Genomic 'haircut' makes world's tiniest genome even smaller: research

September 21 2010

The world's tiniest nuclear genome appears to have "snipped off the ends" of its chromosomes and evolved into a lean, mean, genome machine that infects human cells, according to research published today by University of British Columbia scientists.

Until recently, *E. cuniculi*, a parasitic fungus commonly found in rabbits that can also be fatal to immunocompromised humans, has been widely regarded as having the smallest known nuclear genome. At 2.9 millions base pairs (Mbp) and approximately 2,000 genes, the genome of *E. cuniculi* is less than one-two thousandth the size of the human genome.

But now, a team of researchers led by UBC Botany Prof. Patrick Keeling sequenced the genome of a closely related parasite that makes the *E. cuniculi* genome seem positively king-sized. The genome of *E. intestinalis*, a sister species of *E. cuniculi* that infects human intestines, is 20 per cent smaller, at only 2.3Mbp.

"On one end of the spectrum, genomes can get larger almost without limit, but there is a limit to how small they can get - they can't be less than zero," says Keeling, whose work is published in today's issue of the journal *Nature Communications*. "And the question that fascinated us was 'in an already tiny genome, what else can be lost'?"

Keeling and a team of researchers from Switzerland, Canada and the U.S. compared the genome of *E. cuniculi* and *E. intestinalis* and found little difference between the chromosome "cores" but that the ends were

all "trimmed" in *E. intestinalis*.

"The chromosomes are long threads of DNA, and in *E. intestinalis* its almost as though it got a haircut, removing hundreds of genes, but all from the ends of the threads," says Keeling.

Keeling, director of the Centre for Microbial Diversity and Evolution and a member of Beaty Biodiversity Research Centre at UBC, says the discovery provides insights into how genomes evolve, especially in extreme conditions.

Provided by University of British Columbia