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Taking a Shot at Eradicating Chlamydia

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Taking a shot at eradicating *Chlamydia*

Chlamydia, the leading sexually-transmitted bacterial infection in the United States, can cause severe health disorders including inflammation of the cervix in women and the urethra in men; pelvic inflammatory disease; infertility and ectopic pregnancy; trachoma, a preventable, blinding disease in underdeveloped parts of the world; and an inflammatory reactive arthritis.

A Wayne State University husband–wife team is leading research to elucidate the molecular details of the synovial, or joint-related, pathogenesis process elicited by *Chlamydia trachomatis, (C trachomatis),* as well as developing a vaccine to protect against infection.

Alan Hudson, Ph.D. and Judith Whittum-Hudson, Ph.D., both professors of immunology and microbiology in the Wayne State University School of Medicine, have discovered that *C trachomatis* can generate persistent, difficult to detect infections of the synovium, the thin layer of tissue which lines the joint space, causing reactive arthritis. Until recently, such persistent infections had proven resistant to antibiotics and other relevant therapies.

"We have discovered that, contrary to current thinking, it is not genital strains of *C trachomatis* that cause the inflammatory arthritis," said Hudson. "Rather, only trachoma strains known for causing ocular disease, which are found in low numbers in genital inocula, appear to disseminate from the genital tract to the joint."

Further studies in collaboration with a rheumatologist/researcher at the University of South Florida's School of Medicine, demonstrated for the first time that a combination antibiotic treatment, in lieu of single antibiotic treatment, is effective in eliminating persistent *C trachomatis* in the synovium. This has implications for treatment of disseminated chlamydial infections at other anatomic sites in addition to the synovium.

Taking a combined antimicrobial approach using one antibiotic that inhibits RNA polymerase and heat shock proteins along with another that inhibits bacterial protein synthesis, eradication of persistent chlamydiae may lead to improvement or possibly a cure for the disease.

"Our data give hope for the development of therapies to improve the clinical symptoms of *Chlamydia*-induced reactive arthritis centered on this new treatment approach," said Hudson. "These combined therapies may not only significantly improve the treatment of persistent chlamydial infections; they may also have important implications in a number of other chronic *Chlamydia*-related diseases."

Getting closer to eliminating *Chlamydia*

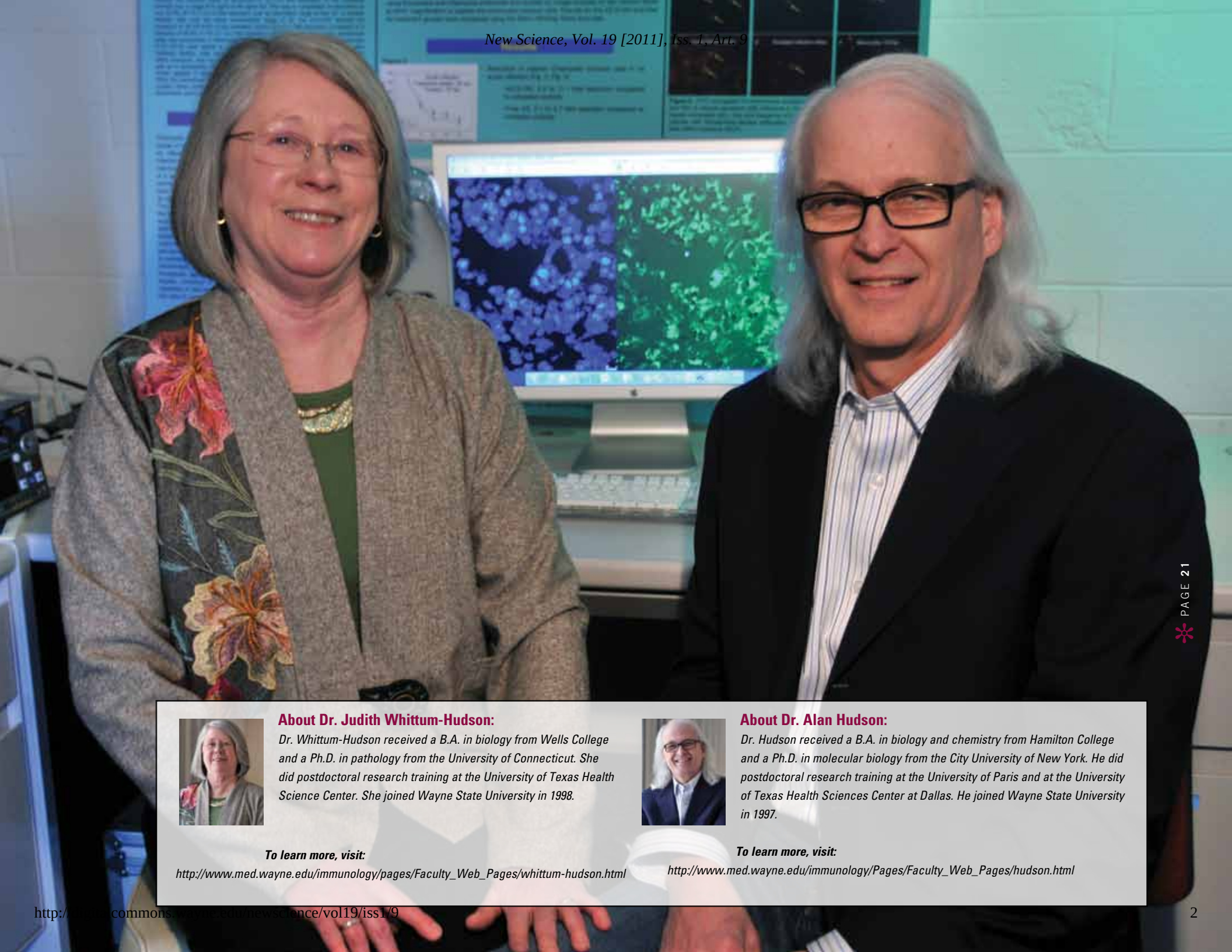
After nearly four decades of research, Whittum-Hudson's research on chlamydial immunopathogenesis and vaccine development is beginning to pay off. She has developed and characterized novel vaccine candidates against chlamydial infections, and several patent applications have been possible because of these efforts.

Most recently Whittum-Hudson has identified several peptides that have potential as vaccines against *Chlamydia*. With many areas of the world lacking access to basic health care and treatments such as antibiotics, a new vaccine given orally or through intranasal delivery may offer more effective protection against *Chlamydia* infections, ultimately decreasing a significant number of cases of the infection.

"I am also exploring novel combinations of these and additional peptides that are mimotopes for the carbohydrate associated with a chlamydial glycolipid antigen," said Whittum-Hudson. "Because these peptides mimic the chlamydial organism, they induce antibodies and other immune responses that recognize the whole organism and may allow them to serve as vaccine candidates." An important aspect of these vaccine candidates is that they could protect against all types of *Chlamydia* capable of infecting humans as well as many animal species.

Using the same theory as vaccine delivery, the duo is also working with researchers from WSU's Department of Chemical Engineering to develop nanomedicine approaches to diagnose and deliver therapy for *Chlamydia*-associated diseases, particularly in the context of the inflammatory reactive arthritis. These collaborations have led to new nanomedicine endeavors with nanoparticles and dendrimers that specifically target infected cells for diagnosis and treatment of chlamydial infections. New patent applications and grants have resulted from these nanotechnology focused studies.

"These various research efforts demonstrate an ongoing, upward trajectory in new approaches to chlamydial research," said Whittum-Hudson. "Through this cutting-edge research, we are closer to one day eliminating diseases caused by *Chlamydia*."



About Dr. Judith Whittum-Hudson:

Dr. Whittum-Hudson received a B.A. in biology from Wells College and a Ph.D. in pathology from the University of Connecticut. She did postdoctoral research training at the University of Texas Health Science Center. She joined Wayne State University in 1998.

To learn more, visit:

http://www.med.wayne.edu/immunology/pages/Faculty_Web_Pages/whittum-hudson.html

About Dr. Alan Hudson:

Dr. Hudson received a B.A. in biology and chemistry from Hamilton College and a Ph.D. in molecular biology from the City University of New York. He did postdoctoral research training at the University of Paris and at the University of Texas Health Sciences Center at Dallas. He joined Wayne State University in 1997.

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