



Biophysical Reviews: focusing on an issue

Damien Hall^{1,2}

Received: 8 April 2022 / Accepted: 8 April 2022 / Published online: 19 April 2022

© International Union for Pure and Applied Biophysics (IUPAB) and Springer-Verlag GmbH Germany, part of Springer Nature 2022

Abstract

This Issue of *Biophysical Reviews* (Volume 14, Issue 2) presents a new feature known as an ‘Issue Focus’ — a contiguous thematic block of five articles placed within a regular Issue format. The current ‘Issue Focus’ is concerned with the recent developments in Costa Rican biophysical science. The regular aspect of this Issue consists of a ‘Meet the Editor’ piece by Sabrina Leslie, the first instalment of an ongoing Commentary feature known as the ‘Editors’ Roundup’, and five disparate review articles covering a variety of topics.

Biophysical Reviews is the official publishing vehicle of IUPAB (the International Union for Pure and Applied Biophysics) (IUPAB 2022) and, due to this association, has a number of different aims. The most basic goal is the recruitment and publication of topical reviews within the area of biophysics by experts in the field. A second aim of the journal is the encouragement of biophysical education and research at both the local and international levels (e.g. Ferrari et al. 2019; Sewell 2019; Connell et al. 2019; Battle et al. 2019). A further aim is the promotion of international cooperation amongst local and national biophysics organizations (e.g. Komatsuzaki et al. 2020; dos Remedios et al. 2022; Itri et al. 2021). In attempting to carry out these diverse aims, the current Issue presents eight excellent review articles, it promotes biophysical research from the central American country of Costa Rica (Chavez et al. 2022), it introduces a new commentary format for the discussion of recently published biophysical research (Shearwin et al. 2022) and highlights the research biography of a biophysical scientist (and Editorial Board Member) from Canada within the latest edition of the ‘*Biophysical Reviews*’ Meet the Editor Series’ (Leslie 2022). It is the first duty of this Editorial to provide a short description of the Issue contents after which we discuss the benefits of the Issue Focus format.

Precis of issue contents

The front matter section of the current Issue consists of three articles. Directly following this Editorial (Hall 2022) is the first instalment of the *Biophysical Reviews* ‘Meet the Editors Series’ for 2022 (Leslie 2022). Contributed by Assoc. Prof. Sabrina Leslie of the Department of Physics and Astronomy University of British Columbia, this compact biography tells Sabrina’s story from her undergraduate and PhD studies (the latter concerned with magnetic characteristics of Bose–Einstein condensates) through to her present-day research endeavours in single molecule analysis using a range of optical and scanning probe microscopies in conjunction with novel applications of microfluidics. Sabrina’s academic story is both well told and interesting — *Biophysical Reviews* is indeed fortunate to have her as a member of its Editorial Board (Leslie 2022). Rounding out the front matter is the first in the *Biophysical Reviews* ‘Editors’ Roundup’ which is an ongoing Commentary in which those associated with publishing biophysical content can highlight recent publications of interest from their journal in a collective format. The current Editors’ roundup has received contributions from three journals (*Biophysical Reviews*, *Biophysics* and *Physicobiology and Cell Biochemistry and Biophysics*) (Shearwin et al. 2022). It is hoped that such a platform can be utilized across the board of biophysical publications.

The main body of the current Issue is composed of five review articles. The first of these is an invited contribution from the laboratory of Prof. Michael Nash (jointly located at the University of Basel and ETH Zurich) which is concerned with the molecular engineering and biophysical

✉ Damien Hall
hall.damien@staff.kanazawa-u.ac.jp;
damienhall30@gmail.com

¹ WPI Nano Life Science Institute, Kanazawa University, Kakumamachi, Kanazawa, Ishikawa 920-1164, Japan

² Department of Applied Physics, Aalto University, 00076 Aalto, Finland

measurement of the components within the fibrin coagulation system, and the collective properties of the fibrin clot itself (Risser et al. 2022). Providing an extensive description of the biochemical players and the pathways involved within the thrombin-mediated fibrin clotting cascade, along with pharmaceutical treatment strategies (and particular drugs), this work will undoubtedly become a valuable resource for the medical/biophysical investigation of hemostasis (Risser et al. 2022).

The second review article contributed from the Mazumder group at the Manipal Academy of Higher Education (Karnataka, India) discusses recent applications of machine learning (and deep learning) techniques to the processing of images taken using various optical microscopy methodologies (Melanthota et al. 2022). After providing a relatively digestible introduction to machine learning approaches by describing the algorithmic underpinning of the perceptron unit, the authors go on to highlight examples of its application to biological images obtained by bright-field, fluorescence, light sheet, phase and Raman microscopy. This review nicely straddles the basic and topical science briefs associated with review articles published within the journal (Melanthota et al. 2022).

Review article number three is concerned with recent developments in the phenomenon of haemoglobin allostery — particularly that associated with the cooperative binding of oxygen. In their review of this topic, the three Japan-based authors, Nagatomo, Nagai and Kitagawa, concentrate on recent resonance Raman measurements of the iron-histidine dative bond formed in the greater Fe-protoporphyrin coordinate complex (Nagatomo et al. 2022). Through a discussion of mutant haemoglobin behaviours the authors advance arguments which explain why human haemoglobin exists as a tetramer (Nagatomo et al. 2022).

The fourth review article, from the laboratory of Prof. Rajesh Mistra (Jawaharlal Nehru University, India), discusses the differences in structure and function amongst α -amylase enzymes that have evolved amongst extremophilic members of the archae and bacterial domains (Ahmad et al. 2022). The α -amylase enzyme hydrolyses the internal α -1,4-glycosidic bond of the major carbohydrate polymers of starch, glycogen and amylopectin to form either disaccharide units or shorter chain sugars, collectively described as dextrans. Aside from their essential nature for the maintenance of all biological life, the α -amylase enzymes possess an incredible industrial importance amongst diverse manufacturing fields such as brewing, fibre preparation and detergent production. After introducing the reader to the different extremophile niches, such as thermophilic (high temperature adaption), psychrophilic (low temperature adaption), halophilic (high salt tolerance), acidophilic (acid tolerance) and barophilic (high pressure adaption), the authors describe the evolved structural and chemical adaptations within the

α -amylase enzymes isolated from these just mentioned types of extremophiles (Ahmad et al. 2022).

The last of the five non-thematic Reviews in the present Issue is a contribution from the chemical engineering group of Prof. Manouchehr Vossoughi based in Shiraz University (Tehran, Iran). Building upon their group's considerable expertise in microfluidic fabrication, the authors review recent usages of microfluidic technology in the study, measurement and potential treatment of cancer metastasis — the phenomenon of cancer cell detachment from a primary tumour with its subsequent spreading to alternative sites within the body (Hakim et al. 2022). Placing their focus on recent advances in design principles that allow constructed microfluidic devices to clearly isolate and replicate the individual steps of the metastatic cascade, the authors provide insight into how chemical, mechanical, thermal and rheological aspects of the cancer life cycle might be mimicked using microfluidic technologies (Hakim et al. 2022).

Issue focus on Costa Rican biophysics

Since 2011, Biophysical Reviews has run thematic Special Issues (SIs) on single topics. Typically, over a period of 8 to 12 months, the guest editors organizing these SIs invite and handle the submitted review articles, arranging critiques from experts in the field, requesting revisions from the authors and then finally, judging the suitability of the resultant manuscripts for inclusion within the SI. Due to the fixed publication schedule of the journal, the SI guest editors need to ensure that each SI must be prepared on time and also contain within it a minimum of ten articles. Such strictures tend to dissuade inherently smaller, or just starting, scientific groups from attempting to form their own SI. However, it is often these smaller or younger groups that would most benefit from bringing attention to their scientific activities through the medium of an SI. To circumvent such a catch 22 situation, Biophysical Reviews has started a small format SI, known as an 'Issue Focus' (IFocus) that can be housed as a contiguous block within a regular Issue. Each IFocus requires just five articles and so the organizational commitment required by the guest editors is significantly less. These articles carry a special IFocus imprint and are meant to be read as a collective.

The current Issue houses the journal's first ever IFocus on the topic of 'Costa Rican Biophysics' (Chavez et al. 2022). Expertly arranged and handled by three Costa Rican guest editors, Dr. Gustavo Chavez, Dr. Christopher Solís and Assist. Prof. Jose Angel Rodriguez Corrales with the contributions to the IFocus recruited from the second Costa Rican Biophysical Symposium held in 2021. This IFocus consists of an Editorial (Chavez et al. 2022), a Commentary describing the state of hyperpolarization-based solid state nuclear magnetic

resonance facilities and training opportunities within Costa Rica (Céspedes-Camacho and Matsyik 2022) and three very detailed and high-quality review articles concerned with the light-based control of neuronal cell depolarization via a novel mechanism involving regulation of cell membrane ‘opto-capacitance’ (Pinto et al. 2022), machine learning methods for the processing of multichannel fluorescence microscopy images (Acuna-Rodriguez et al. 2022) and the use of neurons isolated from the Helix land snail as a biophysical model of epilepsy (Brenes, 2022). Each of these articles is an interesting read by themselves; however, taken as a collective, they are an impressive advertisement for the high level of biophysical research carried out by Costa Rican scientists working both, at home, and abroad. Hopefully, the above description is sufficient to encourage the reader to take a careful look at this new IFocus feature. To effect the segue, I direct you to the IFocus Editorial (Chavez et al. 2022) for a fuller explanation of its contents.

Concluding remarks

Those contemplating submitting their review article to Biophysical Reviews are asked to discuss the matter with either the Chief Editor or a close by Executive or Editorial Board Member. More information about the journal is available at its official Springer Nature website and social media pages on Twitter and YouTube.

Web: <https://www.springer.com/journal/12551>

Twitter: @BiophysicalRev1

YouTube: www.youtube.com/channel/UCzG_5MWmnrB2UBibtxs2DuA

After establishing, the appropriateness of your suggested topic a general timetable for the submission of your article (usually about 4 to 6 months following the official invitation) will be arranged in conjunction with the professional officers of the journal.

Acknowledgements I would like to thank Dr. Meran Lloyd-Owen and Prof. Adam S. Foster for comments made on an earlier draft of this manuscript. DH acknowledges funding associated with the receipt of a ‘Tokunin’ Assistant Professorship carried out at the WPI-Center for Nano Life Science, Kanazawa University. DH also acknowledges the University of Aalto, for an appointment to their Affiliated Researcher Program carried out within the Department of Applied Physics.

Declarations

Conflict of interest D.H. reports no conflict of interest. No humans or animals were harmed during the writing of this article.

References

Acuna-Rodriguez JP, Mena-Vega JP, Arguello-Miranda O (2022) Live-cell fluorescence spectral imaging as a data

- science challenge. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00941-x>
- Ahmad A, Rahamtulla, Mishra R (2022) Structural and functional adaptation in extremophilic microbial α -amylases. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00931-z>
- Battle AR, Norton RS, Böcking T, Noji H, Kim KK, Nagayama K (2019) Editorial: special issue of Biophysical Reviews dedicated to the joint 10th Asian Biophysics Association Symposium and 42nd Australian Society for Biophysics Meeting, Melbourne, Australia, December 2–6, 2018. *Biophys Rev* 11:245–247. <https://doi.org/10.1007/s12551-019-00553-y>
- Brenes O (2022) Invertebrate neurons as a simple model to study the hyperexcitable state of epileptic disorders in single cells, mono-synaptic connections, and polysynaptic circuits. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00942-w>
- Céspedes-Camacho IF, Matsyik J (2022) Solid-state NMR and hyperpolarization methods for the research, development and innovation in Costa Rican science. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00946-6>
- Chavez G, Rodriguez-Corrales JA, Solis C (2022) Editorial for ‘issue focus on 2nd Costa Rica biophysics symposium – March 11th -12th, 2021’. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00947-5>
- Connell SH, Mtingwa SK, Dobbins T, Khumbah N, Masara B, Mitchell EP, Norris L, Ngabonziza P, Ntsoane T, Winick H (2019) Towards an African light source. *Biophys Rev* 11:499–507. <https://doi.org/10.1007/s12551-019-00578-3>
- dos Remedios C, Cranfield C, Whelan D, Cox C, Shearwin K, Ho JWK, Allen T, Shibuya R, Hibino E, Hayashi K, Li A (2022) A special issue of the Australian society for Biophysics. *Biophys Rev* 14:1–2. <https://doi.org/10.1007/s12551-022-00936-8>
- Ferrari A, Capitanio M, Vassalli M, Martinac B (2019) Science by the sea: how nanoengineering met mechanobiology in Camogli. *Biophys Rev* 11:659–661. <https://doi.org/10.1007/s12551-019-00598-z>
- Hakim M, Kermanshah L, Abouali H, Hashemi HM, Yari A, Khorasheh F, Alemzadeh I, Vossoughi M (2022) Unravelling cancer metastatic cascade using microfluidics-based technologies. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00944-8>
- Hall D (2022) Biophysical Reviews: focussing on an issue. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00953-7>
- Itri R, Baptista M, Costa-Filho AJ, Garratt RC (2021) A special issue of Biophysical Reviews dedicated to the 20th IUPAB (virtual) Congress “in” Foz do Iguaçu. *Biophys Rev* 13:797–801. <https://doi.org/10.1007/s12551-021-00910-w>
- IUPAB (2022) The website of the International Union for Pure and Applied Biophysics. <http://iupab.org/> (Accessed 4/4/2022)
- Komatsuzaki T, Nakamura H, Tame J, Yanaka S, Nagai T, Nagayama K (2020) Editorial for the special issue of Biophysical Reviews focused on the Biophysical Society of Japan with select scientific content from the 57th BSJ annual meeting, Miyazaki. *Japan Biophysical Reviews* 12:183–185. <https://doi.org/10.1007/s12551-020-00691-8>
- Leslie SR (2022) Biophysical Reviews ‘meet the editors series’ – a profile of Sabrina Leslie. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00948-4>
- Melanthota SK, Gopal D, Chakrabart S, Kashyap AA, Radhakrishnan R, Mazumder N (2022) Deep learning-based image processing in optical microscopy. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00949-3>
- Nagatomo S, Nagai M, Kitagawa T (2022) Structural origin of cooperativity in human hemoglobin: a view from different roles of α and β . *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00945-7>
- Pinto BI, Bassetto Jr. CAZ, Bezanilla F (2022) Opto-capacitance: physical basis and its application. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00943-9>

- Risser F, Urosev I, Lopez-Morales J, Sun Y, Nash M (2022) Engineered molecular therapeutics targeting fibrin and the coagulation system: a biophysical perspective. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00950-w>
- Sewell BT (2019) The workshop on “biophysics and structural biology at synchrotrons” presented at the University of Cape Town from 16–24 January 2019. *Biophys Rev* 11:491–493. <https://doi.org/10.1007/s12551-019-00575-6>

Shearwin K, Nakamura H, Hall D (2022) Editors roundup – April 2022. *Biophys Rev* 14(2). <https://doi.org/10.1007/s12551-022-00954-6>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.