subjects) can indeed help better understand culinary phenomena and ultimately influence the way we cook and eat. Doing this, we will also demonstrate that food transformation and consumption incidentally provide interesting supports for innovative pedagogical approaches in biophysics at any level, suggesting promising (and appetizing!) opportunities to raise interest in biophysics among students as well as more general public audiences.

1679-Pos Board B630

The Molecular and Cellular Biophysics of Probiotic Bacteria

Astghik Z. Pepoyan.
Food Safety & Biotechnology, Armenian National Agrarian University, Yerevan, Armenia.

Elie Metchnikoff proposed the use of probiotics a century ago. Probiotics regulate the integrity and functionality of gut microbiota. Currently, the scientific attention is more focused on the strain-specific features of probiotics and their use against pathogens or for the treatment of diseases and imbalances of the intestinal microbiota. New developments in nanobiotechnology, the potential use of genetically modified probiotics in foods, or the application of transgenic bacteria in environmental bioremediation require a new look at probiotics' investigations.

At the same time, biophysics describes the biological functions of organisms in different levels in language of the biological molecules' structure and activities. The including of molecular and cellular biophysics of probiotic bacteria in education programs will promote the development of nutritional and health sciences.

1680-Pos Board B631

Enjoy Co-Learning in Acacemic Meetings and Conferences: How to Enhance Communication Among Peers in Biophysics and Neighboring Fields

Senkei Umehara.
Department of Innovation Research, Japan Science and Technology Agency, Chiyoda-Ku, Tokyo, Japan.

Biophysics has high potential in liaising with neighboring fields of study. Providing both theoretical and technological means to help generalize complex biological systems, it bridges apparent gaps between such disciplines as informatics and modeling, engineering, physics, chemistry, specialized branches of biological sciences, and applications in agriculture, pharmacology and medicine, to name a few. Obviously, individual biophysicists can benefit from this potential by nature, but more opportunities to catalyze interactions with outside world would make them even happier.

Here we try to show some practical tips to increase the chance of educational or co-learning opportunities among participants in academic meetings and conferences. These tips are gained through the management of funding programs adopting a ''virtual institute'' system, where multidisciplinary players are joined from remote places. Through examples of good practices, future conference organizers would be able to develop ideas that can effectively be implemented in their own planned gatherings. Moreover, we hope that students and early career biophysicists would find clues to broaden their research, which eventually lead to more impactful academic achievements and societal contributions in the future.

In previous biophysics meetings in Japan and the United States, we have introduced to fellow researchers some science communication opportunities, which include informal education in science festivals or events, public dialogs in a world café format, and crisis communication. This time the focus will rather be more expert-oriented, but the point is that any encounters with someone outside of one's own expertise would be a golden opportunity for breakthrough. Our hope is to have individual scientists recognize the importance of multifaceted perspectives that are often provided outside their own laboratories, and inspire them to enjoy more ''close encounters'' within the scientific community and beyond.

1681-Pos Board B632

Cloud Experimentation for Biology: Systems Architecture and Utility for Online Education and Research

Zahid Hossain[1], Xiaofan Jin[2], Engin Baumbacher[3], Alice Mira Chung[2], Stephen Koo[4], Jordan David Shapiro[2], Cynthia YTram Truong[2], Sean Choi[4], Paulo Blikstein[3], Ingmar Hans Riedel-Kruse[2].
[1]Computer Science and Bioengineering, Stanford University, Stanford, CA, USA, [2]Bioengineering, Stanford University, Stanford, CA, USA, [3]Education, Stanford University, Stanford, CA, USA, [4]Computer Science, Stanford University, Stanford, CA, USA.

Interacting with biological systems via experiments is important for academia, industry, and education, but access barriers exist due to training, costs, safety, logistics, and spatial separation. Automated high-throughput equipment combined with web streaming could enable interactive biology experiments online, but no such platform currently exists. Here we present a cloud experimentation architecture (paralleling cloud computation), that is optimized for a class of domainspecific equipment (biotic processing units) to share and execute many experiments in parallel by mapping synchronous equipment cycles to asynchronous user actions. We implemented an instance of this architecture that enables chemotactic stimulation experiments with the slime mold Physarum polycephelum. A user study in the blended teaching and research setting of a graduate-level biophysics class demonstrated that this platform lowers the access barrier for nonbiologists, enables discovery, and facilitates learning analytics. This architecture is flexible for integration with various biological specimens and equipments to facilitate scalable interactive online education, collaborations, conventional research, and citizen science.

1682-Pos Board B633

An Interdisciplinary Hands-On Module for Science Outreach in Resource-Limited Settings

Vernita D. Gordon, Karishma S. Kaushik, Ashley Kessel, Nalin Ratnayeke.
Department of Physics and Center for Nonlinear Dynamics, The University of Texas at Austin, Austin, TX, USA.

Collaboration across disciplines has played a pivotal role in understanding and advancing science. However, opportunities to gain interdisciplinary research experience continue to remain uncommon. We have developed a hands-on, experimental module that uses an interdisciplinary approach, combining biology experiments and a physics-based analytical model, to address a scientific problem. This module was first implemented at the Hands-on Research in Complex Systems School held at The Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy from 29 June - 11 July 2014. In our experience, this module was robust, reproducible, resource-efficient, and cost-effective. These serve as favorable features in taking this module to diverse settings such as undergraduate research manifestos, STEM camps, school programs, and laboratory training workshops. Given the paucity of structured training or education programs that integrate diverse scientific fields, this module can provide valuable, interdisciplinary, research experience in science outreach and education initiatives.

1683-Pos Board B634

Protein Structure Solution Skills Made Accessible: Steps Toward an Online Classroom

Gundula Bosch[1], Lauren E. Boucher[2], Alexia S. Miller[2,3], Jurgen Bosch[2].
[1]Molecular Microbiology & Immunology, Johns Hopkins School of Public Health, Baltimore, MD, USA, [2]Biochemistry & Molecular Biology, Johns Hopkins School of Public Health, Baltimore, MD, USA, [3]Program in Molecular Biophysics, Johns Hopkins School of Medicine, Baltimore, MD, USA.

The ability to solve and interpret protein structures is a critical skill set for molecular life scientists of many disciplines. However, courses teaching practical crystallography skills are rarely integrated into regular graduate or undergraduate curricula. Moreover, expert-led workshops are often expensive and have long wait lists. In our molecular biophysics program, we currently address this issue through offering an immersive, active-learning workshop covering hands-on crystallography skills in a blended delivery format. Preliminary evaluation results recently indicated long-term, sustained structure solving skills in our learners.

In order to reach a broader learner population, we are now taking the next steps toward developing an online course environment, to enable also full-time students, postdoctoral fellows and professional scientists, independent of institutional affiliation and geographic location, to take the course at their own pace in a part-time modus.

Our instructional strategies comprise:

- Modular topic preparation through individual readings and recorded mini-lectures;
- Readiness checks through short quizzes;
- Problem-based learning by provision of real-world data sets through server-download;
- Peer-to-peer consultation on intermediate structure solution steps via online team space;
- Progress assessment through regular update reports and feedback by the instructor team via discussion forum and real-time online meet-ups;
- Online presentation as well as peer- and instructor critique of a final project, mimicking a conference presentation that focuses on the structure solution pathway.
- Three to six months after the course, we provide our learners with an unknown dataset to solve on their own, to evaluate the level of sustained learner performance post instruction.

We will present the current status of our online implementation efforts, as well as first insights from a pilot feasibility study with national and international off-site participants.