For a tree time can be slowed down: Analysis of proliferation capacity of tree cells

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Time can (apparently) be slowed down for Pinus longaeva, a pine living on West coast of United States. Trees are found to be more than 3,000 years old and several are over 4,000 years old. The cells of these trees, as well as trees with normal life span, were extracted for telomere and/or telomerase activity.

In general, normal somatic cells proliferate with a finite replicative capacity and with each cell division, telomeres (the physical ends of linear chromosomes) progressively shorten until they reach a critical length, at which point the cells enter replicative senescence. Some cells maintain telomere length by the activation of the telomerase enzyme.

The bristlecone pine, Pinus longaeva, is the oldest known living eukaryotic organism, with the oldest on record turning 4770 years old in 2005. We undertook an investigation of telomere length and telomerase activity in such trees with objective to determine the following:
1. What changes occur, if any, in telomere length and telomerase activity with age.
2. What roles, if any, telomere length and telomerase activity may play in contributing to the increased life-span and longevity of P. longaeva with age, as well as in other tree species of various life-spans.

The results from this study support the hypothesis that both increased telomere length and telomerase activity may directly/indirectly contribute to the increased life-span and longevity evident in long-lived pine trees (i.e., 2000-5000 year life-spans) compared to medium-lived (400-500 year life-span) and short-lived (100-200 year life-span) pine trees, as well as in P. longaeva with age.

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