



A fascinating doctoral thesis

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Speaker's corner

A fascinating doctoral thesis

In early March 2004 I had the opportunity of travelling to Trondheim. Although not exactly paradise, this Norwegian city is interesting because it has the most northerly cathedral of Europe. It was built in the 12th century in the Romanesque style, and has been carefully preserved through the ages. The city was still partly covered by snow, but this was rapidly melting in a heavy rain. To find shelter I strolled into the cathedral bookstore, where I discovered a most fascinating doctoral thesis.

We all know that one can write doctoral theses about any subject, but this student had really found an extraordinary topic. He had written his thesis about weathering effects on the stone surface of Trondheim cathedral—a detailed study of how wind, precipitation, and frost have left their traces on this church. Pictures of roofs, windows, and walls showed the destructive influences of the hostile environment in which this church has been built. It was only through regular, careful repair that the building had survived, and this thesis was an attempt to contribute to protecting the building against future attacks on its integrity by proposing a few improvements of the design of its surface.¹ Quite clearly, its author had come to love this building dearly. It was difficult to escape the impression that the author had seen this cathedral as a living being—a grandmother whose hair, face, and skin have suffered from the wear and tear of time.

Browsing through this remarkable book I realised that this image of a building surviving in a hostile environment is actually a nice metaphor for human aging. Aging is a matter of accumulating damage to the body, plus a terrible design failure. It is a matter of being exposed to the wear and tear of time, plus a lack of sufficient repair mechanisms. The latter is evident from the fact that there are examples of species that do not show signs of aging. The oldest living organism in the world is a bristlecone pine (*Pinus longaeva*) nicknamed 'Methuselah'. He is 4770 years old and lives at high altitudes

in a dry area in the White Mountains, east California (USA). Unlike human beings, bristlecone pines show no inherent signs of senescence, and even the oldest among these remarkable trees continue to produce cones with viable seeds.² Longevity in trees is achieved by characteristics such as retention of stem cells after each growth cycle, ability to replace complete damaged organs, a sectorized vascular system that permits part of a tree to survive when the whole cannot, formation of clones, and other biological mechanisms that human beings must do without.³

Can we live longer? Evolution has endowed us with biological systems that were intended to last for 40, 60, perhaps 80 years, and revolutionary advances in life expectancy are probably dependent on engineering these biological systems. Perhaps, if we unravel the secrets of bristlecone pines and other long lived organisms, we can bypass evolution and develop interventions that increase average human life expectancy at birth to 100, 120, perhaps 200 years. If we would prevent the death rate to rise after the age of adolescence, by radically improving our environment and drastically improving our design, life expectancy would increase to 1200 years,⁴ a value approximating that of bristlecone pines and Trondheim cathedral. The "only" remaining question is whether we would actually enjoy it ...

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REFERENCES

- 1 **Storemyr P.** *The stones of Nidaros. An applied weathering study of Europe's northernmost medieval cathedral.* PhD thesis. Trondheim: Norwegian University of Science and Technology, 1997.
- 2 **The ancient bristlecone pine.** <http://www.sonic.net/bristlecone/growth.html> (accessed 12 Sep 2004).
- 3 **Lanner RM.** Why do trees live so long? *Ageing Res Rev* 2002;1:653–71.
- 4 **Ricklefs RE, Finch CE.** *Aging. A natural history.* New York: Scientific American Library, 1995.