Tracking the Evolution of Antibiotic Resistance

Philadelphia, Pa. – With the discovery of antibiotics, medicine acquired power on a scale never before possible to protect health, save lives, and reduce suffering caused by certain bacteria. But the power of antibiotics is now under siege because some virulent infections no longer respond to antibiotic drugs.

This antibiotic resistance is an urgent public health threat that a team of researchers from Sabanci University in Istanbul, Turkey, and Harvard Medical School and Harvard University in Cambridge, Mass., aim to stop. Their approach is based on an automated device they created that yields a new understanding of how antibiotic resistance evolves at the genetic level. The team will present their work at the 57th Annual Meeting of the Biophysical Society (BPS), held Feb. 2-6, 2013, in Philadelphia, Pa.

Called the "morbidostat," the device grows bacteria in various concentrations of antibiotic. This enabled researchers to identify the concentrations at which the antibiotics stopped working and the bacteria became resistant to therapy. Next, they targeted key genes involved in creating the drug-resistant states. Their approach documented real-time changes in genes that gave bacteria an advantage in evolving to "outwit" antibiotics.

Knowledge at the gene level can be applied to the molecular design of the next generation of bacteria-killing antibiotics.

"Morbidostat is designed to evolve bacteria in conditions comparable with clinical settings," explains Erdal Toprak of Sabanci University. "Combined with next generation genome sequencing technologies, it is possible to follow the evolution of resistance in real time and identify resistance-conferring genetic changes that accumulate in the bacterial genome."

Data show an unusual survival profile of the common bacteria they used, *Escherichia coli*. "We identified striking features in the evolution of resistance to the antibiotic trimethoprim," Toprak says. It was these unusual features that helped them isolate the gene involved in conferring antibiotic resistance through multiple mutations.

The team's next steps will involve determining how this genetic information might one day be applied to drug design to develop new antibiotic therapies.

Presentation #3390-Pos, "Evolution of antibiotic resistance through a multi-peaked adaptive landscape," will take place at 10:30 a.m. on Wednesday, Feb. 6, 2013, in the Pennsylvania Convention Center, Hall C. ABSTRACT: http://tinyurl.com/bfcke65

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This news release was prepared for the Biophysical Society (BPS) by the American Institute of Physics (AIP).

ABOUT THE 2013 ANNUAL MEETING

Each year, the Biophysical Society Annual Meeting brings together over 6,000 research scientists in the multidisciplinary fields representing biophysics. With more than 3,900 poster presentations, over 200 exhibits, and more than 20 symposia, the Annual Meeting is the largest meeting of biophysicists in the

world. Despite its size, the meeting retains its small-meeting flavor through its subgroup meetings, platform sessions, social activities, and committee programs.

The 57th Annual Meeting will be held at the Pennsylvania Convention Center (1101 Arch Street, Philadelphia, PA 19107). For maps and directions, please visit: http://www.paconvention.com/explore-philadelphia/directions-and-parking.

QUICK LINKS
Meeting Home Page:
http://www.biophysics.org/2013meeting/Main/tabid/3523/Default.aspx
Housing and Travel Information:
http://www.biophysics.org/2013meeting/AccommodationsTravel/HotelInformation/tabid/3621/Default.aspx
Program Abstracts and Itinerary Planner:
http://www.abstractsonline.com/plan/start.aspx?mkey=%7B763246BB-EBE4-430F-9545-81BC84D0C68C%7D

PRESS REGISTRATION
The Biophysical Society invites credentialed journalists, freelance reporters working on assignment, and public information officers to attend its Annual Meeting free of charge. For more information on registering as a member of the press, contact BPS Director of Public Affairs and Communications Ellen Weiss at eweiss@biophysics.org or 240-290-5606, or visit http://www.biophysics.org/2013meeting/Registration/Press/tabid/3619/Default.aspx. Press registration will also be available onsite at the Pennsylvania Convention Center in the Biophysical Society's meeting office, Room 304VIP.

ABOUT BPS
The Biophysical Society (BPS), founded in 1958, is a professional scientific society established to encourage development and dissemination of knowledge in biophysics. The Society promotes growth in this expanding field through its annual meeting, monthly journal, and committee and outreach activities. Its 9000 members are located throughout the U.S. and the world, where they teach and conduct research in colleges, universities, laboratories, government agencies, and industry. For more information on the Society or the 2013 Annual Meeting, visit www.biophysics.org.

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