

A deeper look into the pathogen responsible for crown gall disease in plants

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Next week's *Journal of Biological Chemistry* "Paper of the Week" by Wai Mun Huang and colleagues at the University of Utah Health Sciences Center and the University of Minnesota reveals new insights into the molecular properties of the rod-shaped soil bacterium *Agrobacterium tumefaciens*, the pathogen responsible for crown gall disease, a tumor-forming infection in plants, such as tomatoes, walnuts, grapes and beets.

The bacterium is parasitic: It infects its plant host by entering through an open wound, inserts a small segment of its genetic code into the plant's genome, devours energy made by the plant, and forms knobby brown lesions on the plant stem.

Huang's group focused on the pathogen's genetic material. Most bacteria have circular chromosomes. But *A. tumefaciens* C58, the strain studied by Huang's group, contains one circular chromosome and one linear chromosome (along with two circular plasmids). Huang's research illuminates how this bacterium maintains its linear chromosome.

Huang's team ascertained the DNA sequence for the telomeres, or the protective end caps, of the linear chromosome in *A. tumefaciens* C58 and confirmed that an enzyme, TelA, actually forms them by making hairpin loops. These end caps are important for maintaining the stability of linear chromosomes. Interestingly, TelA also binds the telomeres. This activity is unique among [bacterial enzymes](#) of this kind and may protect the telomeres (which degrade over time and thus lose their ability

to preserve DNA), as telomere [binding proteins](#) do in eukaryotes.

"Hairpin-ended linear chromosomes and plasmids are found in a number of branches of bacteria and viruses," Huang says. "They are simple and elegant to form and to maintain." But what remains to be understood is why this linear configuration is not more common or even the preferred configuration for bacteria, Huang emphasizes.

More information: "Linear chromosome generating system of *Agrobacterium tumefaciens* C58: Protelomerase generates and protects hairpin ends" by Wai Mun Huang, Jeanne DaGloria, Heather Fox, Qiurong Ruan, John Tillou, Ke Shi, Hideki Aihara, John Aron, and Sherwood Casjens

Link to Paper in Press version of article: bit.ly/MfBz8C

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