

EDITORIAL

QB: A new inter- and multi-disciplinary forum for modeling, engineering and understanding life

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Compared to physics and chemistry, biology has traditionally been regarded as more of a descriptive science, although Reginald Harris (1933) wrote in the preface to the first volume of the Cold Spring Harbor (CSH) Symposia series on Quantitative Biology: "... The primary motive of the conference symposia is to consider a given biological problem from its chemical, physical and mathematical, as well as from its biological aspects". In 1942, the Nobel-Prize-winning Luria-Delbrück experiment set up one of the first examples to apply mathematics to make quantitative predictions in bacteriophage genetics. This celebrated collaboration of a biologist and a physicist began to bear fruits after they established the annual summer CSH course in 1945 and trained a new generation of molecular biologists, who were inculcated with their view of how biology should be done — quantitatively and critically. The Quantitative Biology Symposium of 1953 marks its historical impact when Delbrück announced the last minute addition to the program, "The discovery of structure for DNA proposed by Watson and Crick..." History repeated itself with another triumph of magnificent collaboration of a biologist and a physicist. Nowadays, a variety of modern "-omics" approaches and rapid advances in technology are producing data of enormous quantity and increasing quality; integrative analyses and multi-disciplinary collaboration have become commonplace. On behalf of our outstanding editorial board, our sponsoring institutions and our international publisher, we are pleased to announce the launch of *QB* (*Quantitative Biology*), a new international journal which will not only serve as a new inter- and multi-disciplinary forum for quantitatively modeling and engineering life, but will also serve as a new cultural network for promoting scientific communication and exchanges between the East and the West. For details on the Journal, please check either websites: <http://www.springer.com/40484> and <http://journal.hep.com.cn/qb/>.

In this inaugural issue, Ewens provided an authoritative account on the historical development and extension of population genetics and molecular evolution, especially how Wright, Haldane and Fisher put Darwin theory of evolution on firmer quantitative footing. He emphasizes the essential role that mathematics plays in quantitative formulation of genetics and evolutionary models. For new generation of quantitative biologists, its educational impact will be profound. Ao, Hood and colleagues provided the most recent update on their new stochastic dynamic theory of network biology based on endogenous molecular-cellular network hypothesis, which represent a grand attempt to unify biology from phage lambda to human cancer by evolutionary landscape potentials. The related perspective by Qian expressed his general hope that stochastic physics may prove an eventual quantitative solution to complex systems and biology as it does to thermodynamics of non-equilibrium chemical reaction systems. In the future, *QB* would welcome more concrete experimental data that can substantiate theoretical models. On the omics front, Mias and Snyder summarized their view on the cutting-edge integrative POP (Personal Omics Profiling) technology with personal experience. It provides a glimpse on how quantitative dynamic omics and personalized medicine may

transform future healthcare strategy. Liu and colleagues provided an updated review on computational methodology for ChIP-seq, one of the most comprehensive and quantitative NGS (next-generation sequencing) approaches to create genome-wide protein-DNA interaction map *in vivo*. Mitra and colleagues described their most recent effort on computational neuroanatomy and co-expression of genes in mammalian brain. Together with brain connectome, quantitative gene expression annotated anatomy map will eventually provide physical basis for the understanding of systems biology of the brain as well as the conscious state of the mind. This issue also includes a News and Views briefing on a recent innovative systems biology joint workshop between PKU and UCSF.

The online version of *QB* will be freely available before the end of 2014, and an optional free access model will be in place from 2014. Submission, review, and editorial communications all take place through ScholarONE (<http://mc.manuscriptcentral.com/qb>) — a well known online processing system. The truly international editorial board aims to make *QB* an exciting new home for interdisciplinary quantitative biology-related research and international collaboration. On the occasion of celebrating the 60th anniversary of Double-helix Structure of DNA, the launch of our new journal will stimulate more creative models and innovative engineering of life systems at all levels.

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Co-Editors-in-Chief