

# Longevity

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The word "**longevity**" is sometimes used as a synonym for "life expectancy" in demography or to connote "long life", especially when it concerns someone or something lasting longer than expected (an ancient tree, for example).

Reflections on longevity have usually gone beyond acknowledging the brevity of human life and have included thinking about methods to extend life. Longevity has been a topic not only for the scientific community but also for writers of travel, science fiction, and utopian novels.

There are many difficulties in authenticating the longest human life span ever by modern verification standards, due to inaccurate or incomplete birth statistics. Fiction, legend, and folklore have proposed or claimed life spans in the past or future vastly longer than those verified by modern standards, and longevity narratives and unverified longevity claims frequently speak of their existence in the present.

A life annuity is a form of longevity insurance.

## History

A remarkable statement mentioned by Diogenes Laertius (c. 250 AD) is the earliest (or at least one of the earliest) references about *plausible* centenarian longevity given by a scientist, the astronomer Hipparchus of Nicea (c. 185 – c. 120 BC), who, according to the doxographer, was *assured* that the philosopher Democritus of Abdera (c. 470/460 – c. 370/360 BC) lived 109 years. All other accounts given by the ancients about the age of Democritus appear, without giving any specific age, to agree that the philosopher lived over 100 years. This possibility is likely, given that many ancient Greek philosophers are thought to have lived over the age of 90 (e.g., Xenophanes of Colophon, c. 570/565 – c. 475/470 BC, Pyrrho of Ellis, c. 360 – c. 270 BC, Eratosthenes of Cirene, c. 285 – c. 190 BC, etc.). The case of Democritus is different from the case of, for example, Epimenides of Crete (7th, 6th centuries BC), who is said to have lived 154, 157 or 290 years, as has been said about countless elders even during the last centuries as well as in the present time. These cases are not verifiable by modern means.

## Present life expectancy

*Main article: List of countries by life expectancy*

Various factors contribute to an individual's longevity. Significant factors in life expectancy include gender, genetics, access to health care, hygiene, diet and nutrition, exercise, lifestyle, and crime rates. Below is a list of life expectancies in different types of countries:<sup>[1]</sup>

- First World: 77–83 years (e.g. Canada: 80.1 years, 2005 est.)

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- Third World: 35–60 years (e.g. Mozambique: 40.3 years, 2005 est.)

Population longevity can be seen as increasing due to increases in life expectancies around the world.<sup>[1][2]</sup>

- Spain: 81.02 years in 2002, 82.31 years in 2005<sup>[citation needed]</sup>
- Australia: 80 years in 2002, 80.39 years in 2005<sup>[citation needed]</sup>
- Italy: 79.25 years in 2002, 79.68 years in 2005<sup>[citation needed]</sup>
- France: 79.05 years in 2002, 79.60 years in 2005<sup>[citation needed]</sup>
- Germany: 77.78 years in 2002, 78.65 years in 2005<sup>[citation needed]</sup>
- UK: 77.99 years in 2002, 78.4 years in 2005<sup>[citation needed]</sup>
- USA: 77.4 years in 2002, 77.7 years in 2005, 77.5 years in 2009<sup>[citation needed]</sup>

## Long-lived individuals

The Gerontology Research Group validates current longevity records by modern standards, and maintains a list of supercentenarians; many other unvalidated longevity claims exist. Record-holding individuals include:

- Jeanne Calment (1875–1997, 122 years, 164 days): the oldest person in history whose age has been verified by modern documentation. This defines the modern human life span, which is set by the oldest documented individual who ever lived.
- Shigechiyo Izumi (1865–1986, 120 years, 237 days, disputed): the second oldest male ever recognized by the Guinness Book of World Records; this is questioned by some scholars, who believe that conflation of dates or names has compromised the authenticity of Izumi's age.

## Longevity narratives

*Main article: Longevity narratives*

Longevity narratives or longevity stories are cultural traditions and lore about exceptional, improbable, or impossible human longevity, with or without eternal youth. These stories include sincere beliefs of claims of extreme age as well as sincerely and insincerely exaggerated claims of extreme age. Each category of belief is based on a different motivation for claiming exceptional age.

Stories of exaggerated longevity have been around since the earliest civilizations. The first longevity narratives were probably the patriarchal/matriarchal claims, which are often an attempt to link humans to the gods or to God due to fuller life. In some religious traditions there are claims that, if one follows a certain philosophy or practice, one can become immortal or at least live to an extreme age.

Fountain of Youth narratives describe some natural source, potion, or other secret that provides healing and particularly longevity and youthful health (eternal youth). An extension and adaptation of the fountain of youth concept is the idea that a particular place, rather than a substance, carries what is needed to attain extreme age, and that a person seeking extreme longevity needs to move to a special district. Nationalist pride often contributes to motivate such tradition. Other longevity narratives are race-based or family-based, proposing unproven beliefs that a certain race or tribe tends to live longer than others.

The village elder narrative reflects a preliterate societal respect for aging, patriarchy, etc., that leads to exceptional age claims intended to venerate the oldest person in the village.

In the "P. T. Barnum" longevity stories, one claims to be a great age to attract attention to oneself and/or to

obtain money.

## Future

The U.S. Census Bureau view on the future of longevity is that life expectancy in the United States will be in the mid-80s by 2050 (up from 77.85 in 2006) and will top out eventually in the low 90s, barring major scientific advances that can change the rate of human aging itself, as opposed to merely treating the effects of aging as is done today. The Census Bureau also predicted that the United States would have 5.3 million people aged over 100 in 2100. The United Nations has also made projections far out into the future, up to 2300, at which point it projects that life expectancies in most developed countries will be between 100 and 106 years and still rising, though more and more slowly than before. These projections also suggest that life expectancies in poor countries will still be less than those in rich countries in 2300, in some cases by as much as 20 years. The UN itself mentioned that gaps in life expectancy so far in the future may likely not exist, especially since the exchange of technology between rich and poor countries and the industrialization and development of poor countries may cause their life expectancies to fully converge with those of rich countries long before that point, similarly to how life expectancies between rich and poor countries have already been converging over the last 60 years as better medicine, technology, and living conditions became accessible to many people in poor countries. The UN has warned that these projections are uncertain, and caution that any change or advancement in medical technology could invalidate their projections.<sup>[3]</sup>

Recent increases in the rates of lifestyle diseases, such as obesity, diabetes, hypertension, and heart disease, may drastically slow or reverse this trend toward increasing life expectancy in the developed world.

Since 1840, record life expectancy has risen linearly for men and women, albeit more slowly for men. For women the increase has been almost three months per year. In light of steady increase, without any sign of limitation, the suggestion that life expectancy will top out must be treated with caution. Scientists Oeppen and Vaupel observe that experts who assert that "life expectancy is approaching a ceiling ... have repeatedly been proven wrong." It is thought that life expectancy for women has increased more dramatically due to the considerable advances in medicine related to childbirth.<sup>[4]</sup>

Some argue that molecular nanotechnology will greatly extend human life spans. If the rate of increase of life span can be raised with these technologies to a level of twelve months increase per year, this is defined as effective biological immortality and is the goal of radical life extension.

## Non-human biological longevity

*Main article: List of long-living organisms*

### Currently Living:

- Methuselah: 4,800-year-old bristlecone pine in the White Mountains of California, the oldest currently living organism known.

### Currently Nonliving:

- Two-hundred and fifty million year-old bacteria, *bacillus permians*, were revived from stasis after being found in sodium chloride crystals in a cavern in New Mexico. Russell Vreeland, and colleagues from West Chester University in Pennsylvania, reported on October 18, 2000 that they had revived the halobacteria after bathing it with a nutrient solution. Having survived for 250 million years, it is the oldest living thing

ever recorded.<sup>[5]</sup>

- A bristlecone pine nicknamed "Prometheus", felled in the Great Basin National Park in Nevada in 1964, found to be about 4,900 years old, is the longest-lived single organism known.<sup>[6]</sup>
- A quahog clam (*Arctica islandica*), dredged from off the coast of Iceland in 2007, was found to be from 400 to 410 years old, the oldest animal documented. Other clams of the species have been recorded as living up to 374 years.<sup>[7]</sup>
- *Lamellibrachia luymesii*, a deep-sea cold-seep tubeworm, is estimated to reach ages of over 250 years based on a model of its growth rates.<sup>[citation needed]</sup>
- Hanako (Koi Fish) was the longest-lived vertebrate ever recorded at 215 years.
- A Bowhead Whale killed in a hunt was found to be approximately 211 years old (possibly up to 245 years old), the longest lived mammal known.<sup>[8]</sup>
- Tu'i Malila, a radiated tortoise presented to the Tongan royal family by Captain Cook, lived for over 185 years. It is the oldest documented reptile. Adwaitya, an Aldabra Giant Tortoise, may have lived for up to 250 years.

## See also

- Actuarial Science
- Alliance for Aging Research
- Biodemography
- Biodemography of human longevity
- Calorie restriction
- List of centenarians
- DNA damage theory of aging
- Hayflick limit
- *How Not to Die: Surprising Lessons on Living Longer, Safer, and Healthier from America's Favorite Medical Examiner* (book)
- Indefinite lifespan
- Life extension
- List of last survivors of historical events
- Lloyd Demetrius
- Maximum life span
- Methuselah Foundation
- Mitohormesis
- Oldest viable seed
- Reliability theory of aging and longevity
- Research into centenarians
- Resveratrol
- Senescence
- Strategies for Engineered Negligible Senescence

## Notes

1. <sup>a</sup> <sup>b</sup> CIA World Factbook
2. <sup>^</sup> CIA World Factbook 2002
3. <sup>^</sup> World Population to 2300 (<http://www.un.org/esa/population/publications/longrange2/WorldPop2300final.pdf>) , United Nations
4. <sup>^</sup> [[Oeppen, Jim (<http://www.demogr.mpg.de/cgi-bin/staff/mpistaffmember.plx?pid=519>) ]; James W. Vaupel (2002-05-10). "Broken Limits to Life Expectancy" (<http://www.sciencemag.org/cgi/content/full/296/5570/1029>) .

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5. ^ 250-Million-Year-Old Bacillus permians Halobacteria Revived. October 22, 2000. Bioinformatics Organization. J.W. Bizzaro. [1] ([http://www.bioinformatics.org/forum/forum.php?forum\\_id=283](http://www.bioinformatics.org/forum/forum.php?forum_id=283))
6. ^ Hall, Carl. "Staying Alive" (<http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/1998/08/23/SC72173.DTL>) . *San Francisco Chronicle*, 23 August 1998.
7. ^ Bangor University: 400 year old Clam Found (<http://www.bangor.ac.uk/news/full.php.en?Id=382>) (retrieved 29 October 2007) BBC News: Ming the clam is 'oldest animal' (<http://news.bbc.co.uk/2/hi/science/nature/7066389.stm>) (retrieved 29 October 2007)
8. ^ Rozell (2001) "Bowhead Whales May Be the World's Oldest Mammals" (<http://www.gi.alaska.edu/ScienceForum/ASF15/1529.html>) , Alaska Science Forum, Article 1529 (retrieved 29 October 2007)

## References

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- Beyond The 120-Year Diet, by Roy L. Walford, M.D.
- Forever Young: A Cultural History of Longevity from Antiquity to the Present Door Lucian Boia,2004 ISBN 1861891547
- James R. Carey & Debra S. Judge: Longevity records: Life Spans of Mammals, Birds, Amphibians, reptiles, and Fish. Odense Monographs on Population Aging 8, 2000. ISBN 87-7838-539-3
- James R. Carey: Longevity. The biology and Demography of Life Span. Princeton University Press 2003 ISBN 0-691-08848-9

## External links

- The British Longevity Society (<http://www.thebls.org>)
- American Federation for Aging Research (<http://www.afar.org>)
- Why We Age - A Comprehensive Anti-ageing and Longevity Resource (<http://www.whyweage.com>)
- Alliance for Aging Research (<http://www.agingresearch.org/longevitydividend/overview.cfm>)
- Longevity and Pensions ([http://knowledge.allianz.com/en/special/aging\\_populations.html](http://knowledge.allianz.com/en/special/aging_populations.html)) , Allianz Knowledge Site, February 2008
- The Longevity Project (<http://www.thelongevityproject.com/>)
- International Longevity Center (<http://www.ilcusa.org>)
- International Longevity Centre - UK (<http://www.ilcuk.org.uk>)
- The Okinawa Centenarian Study (<http://www.okicent.org>)
- Longevity and Aging of Animals (<http://www.senescence.info/nature.html>)
- Longevity Science (<http://longevity-science.org/>)
- Mechanisms of Aging (<http://www.benbest.com/lifeext/aging.html>)
- International Research Centre for Healthy Ageing & Longevity (IRCHAL) (<http://longevity-international.com/>)
- HOW TO LIVE FOREVER | Documentary featuring interviews with the world's oldest people. (<http://www.liveforevermovie.com/>)

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