At the moment of writing this editorial (September 2004), the oldest living person in the world is Hendrikje van Andel. She celebrated her 114th birthday on June 29 of this year, and lives in an old people’s home in Hoogeveen, the Netherlands. When interviewed by the world press she cheerfully gave away her secret: a herring and a glass of orange juice a day. While survival beyond the age of 100 has become more common during the 20th century, survival beyond the age of 110 is still extremely rare, and survival beyond the age of 120 is practically non-existent. The eight years that still separate Hendrikje van Andel from the age at which world record holder Jeanne Calment died in 1997, clearly illustrate how much of a ‘statistical outlier’ the latter was. Jeanne Calment was born in 1875 in the French town of Arles, where she lived all her life and encountered Vincent van Gogh in her father’s shop in the 1890s. “I’ve been forgotten by God”, is how she explained her miraculous survival that must have been a lonely experience indeed, as she survived her only grandson in 1963.1

At the moment of writing this editorial (September 2004), 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). He is not exactly beautiful: he stands 18 metres tall, has a misshapen trunk measuring 1 1/2 metres wide, and is partly bald as one would expect. Unlike human beings, however, bristlecone pines show no inherent signs of senescence, and even the oldest among these remarkable trees continue to produce cones with viable seeds. Their potential life spans seem to be limited by pests, fires and soil erosion only.2 Several other tree species are very long lived, and many cities and villages in Europe have their longest lived tree, usually an oak, chestnut or lime tree thought to be a few centuries old. Longevity in trees is achieved by characteristics such as retention of stem cells after each growth cycle, ability to replace complete damaged organs, a sectored vascular system that allows part of a tree to survive when the whole cannot, formation of clones, and other biological mechanisms that human beings must do without.3

Why then do humans progressively die from ‘natural causes’ such as diseases and senescence while some trees do not? Ageing is usually defined as the progressive loss of function accompanied by the decreasing fertility and increasing mortality rates that we see with advancing age. We tend to accept these phenomena as the result of extrinsic mortality (due to trauma, predators, infection, ...), which leads to a progressive weakening of the force of selection with increasing age. By an age when survivorship has declined to low levels, the force of selection is too weak to oppose the accumulation of deleterious mutations. If extrinsic mortality is high, therefore, as it must have been during the largest part of mankind’s history, there is little selection for a high level of somatic maintenance (required to counteract the effects of ageing), and evolution will select for a high level of reproduction instead. If extrinsic mortality is low, as in the case of bristlecone pines, evolution will favour greater investments in maintaining the organism intact.4

Does this imply that further breakthroughs in human life expectancy are unlikely? On this issue, the world’s experts are divided. There are those who argue that evolution has endowed us with biological systems that were intended to last for 40, 60, perhaps 80 years, and that it is unlikely that we will in the foreseeable future be able to engineer these biological systems effectively.5 And there are those who see sufficient scientific progress to believe that such engineering will be possible.6 Perhaps, if we unravel the secrets of bristlecone pines and other long-lived organisms, we can by-pass evolution and develop interventions that increase average human life expectancy at birth to 100, 120, perhaps 200 years.

Would this be desirable? On this issue, the general public is divided. Of course, there are many who would like to be the first to apply new life-extending technologies, but there are as many others who fear the possible emptiness of extra decades of survivorship. As British poet Roger McGough writes in his poem on the bristlecone ‘Methuselah’: ‘If truth be known I would rather be a flower, or a leaf that lives/ and breathes with brief intensity./ My life is as thin as the wind/ And I am done with counting stars./ On the side of this mountain/ I might live forever,/ Could you imagine anything worse?/ My name is Methuselah and this is my curse’.

One conclusion imposes itself: whatever the pace at which human life expectancy increases, investments in life extension will need to go hand in hand with enriching the longer lives of the elderly.

REFERENCES