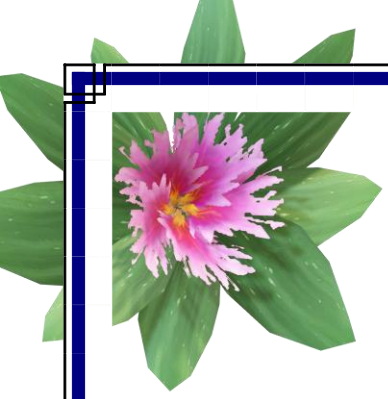

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Iran Society of Biophysical Chemistry

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The 18th National and 3rd International Conference on Biophysical Chemistry

University of Hormozgan, BandarAbbas, Iran

December 25 - 26, 2024

The 18th National Conference and 3rd International Conference on Biophysical Chemistry was held on December 25–26, 2024, hosted by the University of Hormozgan in the coastal city of Bandar Abbas, near the Persian Gulf, Iran. This event brought together numerous professors, students, and researchers in the fields of Biophysics, Biochemistry, Biotechnology, Bioinformatics, and related disciplines, where they presented their research achievements through lectures and posters. The president and board of directors of the University of Hormozgan, along with several provincial officials, attended the opening session and delivered speeches. During this session, Professor Dr. Moosavi-Movahedi, the President of the Iran Society of Biophysical Chemistry (ISOBC), proposed the establishment of a scientific chair on marine Biochemistry and Biophysics which was well received and met strong support by provincial officials, researchers and audience.

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A virtual exhibition of the conference's poster presentations was also featured, offering a dynamic and interactive experience. The exhibition remains accessible via the following link: https://bioch.hormozgan.ac.ir/majazi

Closing Ceremony & Recognitions:

At the closing ceremony, five outstanding researchers from various universities were honored for their exceptional poster presentations, with financial support from the ISOBC sponsors. Additionally, the Iran Society of Biophysical Chemistry Award was presented to a postdoctoral researcher at the University of Hormozgan.

One of the most impactful aspects of this conference was the recognition of five talented pupils from underprivileged areas of Hormozgan Province. These pupils were honored with a plaque of appreciation and a cash award, sponsored by the ISOBC sponsors. This initiative brought joy and excitement to both the pupils and their families, marking a meaningful and innovative moment in the conference.

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Key Achievements:

This conference provided a valuable platform for scientific exchange, discussion, and collaboration among faculty members, students, and researchers from various universities. It also contributed to the advancement of Biophysical Chemistry and helped to promote scientific growth within Hormozgan province and Persian Gulf area.

Dolphins of the Persian Gulf of Iran

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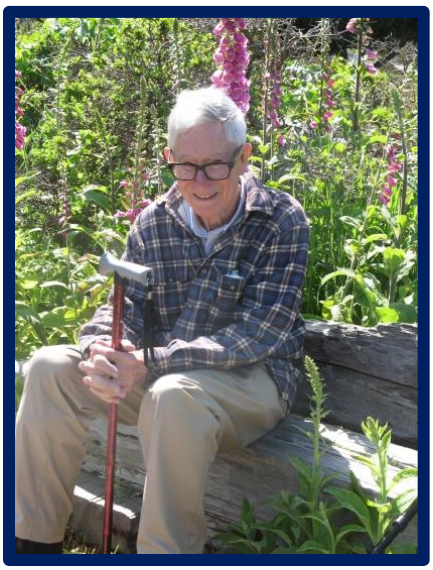
Obituary

Robert L. Baldwin (1927-2021)

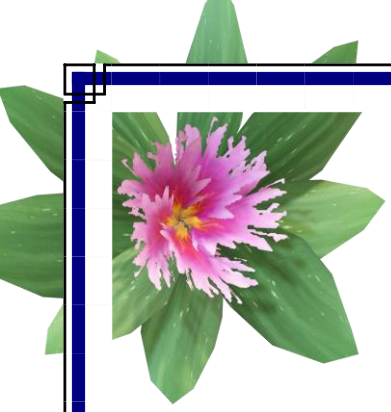
Prepared by M.H. Alizadeh

Ph.D. student in Biochemistry
Institute of Biochemistry and Biophysics (IBB)
University of Tehran



Robert Lesh “Buzz” Baldwin, an eminent biochemist and a pioneer in the field of protein folding, passed away on March 6, 2021, at the age of 93, at his home in Los Trancos Woods, California. Baldwin, an emeritus professor at Stanford University School of Medicine, dedicated his career to unraveling the mysteries of how proteins, the workhorses of biological systems, fold into their functional three-dimensional shapes. His groundbreaking discoveries significantly advanced molecular biology, influencing countless scientific disciplines and medical innovations.

Baldwin was born on September 30, 1927, in Madison, Wisconsin. He earned a Bachelor of Chemistry from the University of Wisconsin in 1950 and went on to the University of Oxford as a Rhodes Scholar, where he completed PhD in Biochemistry in 1954. After securing initial academic and research positions at the University of Wisconsin, he was invited by Arthur Kornberg to join Stanford’s newly established Department of Biochemistry in 1959, beginning the start of a transformative period in his scientific journey.



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Baldwin's research was instrumental in elucidating how proteins fold rapidly and accurately from linear chains of amino acids into intricate three-dimensional structures, an essential process for their biological function. His rigorous experiments revealed the existence of intermediate folding states, challenging earlier hypotheses of random trial-and-error folding mechanisms. This insight paved the way for deeper exploration of protein structure, with significant implications for drug development and our understanding of molecular diseases.

At Stanford, Baldwin ascended to the rank of full professor by 1964 and chaired the Department of Biochemistry from 1989 to 1994. He became an emeritus professor in 1998 but continued to contribute to scientific discussions and research for several years. Known for his intellectual rigor and generosity as a mentor, Baldwin trained numerous students who themselves became influential scientists, fostering a legacy of excellence and curiosity in biochemistry.

Baldwin's contributions to science earned him numerous accolades, including election to the National Academy of Sciences and the American Academy of Arts and Sciences. He received prestigious awards such as the Stein & Moore Award from the Protein Society and the Founder's Award from the Biophysical Society, recognizing his profound impact on molecular biology and biochemistry. His loss is deeply felt by scientific community.

In 2024, we had the privilege of studying one of Dr. Baldwin's seminal papers in our "Physical Chemistry of Proteins" course at the Institute of Biochemistry and Biophysics, University of Tehran. This experience underscored the enduring relevance of his groundbreaking insights into protein folding, which continue to shape our understanding of the molecular foundations of life.

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Artificial Intelligence in Biophysics

Artificial Intelligence (AI) is transforming biophysics by providing advanced tools to understand complex biological systems. AI enhances protein structure prediction, exemplified by models like AlphaFold, which reduce reliance on traditional experimental methods. AI also aids in molecular dynamics simulations to study protein behavior, aiding research into misfolding diseases such as Alzheimer's.

In biophysical imaging, AI algorithms improve image resolution, segmentation, and real-time analysis, enabling deeper insights into biomolecular interactions and cellular processes. Additionally, AI optimizes nanoparticle design for drug delivery, predicting their interactions with biomolecules and improving biocompatibility.

AI also plays a role in biomechanics, analyzing cellular responses to mechanical forces and predicting molecular diffusion. In drug discovery, AI speeds up screening processes and enables personalized medicine by tailoring treatments based on individual biological data. As AI models advance, their integration with experimental biophysics will continue to drive groundbreaking discoveries in health and medicine.

Artificial Intelligence is reshaping the landscape of biophysics, enhancing our ability to explore the complexities of biological systems. From protein folding and LLPS to nanoparticle interactions and drug discovery, AI-powered approaches are accelerating progress in biomedical research. By integrating AI with experimental biophysics, researchers can tackle pressing challenges in human health, develop innovative therapies, and deepen our understanding of the fundamental principles governing life at the molecular level.

The future of biophysics lies in harnessing the full potential of AI, driving scientific breakthroughs that will redefine our approach to health, disease, and biomolecular engineering.

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Interactomics: Mapping the Web of Life

Prepared by M.H. Alizadeh

Ph.D. student in Biochemistry
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University of Tehran

Interactomics studies molecular interactions within biological systems, focusing on the intricate networks of proteins, RNAs, and other biomolecules. Central to this field are protein-protein interactions (PPIs), which regulate cellular processes like signal transduction and metabolism. Recent advancements have expanded interactomics to include RNA-RNA interactions, highlighting RNA's regulatory and scaffolding roles in molecular networks. This systems-level approach offers insights into cellular function by unraveling the complex interplay of molecular interactions.

Emerging in the late 1990s with high-throughput technologies, interactomics enables mapping the "interactome," the complete set of molecular interactions within a cell. Visualized as networks where nodes represent biomolecules and edges denote interactions, interactomes reveal hubs—nodes with numerous connections—crucial for network stability. Disruption of these hubs often results in severe cellular dysfunction, as seen in many diseases.

Interactomics operates on multiple scales. Small-scale studies focus on specific pathways, while large-scale approaches, using techniques like cross-linking mass spectrometry (XL-MS), map extensive interaction networks. Dynamic interactomics tracks changes in interactions across spatial and temporal dimensions, offering insights into network adaptability during environmental or developmental shifts.

Applications are vast, from identifying disease biomarkers to predicting biomolecule functions. Challenges like capturing context-specific interactions and addressing false positives remain, but advancements in artificial intelligence (AI) offer promising solutions. AI-driven tools can refine network models and address spatiotemporal variability, paving the way for more precise insights into molecular networks.

In summary, interactomics is a cornerstone of systems biology, illuminating the molecular interactions driving life. With evolving technologies, it holds transformative potential for understanding health, disease, and evolution.

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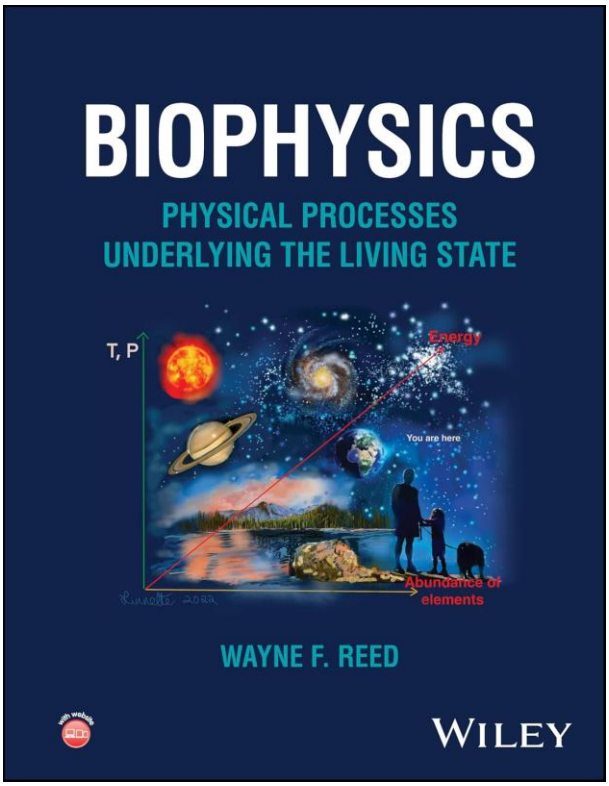
New books

1. **Biophysics: Physical Processes Underlying the Living State**



Publisher: Wiley; 1st edition (March 5, 2025)
publication date: March 5, 2025
Language: English
Print length: 528 pages
ISBN-10: 1119696402
ISBN-13: 978-1119696407

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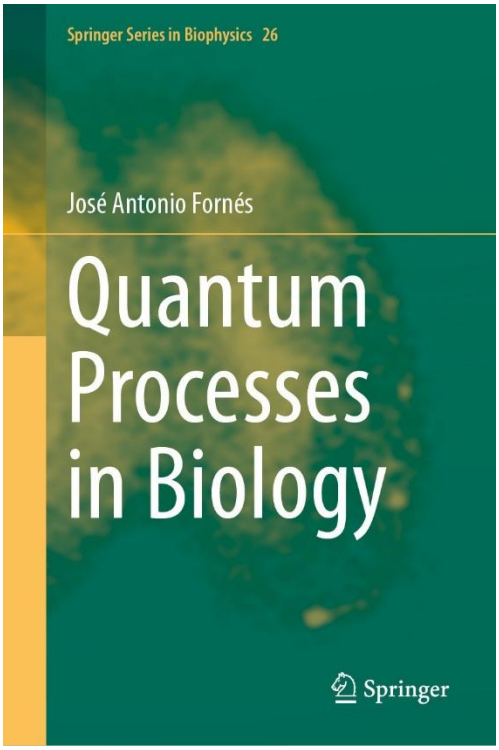
2. Quantum Processes in Biology



Publisher: Springer Cham
Publication date: 06 June 2024
Language: English
Hardcover ISBN: 978-3-031-58077-2

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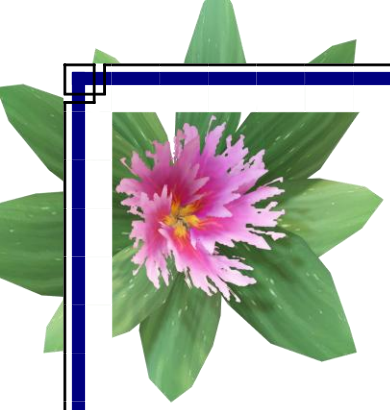
New conferences



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Biophysics Fellows Research Conference at the NIH

The Biophysics Fellows Research Conference at the NIH (BFRC-NIH) will be held at the NIH Bethesda Campus on **August 28 and 29, 2025**.

https://www.niddk.nih.gov/research-funding/at-niddk/training-employment/graduate-phd-postdoctoral/biophysics-fellows-research-conference

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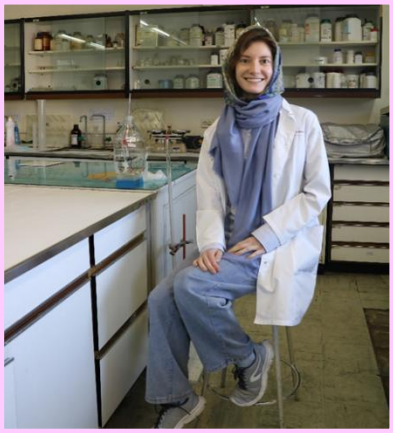
International Collaboration in Scientific Research: Insights from Dr. Maria Medvedova



Dr. Maria Medvedova has recently concluded her visit at the Institute of Biochemistry and Biophysics (IBB), University of Tehran, a position made possible through a collaborative agreement with the A.N. Belozersky Institute of Physico-Chemical Biology at Moscow State University. In the following interview, she offers valuable insights and reflections on her experiences at IBB, highlighting the significance of international collaboration in advancing scientific research.

1. Which lab did you work in, and how did you find the overall atmosphere of that lab?

I worked in the Protein Chemistry Laboratory at IBB. I really enjoyed the people, the atmosphere, and the working process here. Everyone was welcoming and supportive, which made my experience even more enriching.

2. Can you describe the research project you have been involved in during your time here?

I worked on introducing a mutation that changes leucine at position 137 to methionine in AlphaB-crystallin to analyze its structural and functional changes and oligomer formation. AlphaB-crystallin is a small heat shock protein with diverse cellular functions. It acts as a molecular chaperone, selectively targeting intermediate filament proteins during thermal stress in lens cells. It plays crucial roles in various tissues, including the eye lens, heart, and brain. By studying this mutation, we aim to better understand the molecular mechanisms behind protein misfolding disorders and explore potential therapeutic strategies.

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3. What techniques or methodologies have you learned or applied in your research at IBB?

I had the opportunity to try molecular dynamics and site-directed mutagenesis for the first time.

4. How does your current research align with your previous work or academic background?

Before coming to IBB, I worked with alpha-synuclein and prion proteins in Moscow. Both proteins are known for their ability to form pathological aggregates, which contribute to neurodegenerative diseases such as Parkinson's and prion disorders.

Given that AlphaB-crystallin functions as a molecular chaperone, it is particularly relevant in this context. Chaperones can prevent or mitigate protein aggregation, making them potential therapeutic targets for protein misfolding disorders.

5. What has been your experience living in Iran, and how does it differ from your home country?

There are quite a lot of differences! While living here, I kept a notebook to write down everything that was new or unusual to me. Here are a few things that stood out:

1. The weekend in Iran is on Fridays, while in Russia, it's on Sundays.
2. Before coming here, I thought only Russians used samovars, but they are even more popular in Iran!
3. One of the most surprising things for me was discovering sweet lemons! In Russia, we only have sour lemons.

6. Have you encountered any cultural differences in the academic or research environment? If so, how have you adapted?

One interesting cultural difference I noticed is the tradition of letting others enter a room before you. Sometimes, my colleagues and I would get stuck at the door because we were all trying to be polite! It's a lovely tradition that I wasn't familiar with before, but I quickly adapted to it

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7. What have you enjoyed most about the local culture during your stay?

The kindness and openness of the people have been the most remarkable aspect of my stay. I was also deeply impressed by the beauty of mosques and palaces. The architecture, colors, and intricate details are truly breathtaking.

8. How has your collaboration with local researchers influenced your work?

I hope that our work together will lead to a publication. The collaboration has been productive, and I look forward to seeing the results of our joint efforts.

9. What have you learned from your colleagues at IBB?

Apart from learning new lab techniques like site-directed mutagenesis, I found it fascinating that even for the same methods, our protocols differ slightly. Beyond the scientific aspect, my Iranian colleagues also taught me to appreciate the rain. Whenever it rained in Tehran, everyone would go outside to enjoy it, which was a beautiful perspective I hadn't seen before.

10. What challenges have you faced during your research or adjustment to the new environment?

During my first few days, it was a bit difficult since only a few people in the dormitory spoke English. However, my labmates were very helpful, and overall, I had a wonderful time adjusting to life here.

11. How have you overcome any language barriers or communication challenges?

Sometimes, both my Iranian colleagues and I struggled to find the right English words. But after a while, we discovered that Russian and Farsi share many common words, so we often used our native languages to help bridge the gap.

12. How has your experience here influenced your future research goals or career plans?

I hope that my time here will strengthen our collaboration and open doors for future joint research projects.

13. Would you consider returning to Iran for future research collaborations? Why or why not?

I would definitely consider returning to Iran for future research collaborations. After working here for a month, I can see how valuable and productive international cooperation is, and I would love to continue contributing to such projects.

14. What are your overall impressions of IBB and the lab you worked in?

The University of Tehran campus is beautiful, and sometimes, we even went up to the roof of IBB to enjoy the view. Over the past month, I have grown close to the lab and my labmates. I can already tell that I will miss both the people and the place.

15. What advice would you give to other researchers considering a similar opportunity?

Be open to new experiences! Also, learning numbers and a few phrases in Farsi can be very helpful and besides, Farsi is an incredibly beautiful language.

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Spring 1404 aligns with Ramadan, a time of inner purification, creating a unique connection between nature's renewal and human spiritual growth. As nature blossoms, Ramadan offers a chance for fasting, reflection, and refinement. This synchrony between biological cycles and spiritual periods mirrors the harmony found in science and mysticism, illustrating the balance between body and mind, nature and intellect. Like spring nurturing new growth, Ramadan clears the mind and fosters fresh ideas. This period reminds us that true evolution happens not only through technological progress but also through a deepening understanding of humanity's place in the universe.

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