Scientists at The Scripps Research Institute Solve Structure of Fibers that Attach Many Bacteria to Host Cells

La Jolla, CA. November 2, 1995 — A team of scientists at The Scripps Research Institute, led by John L. Tainer, Ph.D., has succeeded in characterizing the structure of hair-like fibers responsible for the attachment of many pathogenic bacteria to host cells. Solving the three-dimensional structure of the protein, pilin, and the fibers it forms could provide key information for drug or vaccine design against the many different pathogens that require Type IV pili for host cell targeting and infection, according to Tainer.

He continued, "While this work focuses on pilin from Neisseria gonorrhoeae, the pathogen responsible for gonorrhea, similarities to Neisseria meningitidis, the cause of the often fatal bacterial meningitis, may lead to a common vaccine for both diseases."

The work was reported today in the journal, Nature, in an article entitled, "Structure of the fibre-forming protein pilin at 2.6 A resolution," by Hans E. Parge, Katrina T. Forest, Michael J. Hickey, Deborah A. Christiansen, Elizabeth D. Getzoff, and John A. Tainer.

Using an advanced biophysical technique known as x-ray crystallography combined with other data, the scientists have demonstrated how the protein is likely to assemble and how it assists
pathogens in avoiding the body's normal defenses. The human body produces antibodies to fight bacterial infection, but certain bacteria have evolved ways of eluding those defenses by producing many variants in the targets, called antigens, that the antibodies recognize and bring under attack.

The structure solved by the TSRI research group reveals a novel pilin fold and the structural basis for this so-called antigenic variation that allows Neisseria gonorrhoeae, the human pathogen responsible for the most widespread sexually transmitted disease, to escape the host immune response. It provides the first structure for any protein that undergoes direct antigenic variation, a class which includes antigens from malaria, by replacing or recombining antigens exposed to the immune system.

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NOTE: A videotape of the assembly is available upon request.