

problem by attaching the compound to a smaller molecule known as a peptide. She designed peptides that were able to burrow through the cell wall, dragging the Morpholino along with them.

Now a senior research associate professor in the College of Veterinary Medicine, Moulton continues to investigate methods for delivering these gene-based drugs where they can do the most good. An important benefit of this technology, she adds, is that it can respond quickly to mutations that

render pathogens resistant to antibiotics. “With Morpholinos, we can quickly sequence the DNA, design a compound to accommodate the mutation, make the compound and put the right delivery component on it in about three weeks,” she told Lyn Smith-Gloria, a publicist in the college.

Success with *Acinetobacter* was followed by another milestone in 2014. Iversen and his colleagues at Sarepta Therapeutics reported in the journal *Antimicrobial Agents and Chemotherapy* that Morpholinos customized to Ebola genes protected laboratory monkeys against the disease.

The future of molecular medicine is bright, says Geller. “It’s expanding exponentially with the sequencing of the human genome. And now over 5,000 bacterial genomes have been sequenced. The data that is available is enormous, and we’re only now learning what to do with that information.” **terra**

Transmission Lines

The Atlas of Infectious Diseases

Infectious diseases are not equal-opportunity illnesses. Much depends on location, income and access to clean water, medical care and public health services. For example, mosquito control is still a bulwark against malaria and yellow fever. Historically, trade routes were highways for pathogens such as *Vibrio cholera* and *Yersinia pestis*, the bacteria that cause cholera and plague respectively.

The close relationship between geography and disease is revealed in a new interactive atlas produced by Oregon State University students. *The Atlas of Infectious Diseases* combines global data on wealth, water, health care and historical and modern diseases such as tuberculosis, malaria, AIDS, polio and Ebola.

“Geography introduces a multiscale analysis of the distribution and spread of infectious diseases between individuals and across regions,” says Brooke Marston, one of the authors and a graduate student in the College of Earth, Ocean, and Atmospheric Sciences. Marston was one of 19 students who produced the atlas in a computer-assisted cartography course taught by Assistant Professor Bernhard Jenny.

The biggest challenge, she adds, was getting access to data. “There was not always a wealth of data readily available. Additionally, privacy laws may require data to be aggregated and stripped of individual identifiers, making it difficult to visualize data on a finer scale.”

The atlas was produced for the iPad and can be downloaded free from the iBooks Store or the OSU Cartography and Geovisualization Group’s website, cartography.oregonstate.edu.



A non-interactive version for desktop computers and other tablets is also available.

The atlas received the 2014 New Mapmaker Award from the British Cartographic Society and the National Geographic Society and the 2014 NACIS (North American Cartographic Information Society) Student Dynamic Map Competition Award for Best Narrative Map.