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News Release

USU Scientists Uncover Common Ancestry of Bacterium and Plants *Discovery Could Provide Clues to New Treatments for Chlamydia*

Bethesda, MD – Researchers from the Uniformed Services University of the Health Sciences (USU) have discovered that *Chlamydia*, a bacteria that causes a sexually transmitted disease (STD), shares an evolutionary heritage with plants. That shared evolutionary heritage, which is not found in most other bacteria, points to a prime target for development of an effective cure for *Chlamydia* infections.

Diaminopimelate, or DAP, is an unusual amino acid that is only synthesized by plants and bacteria. Plants use DAP to make lysine, an essential amino acid, while bacteria use DAP both to make lysine and as a key building block of their cell wall.

In studying the genome sequence of *Chlamydia trachomatis* for the DAP synthesis pathway, Anthony Maurelli, Ph.D., professor of Microbiology and Immunology at USU, along with Andrea McCoy, Ph.D., a former USU Molecular and Cell Biology graduate student, and Nancy Adams, a scientist in Maurelli's laboratory, discovered that *Chlamydia* appeared to be missing genes for three of the eight enzymes needed to make DAP. They discovered that a single *Chlamydia* gene, encoding the enzyme L,L-diaminopimelate aminotransferase, filled this pathway hole and provided a new route for synthesizing DAP.

The gene that Maurelli's team discovered was similar to a sequence that Thomas Leustek of Rutgers University had reported in the mustard plant *Arabidopsis* earlier this year. Collaboration between the two groups allowed them to show that the *Chlamydia* enzyme was the same as the plant enzyme and that the pathway used by plants to produce the essential amino acid lysine is probably used by *Chlamydia* to synthesize DAP for its cell wall.

Chlamydia infections commonly cause urethritis in men, and in women (who are generally asymptomatic with it), if untreated, can lead to pelvic inflammatory disease, ectopic pregnancy and infertility. An estimated 2.8 million men and women each year are infected with *Chlamydia* making it the most common bacterial sexually transmitted infection in the United States. *Chlamydia* can be easily treated and cured with antibiotics. However, bacteria often develop resistance to antibiotics, and this discovery offers potential for new drug development. The discovery also suggests that inhibitors of this new enzyme may prove to be effective herbicides as well.

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The latest work, which describes the similarities in the enzymes of *Chlamydia* and plants, was published in the *Proceedings of the National Academy of Sciences*' Online Early Edition this week. In addition to Dr. Maurelli's team, other authors include Thomas Leustek and Andre Hudson of Rutgers University and Charles Gilvarg of Princeton University.

Established by U.S. Congress in 1972, the Uniformed Services University of the Health Sciences is located on the campus of the National Naval Medical Center in Bethesda, Md., and is the nation's only federal school of medicine and graduate school of nursing.

For more information, call the Office of External Affairs at (301) 295-3578.

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