



## Editorial

## Biophysical science in Italy: SIBPA turns 40

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## HIGHLIGHTS

- XXI SIBPA National Congress at Ferrara
- SIBPA celebrates the fortieth anniversary of its foundation.
- Inter- and multi-disciplinary biophysics

## GRAPHICAL ABSTRACT



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## ABSTRACT

This Special Issue of Biophysical Chemistry includes a selection of the papers presented at the XXI Congress of the Italian Society of Pure and Applied Biophysics (i.e., SIBPA, Società Italiana di Biofisica Pura ed Applicata) held on September 2012 at the University of Ferrara, Ferrara, Italy. Topics cover all biophysical disciplines, from molecular to cellular, to integrative biophysics giving an almost comprehensive view of the interdisciplinary and multidisciplinary approaches, proper of the modern biophysics. SIBPA, which celebrates its 40th anniversary in 2013, has steadily grown and appeals to both specialists and a wider general audience.

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## 1. SIBPA

The Italian Society for Pure and Applied Biophysics, SIBPA (Società Italiana di Biofisica Pura ed Applicata) was founded in 1973 – the current year marks the 40th anniversary of its foundation – by a small group of Italian physicists who wished to find a commonality between Physics and Biology while respecting the peculiarity of the two disciplines. It is the oldest biophysical society in Italy and the only Italian society included among national representatives of IUPAB (International Union for Pure and Applied Biophysics) and EBSA (European Biophysical Societies' Association). SIBPA's institutional aims are: a) to promote and facilitate the dissemination of knowledge in biophysics; b) to support and organize initiatives for education, training and the updating of biophysics-related issues; c) to enhance the collaboration between laboratories at universities and research institutions; d) to organize meetings, conferences and seminars on biophysical topics; and e) to

establish scholarships and awards for young researchers engaged in biophysical research. Every two years SIBPA holds a National Congress whose main topics range from molecular to integrative biophysics. In recent editions, nanobiophysics and advanced microscopies have been added. Since 1997 SIBPA promotes and organizes, jointly with IVSLA (Istituto Veneto di Scienze, Lettere ed Arti) in Venice, Italy, the well-established annual International School of Pure and Applied Biophysics, dealing with cutting-edge topics in biophysics. SIBPA regularly announces merit-based scholarships and travel grants to attend the EBSA and the USA Biophysical Society meetings and its biennial National Congress.

## 2. The 2012 congress

This special issue of Biophysical Chemistry includes the Proceedings of XXI Congress of the Italian Society for Pure and Applied Biophysics (SIBPA) held in the town of Ferrara from 17th to 20th September 2012.

The city of Ferrara is situated in the valley of the Po River, a few kilometers before it meets the Adriatic Sea. The city is half medieval and half

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renaissance and rich of works of art, but is itself a jewel so that, since 1995, it belongs to the UNESCO's World Heritage list as a wonderful example of a city which has maintained its urban fabric essentially intact. We must remember that seismic events, occurred in that area from May through July 2012, have caused several deaths, many severely injured persons, thousands of homeless people, and damaged historic buildings as well as warehouses and factories. Nevertheless, we admired the calm and firm reaction of Ferrara's people which positively contributed to the outcome of the Congress.

Over 120 researchers working in Biophysics met and discussed their work and its further development. SIBPA bursaries allow the participation of 25 young researchers from Italian University and Research Institutions (Fig. 1). An "industrial session" was also organized with the aim to open a dialog between industries and the world of Biophysics.

Two prizes, entitled "Antonio Borsellino" and "Gianfranco Menestrina" (unforgotten internationally renowned Italian biophysicists), for the best PhD theses in Theoretical Biophysics and Experimental Biophysics have been awarded to *Martina Pannuzzo* (Catania University) and *Antonio Benedetto* (Messina University), respectively (Fig. 2).

### 3. The topics and the invited lectures

The congress schedule included three main sessions: Molecular Biophysics, Cellular Biophysics, and Systemic and Environmental Biophysics. In each session advanced and cutting-edge topics were presented and discussed. Seven national and foreign invited speakers enriched the congress sessions with high-level plenary lectures.

This special issue collects papers selected on the basis of the journal's peer-review process and chosen after a preliminary selection among the papers presented at the Congress. As already mentioned, each article in this special issue underwent careful peer review by international referees identified as leading experts in the area addressed by the manuscript submission. Below we present a summary of the invited speakers' talks which were also included in this special issue.

*Gregor Anderluh* (University of Ljubljana, Slovenia) gave the first invited lecture for the Molecular Biophysics session. He discussed the ability of Listeriolysin O (LLO) to form pores on lipid membranes. LLO is a cholesterol-dependent cytolysin (CDC) secreted by *Listeria monocytogenes*, the pathogen responsible for causing listeriosis. The

mechanism of the pore formation is still debated and two models are proposed: pre-pore to pore transition and arc-shaped pore oligomerization. By using the Planar Lipid Membrane (PLM) technique and Atomic Force Microscopy (AFM) he has shown that both models are valid and the prevalence of one to the other depends on the different membrane lipid compositions.

The second invited talk from *Massimo Stefani* (University of Florence) has concerned the amyloid toxicity, considered as the result of the biochemical and biophysical properties of both amyloid oligomers and the cell membrane. His data suggests that the degree of cytotoxicity of any type of protein oligomer or amyloid-related structure is not merely inherent to specific aggregate properties but, rather, results from a complex interplay between the characteristic of the protein structure (stability, flexibility and exposure of hydrophobic surface) and the biophysical features of the interacting cell membranes due to its lipid composition (fluidity, electrostatic potential, curvature, lateral pressure). These data can contribute to the rationalization of the variable susceptibility of different cell types with distinctive membrane characteristics to structurally different deleterious protein oligomers of the same peptide/protein grown under different stress conditions.

The Cellular Biophysics session started with the invited lecture of *Ildikò Szabò* (University of Padua) with an interesting overview on the regulation of photosynthesis by ion channels of thylakoid membranes of chloroplasts in cyanobacteria and higher plants. An ancestral photoautotrophic prokaryote related to cyanobacteria has been proposed to give rise to chloroplasts of plants and algae through an endosymbiotic event due to the discovery that photosynthetic complexes involved in the electron transport coupled to H<sup>+</sup> translocation and ATP synthesis are similar in higher plants and cyanobacteria. Electrophysiological and biochemical evidence supports the existence of ion channels in the thylakoid membrane in both types of organisms. By allowing specific ion fluxes across thylakoid membranes, ion channels have been hypothesized to either directly or indirectly regulate photosynthesis by modulating the proton motive force. Recent molecular identification of some of the thylakoid-located channels allowed obtaining genetic proof in favor of such a hypothesis.

The invited lecture of *Tomas Morosinotto* (University of Padua), in the Systemic and Environmental Biophysics session, focused on the optimization of light use for biofuel production in algae. One of the main



Fig. 1. Carlo Musio (President of SIBPA) and Silvia Morante (Past President of SIBPA) – standing row from left to right – with 19 of the 25 young researchers supported by the SIBPA bursaries to attend the XXI SIBPA Congress, September 2012, Ferrara.



**Fig. 2.** Silvia Morante (Past President of SIBPA) awards the “Prize A. Borsellino” for the best PhD thesis in Theoretical Biophysics to Martina Pannuzzo (left) and the “Prize G. Menestrina” for the best PhD thesis in Experimental Biophysics to Antonio Benedetto (right) during the XXI SIBPA Congress, September 2012, Ferrara.

limitations is that in photo-bioreactors, the large scale growing systems for algae cultures are optically dense with a consequent not homogeneous light distribution. His research shows that, using alternation of light and dark cycles with different frequencies, which mimic illumination variations in a photo-bioreactor due to mixing, the alga *Nannochloropsis* is able to use efficiently light even under very intense light conditions, provided that the dark period is long enough to allow re-oxidation of photosynthetic apparatus electron transporters. In addition, results indicate that although nitrogen deprivation induces a decrease of all components of photosynthetic electron transport chain, *Nannochloropsis* cells, however, are able to cope with nitrogen deprivation through an induction of cyclic electron transport, which allows maintaining a good efficiency for the residual proteins and a sufficiently high photosynthetic productivity.

Alberto Diaspro (IIT Genua), Paola Gavazzo (CNR Institute of Biophysics, Genua) and Amos Maritan (University of Turin) completed the number of invited speakers. They gave very interesting talks dealing with improvements in optical nanoscopy and super-resolution microscopy, the proposal of genetically engineered neuroblastoma cell line (SKNBE2-S1) as a novel in vitro tool for the biophysical study of human neural cells, and a novel computational approach to the protein folding problem, respectively. Unfortunately their written versions are not included in the present issue.

Finally, we would like to mention the very interesting talk by the Congress' Keynote Speaker *Francisco Bezanilla* (University of Chicago, USA), although his article is not present in this special issue. Bezanilla's research activity has been devoted to the full comprehension of the biophysics and dynamics of ion channels. By manipulating the channel protein with molecular biological techniques, and using electrical and optical techniques to monitor structural changes, he has been a pioneer in the effort to understand ion channel function, particularly the gating properties, at the molecular level.

#### 4. Acknowledgments

We are indebted to the University of Ferrara (in particular Giorgio Rispoli and his outstanding staff, Mascia Benedusi, Marco Aquila and Anna Fasoli) for the organization and the hospitality of the meeting, and to Enrico Di Cera, Editor-in-Chief, and the Elsevier Editorial Office of Biophysical Chemistry for hosting the proceedings of the congress in this special issue.

Moreover, we acknowledge the institutions (Italian National Research Council CNR; CNR-Institute of Biophysics; City of Ferrara) and the firms (Hamamatsu; Nanion Technologies; Nikon; Sitem – Software and Instrumentation; Till Photonics) which supported the Congress, facilitating the participation of students and young researchers.

We are very grateful to the authors who contributed to this issue and to the referees for their careful work in peer-reviewing the manuscripts.

Last but not least, a special thank goes to Silvia Morante, under whose SIBPA Presidency the conference was held. We would express a particular appreciation for her excellent work during the four years of her presidency together with the other former members of the SIBPA Executive Committee: Giberto Chirico, Velia Minicozzi, Antonella Sgarbossa and Pier Luigi San Biagio.

The current SIBPA Executive Committee is now composed of Carlo Musio (President), Daniela Giacomazza (Treasurer), Silvia Morante (Past President), Ranieri Bizzarri, Luigi Bubacco, Mauro Dalla Serra, Anna Moroni, Maria Grazia Ortore, Michael Pusch and Giorgio Rispoli (Councilors).

#### 5. Where will the SIBPA 2014 be held?

The 2014 SIBPA Congress will be held in Palermo. Detailed information will be available at the web site of the society: <http://www.pa.ibf.cnr.it/sibpa>.