New web tool fights antibacterial resistance

June 15 2021, by Callie Rainosek

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In 1943, two scientists named Max Delbrück and Salvador Luria conducted an experiment to show that bacteria can mutate randomly, independent of external stimulus, such as an antibiotic that threatens a bacterial cells' survival. Today the Luria-Delbrück experiment is widely used in laboratories for a different purpose—scientists use this classic

experiment to determine microbial mutation rates. When performing the Luria-Delbrück experiment, scientists need efficient computer algorithms to extract reliable estimates of mutation rates from data, and they also need well-designed software tools to access these sophisticated algorithms.

Through the years, several web tools that allow researchers to more easily input and analyze data on a computer were developed to increase efficiency and efficacy of the Luria-Delbrück experiment. However, no existing web tool allows scientists to access many recently developed algorithms that can extract even more accurate estimates of microbial mutation rates from data.

Qi Zheng, Ph.D., professor at the Texas A&M University School of Public Health, recently developed a new web tool called webSalvador to fill several gaps left by existing web tools. In the *Microbiology Resource Announcements (MRA)* Journal, Zheng explains how webSalvador offers many desirable capabilities that are vital to bacteria mutation research, including more accurate methods for constructing confidence intervals and new methods for comparing mutation rates.

The web tool also eliminates the need for scientists to learn programming and software language, which Zheng described as an "important barrier" to using the Luria-Delbrück experiment to tackle important problems in mutation research, such as the global public health headache of bacterial drug resistance.

"Learning software languages can be challenging and time consuming for most biologists," Zheng said. "With webSalvador, biologists can input data and see results easily."

Increasing the efficiency and efficacy of the Luria-Delbrück experiment is important because it can ultimately help advance mutation research,

which is vital to many branches of life sciences. Zheng cites bacterial drug resistance as one of the most important applications of the Luria-Delbrück experiment, and refers to multi-drug resistant tuberculosis as an example in which advanced mutation research is vital. He calls microbial drug resistance a "widespread, global health problem."

More information: Qi Zheng et al, webSalvador: a Web Tool for the Luria-Delbrük Experiment, *Microbiology Resource Announcements* (2021). DOI: 10.1128/MRA.00314-21

Provided by Texas A&M University