

Research on understanding DNA segregation earns top award for young life scientists

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For his research of DNA segregation, assembly and regulation of bacterial actin-like proteins, and cytoskeleton, Ethan Clark Garner, a regional winner from North America, has been named the Grand Prize winner for the GE & *Science* Prize for Young Life Scientists. The competition, which includes a grand-prize award of \$25,000, is supported by GE Healthcare and the journal *Science*, which is published by AAAS, the nonprofit science society.

Garner will receive his award for his research in the field of molecular biology in Stockholm, Sweden, on Thursday, 11 December, during an award ceremony. He received the grand prize for his essay, "Understanding a minimal DNA segregating machine – Reconstitution and kinetic dissection of a plasmid spindle," which is being published in the 5 December issue of *Science*.

"The award recognizes outstanding doctoral students worldwide and rewards innovative research in the field of molecular biology," said Monica Bradford, executive editor of *Science*. "Supporting promising young molecular scientists early in their careers is important for scientific progress."

Ethan Garner's prize-winning essay describes his research on how a simple system helps ensure that a dividing bacterial cell provides both its halves with duplicate sets of genetic material. His research has focused on the R1 plasmid, one of the rings of DNA found in *E. coli*, which plays a critical role in helping the bacteria become resistant to

antibiotics. Two proteins, ParR and ParM, plus a DNA sequence on the plasmid, parC, create a spindle that pushes duplicate R1 plasmids to opposite ends of the cell.

"Our work shows that only three genes from a plasmid are able to segregate DNA in a test tube, and by studying this machine, we were able to dissect the underlying mechanisms of this process," said Garner. "What is striking is that biology has evolved a remarkably minimal solution to the seemingly complex task of DNA segregation," Garner said in an interview.

By reconstructing this system in a test-tube, Garner has shown how ParR and parC form a complex that stabilizes ParM, which then assembles long filaments that make up the bulk of the spindle. ParM only forms stable filaments when capped at both ends by a parC/ParR complex. Garner says that his research addresses an important question in basic biology, namely what are the basic principles of cell division, and that his findings also raise the possibility of developing a new type of antibiotic that would work by targeting ParM.

"I have been really impressed by the quality of the papers submitted for the GE and Science prize over the years. This year's winners are very impressive young scientists," said Peter Ehrenheim, president and CEO, Life Sciences, GE Healthcare. "It feels good to see such a strong pipeline of talent driving hard for discoveries that will make our world a better place."

Ethan Garner, born in Richland, Washington, received his B.S. in biochemistry from Washington State University, where he worked with Keith Dunker developing tools to predict disordered regions within proteins. At the University of California, San Francisco, he did his graduate work in the field of kinetics and regulation of prokaryotic polymers with Dyche Mullins. Garner will be working in Boston with

Tim Mitchinson, Xiaowei Zhuang, and Alice Ting on elucidating the process of prokaryotic DNA segregation.

Each year since 1995, the GE & *Science* Prize for Young Life Scientists has recognized outstanding young molecular biologists at an early stage of their careers. Some 58 regional winners and 14 grand prize winners have so far received the award, honoring exceptional thesis work in the field of molecular biology.

Xu Tan, from the University of Washington, is the winner of the North American regional prize for his essay on plant hormone auxin functions where he "addressed a century-old problem in our understanding of plants, that is, how a simple hormone auxin functions to affect so many aspects of the life of plant." He explained, "And, very satisfyingly, we found the same principle of how auxin works can be translated into drug discovery to help design drugs for cancer and other diseases."

"I feel extremely fortunate to receive the GE & Science prize. I thank GE and Science for their generous sponsorship. I specially thank my Ph.D. advisor, Dr. Ning Zheng for his unwavering support and encouragement, which will continue to be a beacon for my scientific career," he added.

Applicants for the 2008 GE & *Science* Prize for Young Life Scientists earned their Ph.D. degrees in 2007 and submitted a 1,000-word essay based on their dissertations. Their essays were judged on the quality of research and the applicants' ability to articulate how their work would contribute to the field of molecular biology, which investigates biological processes in terms of the physical and chemical properties of molecules in a cell.

A judging panel selects the GE & *Science* Prize for Young Life Scientists grand prize winner and may present regional awards in four geographic

regions: North America, Europe, Japan and all other countries. These regional winners receive \$5,000 awards. In addition to the grand prize, the 2008 awards also recognize the following regional winners:

Regional Winners:

Xu Tan (North America): For his essay, "Plant Hormone Auxin Functions as Novel Molecular Glue." Tan spent his first 18 years in Changsha, China. He became hooked on biology in high school and won a national first prize in the biology Olympiad. After earning his B.S. from the University of Science and Technology of China in Hefei, he pursued graduate studies at the University of Washington, Seattle. Under the advice of Ning Zheng, Tan did his thesis research on the structural biology of ubiquitin ligases. Looking forward to expanding his research horizons, he is starting a postdoctoral position with Steve Elledge at Brigham and Women's Hospital, Harvard Medical School.

Sabrina Büttner (Europe): For her essay, "Endonuclease G Regulates Cellular Fate." Dr. Büttner was born in Mutlangen, Germany. She studied biochemistry at the Eberhardt-Karls University, Tübingen, Germany, and received her diploma with honors in 2004. During her Ph.D. studies, conducted under the guidance of Frank Madeo at the Institute for Molecular Biosciences, University of Graz, Austria, she investigated yeast programmed cell death in the context of aging and oxidative stress, identifying molecular mechanisms of apoptosis in *S. cerevisiae*. After defending her doctoral thesis in 2007, Dr. Büttner continued her research in the Madeo lab as a postdoctoral fellow, focusing on the further establishment of yeast as a model for neurodegenerative diseases.

Kaori Yamada (Japan): For her essay, "Moving PIP3 Regulates Cell Polarity." Yamada grew up in Kinokawa, a beautiful town in Wakayama, Japan. She received a B.S. degree from the University of Tokyo. A

strong interest in life science led her to remain there as a graduate student in Yasuhisa Fukui's laboratory. During her Ph.D. project, she spent time in the laboratory of Athar H. Chishti, a collaborator at the University of Illinois, Chicago. There, Yamada elucidated how kinesin transports the lipid messenger PIP3 in neurons. She completed her Ph.D. in January 2007 and is currently a postdoctoral fellow at the University of Illinois, Chicago.

Sarel Fleishman (All Other Countries): For his essay, "Modeling at the Gates of the Cell." Fleishman received an M.Sc. in biochemistry (summa cum laude) and a Ph.D. (with distinction) from Tel-Aviv University, Israel, where he studied in the group of Nir Ben-Tal. During his graduate studies, he investigated the structure, function, and evolution of membrane proteins associated with hereditary hearing loss and neurodegenerative diseases, cancer, and bacterial drug resistance. He is currently a Human Frontier Research Postdoctoral Fellow working on computational design of protein-based inhibitors toward pathogenic molecules in David Baker's laboratory at the University of Washington.

For the full text of essays by the regional winners and for information about applying for next year's awards see www.sciencemag.org/feature/dat.../prizes/ge/index.dtl.

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