



Biophysical Reviews: a Q1 ranked journal in biophysics and structural biology

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Abstract

This Editorial for *Biophysical Reviews* (Volume 12, Issue 5) begins with a description of the two feature articles. The first being the latest in the “Meet the Editors Series” describing Rosangela Itri—the *Biophysical Reviews* Executive Editor responsible for the South American region. The second feature article is by Alexandra Zidovska, the inaugural winner of the 2020 “Michèle Auger Award for Young Scientists’ Independent Research.” Next highlighted are the Issue contents, which consist of five Commentaries/Letters and eleven Reviews. Finally, we conclude with a description of *Biophysical Reviews*’ ascension within the world’s major journal rankings index (Elsevier, Scimago)—becoming 12th overall (out of 156) within the biophysics category and receiving the coveted Q1 rating in both biophysics and structural biology sections.

Due to the emergence of COVID-19, 2020 will undoubtedly be remembered as an *annus horribilis* by many, if not all. Despite the difficulties imposed by the pandemic, 2020 has, nevertheless, turned out to be an exceedingly productive year for *Biophysical Reviews*.¹ To date, the journal has published two Special Issues (Komatsuzaki et al. 2020; dos Remedios 2020²) and two regular Issues (Hall 2020a, c). In addition to receiving an increased number of submissions (both invited and unsolicited), the journal has also undertaken a number of special initiatives in 2020. One such initiative is the “Meet the Editors Series”. This series has so far provided interesting insights into both the human and scientific sides of the journal’s senior group of Executive Editors (Olson 2020; Nagayama 2020; Jagannathan 2020; Ho 2020). This Issue’s first article (Itri 2020) extends this grouping, with a short scientific autobiography of the Executive Editor for South America—Prof. Rosangela Itri. A specialist in solution scattering, Rosangela is Professor within the Institute for Physics at Sao Paulo University and a core member of the growing Brazilian synchrotron facility. As described (Itri 2020),

Rosangela’s main topic of research is the study of protein–membrane interactions using the small-angle X-ray scattering (SAXS) technique. What can also be garnered from this piece is Rosangela’s sustained commitment to the international promotion of biophysics as a necessary and important sub-discipline.

A second major new undertaking carried out by *Biophysical Reviews* has been the establishment and running of a competition to honor the life and legacy of Prof. Michèle Auger—a much admired Editorial Board Member who sadly lost her battle with illness in late 2018 (IUPAB 2019). First announced in 2019, the “Michèle Auger Award for Young Scientists’ Independent Research” was created to act as a perpetual memorial to Michèle’s life and service. As described in the original announcement call for 2019 (Hall 2019a)³, the “Michèle Auger Award for Young Scientists’ Independent Research” is to be granted each year to a single candidate performing biophysical research, who at the time of application is under 40 years of age. The award will consist of a plaque and a free personal subscription to the journal along with an invitation to submit a single author editorial review article to *Biophysical Reviews*. The published editorial review will carry a short foreword about the life of Prof. Michèle Auger, along with her work associated with teaching and training the next generation of biophysical scientists. Nominations can be made in the form of a candidate’s one-page curriculum vitae, along with five original manuscripts, to be submitted by email to either the Chief Editor, or any one of

¹ For which we would like to acknowledge the steadfast efforts our professional staff along with the diligence of the journal’s Editorial Board and academic reviewers.

² For the description of the Issue contents, see Hall et al. 2020 and Hall 2020b.

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³ And once again in this year’s announcement call (Hall 2020c).

the *Biophysical Review*'s Executive Editors, prior to October 31. Judging will be carried out by a special committee assembled from the Editorial Board, with this assembly taking place after the submission deadline. The winner will be announced in December, with the winner's single author editorial review to be published in the following year.

The inaugural winner of the Michèle Auger Award for Young Scientists' Independent Research (2020) is Assistant Professor Alexandra Zidovska from the Department of Physics at New York University (Zidovska 2020). As part of the award for 2020, Alexandra has contributed a review article describing her research work on the optical microscopy-based examination of the rheology of the cell cytoplasm. The two separate forewords at the start of Alexandra's review article respectively provide information on both the scientific legacy of Prof. Michèle Auger and Alexandra's own scientific path (Zidovska 2020). Figure 1 both shows Alexandra receiving her award⁴ and also a graph providing some idea of the stiffness of this year's competition.⁵ Nominations for the 2021 award are open until October 31 of 2020. As a way of both remembering Prof. Michèle Auger's association with the journal and acknowledging her efforts in promoting the careers of young and talented researchers, interested readers are encouraged to nominate a young scientist they believe to be deserving.

Commentaries and letters

Immediately following the two feature articles are a mixed set of five Commentaries and Letters. The first two articles are requested Commentaries from young scientists placed amongst the top ten runners-up of this year's Michèle Auger Award, namely Assistant Professor Allison Squires (Squires 2020) and Assistant Professor Antonio Benedetto (Benedetto 2020). Writing about their own lives and research, both authors describe their own scientific fields and individual career progression. Allison's interests are in nanoscale biophysics-based single-molecule measurement and manipulation (Squires 2020). Antonio's interests lie in the study of the solvation of proteins and membranes in various liquids (ranging from aqueous systems to more exotic ionic liquids) (Benedetto 2020). The obvious research strengths of these two participants from the Michèle Auger Award indicate the remarkably high quality of all the entrants in this year's competition.

The next three articles in the current Issue are Letters.⁶ The first such Letter by Kundu et al. (2020) describes current thoughts about the evolutionary origins of the cell membrane,

⁴ This year unfortunately the award was presented via mail.

⁵ The judging mechanism for this year was described in Hall (2020a).

⁶ The Letter format allows greater scope for authors to offer their own opinions and to advance individual hypotheses (on the back of reviewed material) in a manner that lies outside of a traditional review format.

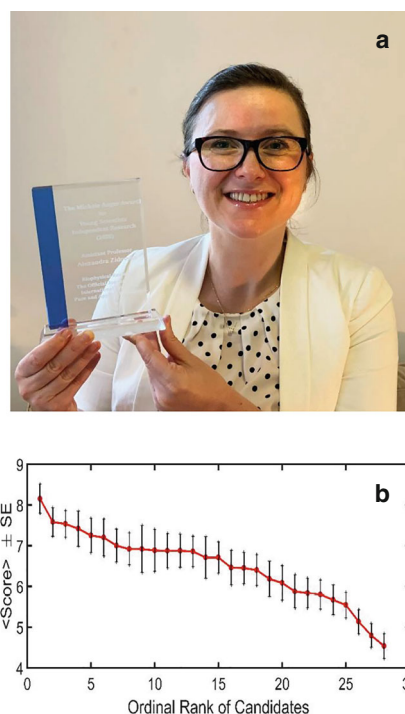


Fig. 1 **a** Photograph of Assistant Professor Alexandra Zidovska accepting her plaque as the inaugural winner of the “Michèle Auger Award for Young Scientists' Independent Research”. Alexandra's Review is the feature article of the current Issue (Zidovska 2020). **b** Ordinal ranking of nominated entrants showing average scores with standard error. Amongst the approximately thirty nominations for the 2020 competition, the judging was quite tight. Each entrant was assessed by a minimum of eight members of a judging panel composed of fifteen distinguished biophysicists. The ranking scale was relative to the candidate pool (with even the lowest ranked candidates being considered as exceptional by the judges)

termed a “protocell,” that allowed for the encapsulation and creation of the unit cell—the fundamental quantum of life. On the basis of well-reviewed supporting literature, the authors discuss the hypothesis that the best candidate constituents for these early protocell vesicles were relatively short-chained fatty acids (Kundu et al. 2020). The authors argue in favor of this protocell origin due to the relative porosity of membranes formed from short-chained fatty acids and their tendency to undergo spontaneous fission (Kundu et al. 2020). In addition to describing evidence supporting their hypothesis, the authors also advance a series of necessary experiments required to test their protocell argument.

The second Letter (Hossein 2020) provides a remarkably compact introduction to the Zika virus, describing its history, molecular composition, structural biology, and medical impact. The author concludes with a critique of current methods for detecting Zika virus using antibody-based methods, describing the problems that these methods face due to intrinsic cross-reactivity with other collocated endemic viruses of the family Flaviviridae (such as Dengue virus) (Hossein 2020).

The third Letter published within this Issue is a submission from a medical doctor with a background in physics, who investigates mechanisms of ultra-violet radiation promotion of skin cancer (Kanellis 2020). In this Letter, Dr. Kanellis describes the current state of the art in medical measurement devices for determining abnormal (disease-related) melanin content in various skin types (Kanellis 2020).

Review articles

As a regular Issue, the articles described here share no common thematic link and therefore provide a remarkably diverse showcase of modern biophysical research. Given the current circumstances, the first review article by Kiss et al. (2020), on the topic of single molecule-based methods for the biophysical investigations of viruses, is particularly topical. In a co-gently written piece, the authors describe the advantages of single-molecule techniques, such as optical tweezers, atomic force microscopy, and various super-resolution fluorescence microscopy methods, with regard to the experimental extraction of non-ensemble averaged distribution information that is capable of providing a rich information stream relating to viral dynamics and structure (Kiss et al. 2020).

The second contributed Review (Furusawa and Irie 2020) initially examines metrological frameworks for quantifying both phenotypic and genomic changes. Acknowledging that most evolutionary change is necessarily constrained in some way, the authors review suitable methods for modeling change adapted from statistical physics-based fluctuation-response theorems of constrained systems. Via a careful synthesis, this thought-provoking article helps to frame the question of what factors act as constraints in the evolutionary process (Furusawa and Irie 2020).

Sharma and Jagannathan (2020) have contributed the third review article on the use of nuclear magnetic resonance (NMR) spectroscopy for the identification of chemical composition changes occurring within prostate cancer (PCa) tissue. Exploiting the ability of NMR methods to both quantitatively measure and identify the individual molecules present within tissue, the authors review chemoinformatics-based ratiometric analytical approaches for generating diagnostic and prognostic tools based on the ratio of particular metabolites that are differentially over- or under-produced in cancerous tissue as compared with healthy tissue (or indeed in other recoverable biosamples, such as blood, urine, or semen). The authors also present the latest uses of solid-state NMR techniques in the analysis of prepared histopathology samples.

The fourth contributed Review (Pandey and Ramakrishnan 2020) examines a range of strategies for the treatment of Alzheimer's disease, covering both the latest in pharmaceutical approaches and recent efforts made in the development of

non-invasive therapies based on the use of light and ultrasound along with trans-cranial magnetic and electric stimulation (Pandey and Ramakrishnan 2020). Reviewing material outside the standard pharmaceutical arena, Gauvey and Pandey provide a fresh look at a less frequently contemplated modality for approaching this very serious problem.

Kumari et al. (2020) have contributed the fifth review article on the topic of deleterious ionic liquid-biological interactions occurring at the cellular and tissue levels of complexity. Following on from the same group's earlier contributed review article, that examined the solvation properties of ionic liquids with biomolecular components such as proteins and phospholipid membranes (Benedetto 2017), this Review discusses the question of ionic liquid cytotoxicity (Benedetto 2017). Given the many advantageous properties of ionic liquids for the potential "tuning" of chemical reactions occurring in hybrid synthetic and biosynthetic reaction design, the problems discussed by Kumari et al. (2020) will be important for harnessing the power of chemical biology in the coming decades.

The sixth Review, contributed by Chiliza et al. (2020), is a collaborative effort between groups from South Africa and Chile. The subject concerns the mechanism of action of the redox reaction carried out by Cytochrome p450 monooxygenase (CP450-MO). As noted by the authors, the principal reaction catalyzed by the CP450-MO enzyme is the insertion of one atom of oxygen into the aliphatic position of an organic substrate, with the other oxygen atom being reduced to water with the oxidized substrate typically becoming more water soluble.⁷ This redox reaction necessarily requires a source of electrons, and it is the exact source of these required electrons that helps to differentiate the various classes of CP450-MO existing in nature. In their Review, Chiliza et al. (2020) describe the structural pre-requisites for successful protein-protein docking, interaction, and electron transfer, between class I CP450-MOs and their protein-based electron donor, ferredoxin—which constitutes its own class of soluble iron-sulfur (Fe-S) cluster proteins. This detailed article provides important information necessary for those wishing to understand the biological mechanism of electron transfer as well as those wishing to use protein engineering methods for the de novo bioengineering of new electron transport pathways (Chiliza et al. 2020).

The next Review, which stems from a collaboration between research groups in Pakistan and Malaysia (Rahim et al. 2020), discusses biophysical aspects of the use of novel nano-biopolymers as the loadable and implantable agents in controlled drug release experiments. In their review article, the authors discuss the effects of nano-dimensional shaping of the polymer, suitable materials for nano-biopolymers, methods of

⁷ The conferment of greater solubility makes this reaction of great utility in processing xenobiotics for their subsequent excretion and in the synthesis of transportable forms of steroid hormones.

synthesis, and toxicity aspects associated with the use of these new biomaterials. The authors conclude their Review with a summary of open questions which need to be answered for further progress in this field (Rahim et al. 2020).

The eighth review article is a lone author piece submitted by Assist. Prof. Ahammad (located at the North South University in Bangladesh) that details the structure and function of the family of Semaphorin proteins (Ahammad 2020). Placing the Review's focus on the various roles that different members of the Semaphorin family play in either promoting, or inhibiting cancer growth, Assist. Prof. Ahammad highlights the potential of this family of proteins as future anti-cancer drug targets (Ahammad 2020).

Beg and Khan (2020) have contributed the tenth review article which deals with the subject of the nature of the protein structural motifs and constituent interfacial amino acid residues that either promote or retard the one-dimensional protein homo-polymerization reaction known as amyloid formation. Placing their focus *in vivo*, the authors take a wide view of amyloid promotion and inhibition by looking at how these factors (and other related factors such as post-translational modifications) affect amyloid formation by examining their role as determinants of intracellular transport, enzymatic processing, and cleavage in addition to their biophysical role in mediating the polymerization reaction. This wider view is undoubtedly the more biologically relevant for determination of the biodynamics operative at the organism level (Beg and Khan 2020).

The final Review of Issue 5 is a three-way collaboration between the United Kingdom, Pakistan, and the United States (Yusuf et al. 2020). This Review presents a historical perspective of the development and usage of cryo-preservation techniques in chromosome sample preparation prior to investigation using various forms of nano-microscopy. Describing both traditional approaches, such as the use of cryo-preparation of the sample with transmission electron microscopy, as well as ultra-modern methodology, involving the use of cryo-preparation in conjunction with atomic force microscopy (AFM), cryo-electron tomography, and super-resolution fluorescence microscopies, the Review article details how cryo-techniques have helped to advance our knowledge of chromosomal packing from the basic chromatin unit level to the consideration of the torsional dynamics associated with fully condensed mitotic chromosome (Yusuf et al. 2020).

Release of 2019 Scimago rankings

In August of 2020, the latest journal rankings list was released by Elsevier, one of the world's largest scientific publishers. Undoubtedly, when used in a lazy fashion, journal metrics may prevent scientific articles from being judged on their individual merits, with assignation of relative plaudits or

criticism instead based on their association with a particular journal (rather than the article's scientific content). Nevertheless, it would be naïve to believe that journal metrics do not drive much of the modern scientific enterprise. Indeed, grant panels along with hiring and tenure committees, are frequently dominated by questions such as “where was it published?” rather than “what was it about?” or “does it make scientific sense?” Acknowledging such modern peculiarities associated with journal rankings (and with these comments provided as caveat emptor) we announce with muted pride *Biophysical Reviews*' emergence as one of the top rated journals in the latest round of the Scimago™ rankings (Scimago 2020a, b). With the conferral of a first quartile (Q1) ranking in both the biophysics and structural biology categories and the recognition of an average number of citations per document over 2 years as 4.91, *Biophysical Reviews* has emerged as the 12th ranked journal overall in the category of biophysics, much improved from its previous ordinal ranking of 40.

Some of the journals success has been due to its push into the social media realm. Largely based around the free online sharing tool promoted by the journal, known as the SharedIt™ initiative (Hall 2017, 2019a, b), the journal operates a YouTube™ channel and a Twitter™ account that act to highlight the articles published by the journal by providing authors with an ultra-modern means to peruse, share, and access content. These two social media platforms can be accessed at the following web addresses.

Biophysical Reviews YouTube Channel

https://www.youtube.com/channel/UCzG_5MWmnrB2UBibtxs2DuA

Biophysical Reviews Twitter Account

@BiophysicalRev1

In discussing any improvement in *Biophysical Reviews*' perceived stature, the journal acknowledges that the principal twin drivers of progress are the very many excellent contributions from our published authors, and the efforts of the reviewers of the manuscripts who have invested their time in critiquing and improving the submitted articles. As the journal operates predominantly on an invitation to publish basis, the continued success of the journal stems from the activity of Editorial Board Members. Their discerning invitations of review articles from as wide an array of countries as possible helps to distinguish *Biophysical Reviews* as a true international venue for publishing biophysics-related content. Building on the efforts of Jean Garnier (2009) and Cristobal dos Remedios (dos Remedios 2016), the Editorial Board has worked with philanthropic spirit to further the aspirations of our parent body IUPAB—the International Union for Pure

and Applied Biophysics—the world’s governing body for the promotion and encouragement of biophysical research.

Concluding remarks

Prospective authors interested in submitting a review article to *Biophysical Reviews* are encouraged to first broach the matter with either the Chief Editor or their local Executive or Editorial Board Member. After discussion on the suitability of their article, a timetable for their submission will be arranged in conjunction with the professional officers of the journal.

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