference

Singapore, Asia

[LINK](#)

26-28/02
2025

XIX Iberian Peptides Meeting (EPI)

Santiago de Compostela, Spain

[LINK](#)