



Press Release

The 2014 HFSP Nakasone Award goes to Uri Alon of the Weizmann Institute for Science

The Human Frontier Science Program Organization (HFSP) is pleased to announce that the 2014 HFSP Nakasone Award has been conferred upon Uri Alon of the Weizmann Institute of Science for his pioneering work in discovering network motifs. His discovery of network motifs provided the single most important foundation of the field of systems biology, because it opened up the previously impenetrable complexity of genetic circuits to systematic analysis and understanding.



The HFSP Nakasone Award was established to honour scientists who have made key breakthroughs in fields at the forefront of the life sciences. It recognizes the vision of former Prime Minister Nakasone of Japan in the creation of the Human Frontier Science Program. Uri Alon will present the HFSP Nakasone Lecture at the 14th annual meeting of HFSP awardees to be held in Lugano, Switzerland, in July 2014.

Uri Alon discovered that complex genetic networks can be understood in terms of much simpler building blocks, called network motifs. He discovered these motifs, and elucidated their functional roles in diverse biological systems from bacteria to animal cells. Alon's seminal work involved three key parts as described in the award nomination. "First, he discovered the algorithm that revealed the existence of motifs and their identities. Second, he used this method to catalog the most important motifs in biological systems, including the now ubiquitous Feed-Forward Loop (FFL), which he showed provides a core set of specific signal processing functions in all cells, including temporal filtering, pulse generation, and ratiometric sensing. Third, he systematically analyzed these motifs both theoretically and experimentally to understand their functional capabilities in bacteria and mammalian cells, along the way introducing innovative, elegant, and widely influential approaches based on accurate quantitative measurements in living cells." Together, this work established the modern paradigm for understanding the fundamental design principles of cells. Moreover, Alon made advances in the theory of how genetic circuits and biological modules evolve. His work on multi-objective optimization (Pareto optimality) and cost-benefit analysis in evolution has led to deep, predictive insights into the architecture of genetic circuits.

The discovery of the network motifs has given rise to the systems biology of cellular circuitry. Recognizing this influence, the 6th edition of Watson's classic textbook "Molecular Biology of the Gene" displays Alon's Feed-Forward Loop motif on the cover, replacing the double helix that appeared on the first edition. Network motifs now provide the very language in which genetic networks are imagined, discussed, and explained.

The principle of motif-based analysis of networks has numerous applications beyond biology and provides a beautiful example of a concept discovered in biology that influences other fields throughout science. "Alon showed how the network motif concept he pioneered can be used to identify the most important functional building blocks in social, ecological, and economic networks. Moreover, as biology increasingly expands to include synthetic approaches to building new genetic circuitry, Alon's motifs are providing the guiding design

principles for the new field of synthetic biology. Finally, Alon has made this work accessible to the entire biological community through a textbook, numerous explanatory articles, and a series of remarkably clear and pedagogical lectures, some widely available on the web.”

The HFSP Nakasone Award was established in 2010. Previous recipients have been Karl Deisseroth (2010), Michael Elowitz (2011), Gina Turrigiano (2012), and Stephen Quake (2013).

The Human Frontier Science Program Organization was founded in 1989 to support international research and training at the frontier of the life sciences and on creating opportunities for young scientists. It is supported by contributions from Australia, Canada, France, Germany, India, Italy, Japan, Republic of Korea, New Zealand, Norway, Switzerland, the United States of America, the United Kingdom and the European Commission, which represents the non-G7 states of the European Union. With its collaborative research grants and postdoctoral fellowship programs it has supported approximately 6000 scientists from 70 countries over the last 25 years.