

*It is one of the most remarkable things that in all of the biological sciences there is no clue as to the necessity of death. If you say we want to make perpetual motion, we have discovered enough laws as we studied physics to see that it is either absolutely impossible or else the laws are wrong. But there is nothing in biology yet found that indicates the inevitability of death. This suggests to me that it is not at all inevitable, and that it is only a matter of time before the biologists discover what it is that is causing us the trouble and that terrible universal disease or temporariness of the human's body will be cured.*

[Richard Feynman](#) (1918 - 1989), Nobel Prize in Physics.

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**Theme of the month: Average and maximum longevity. Progress and stagnation.**

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**Longevity - the positive side**

We live in a comfort and state of health that would have been unimaginable even for the monarchs of the past. We travel faster than in the wildest dreams of the sailors of the time of Christopher Columbus. We fly. We have been to the moon. We have in our pocket a 100-gram object that is more powerful than the science fiction objects envisioned by the most imaginative writers, even from the near past.



Thanks to extraordinary advances in medicine, hygiene and economics today, our life expectancy is three times that of only two centuries ago. Both the speed of development and the heights reached are unparalleled in the history of mankind. Never before have we lived so long. We have never lived in such good health. Never before have we lived so well. And whether pessimists like it or not, these developments have not dried up in recent years, on the contrary they have [accelerated even more since the start of the 21st century](#): we have [gained around 6 years of life expectancy since the start of this millennium](#). Today, even in the country with the shortest life expectancy at birth in the world, this is 53 years ([in the Central African Republic](#)), which is to say 6 years higher than the life expectancy two centuries ago in the country where we lived the longest ([Norway](#)).

**Longevity - the negative side**

However, despite the advances in medicine, hygiene and full-speed-ahead scientific and medical research that are advancing science as never before, we are living no longer than some of our distant ancestors. In the year 6 A.D., [Terentia](#), Cicero's widow, died in Rome. She was 103. The [oldest person in the](#)

[world today](#) is 117, barely 14 years older than Terentia when she died. And, throughout the world, of the almost 8 billion inhabitants, [barely 100,000](#) have reached the age of Terentia.

To expand on this lack of progress, or even regression, it should be pointed out that [Jeanne Calment](#), who lived the longest in the history of humanity (a few controversies aside) died almost 23 years ago. On the side of the men, [the oldest man in the world today is only 40th](#) in the list of the longest-lived men.

### **Average lifespan - maximum lifespan, two concepts that do not only concern humans**

The difference between the average, improvable, lifespan and the maximum lifespan, an almost immutable boundary, extends far beyond humans.

In animals, the average lifespan in the wild is much shorter than the maximum lifespan of the same animal in captivity. A mouse will generally live less than a year in the wild, whereas in captivity it can live for more than two years. A great tit will live two to three years, whereas in a cage it could sing for more than 10 years.

As for as rats and mice in the lab are concerned, the average lifespan is [2 years](#) and the maximum [3.8 years](#) for rats and [a little over 4 years](#) for mice. Countless laboratory experiments measure the longevity of rats and mice after a treatment. For both rodents and humans, while we know of treatments that increase average life expectancy, the maximum life span remains to this day an almost impassable frontier.

Stagnation and even regression is what we called in an earlier letter "[the mystery of the centenarians](#)".

We humans, like other mammals and the vast majority of animals, are beings of built-in obsolescence. What demonstrates the almost impassable nature of the limit is [the Methuselah Mouse Prize](#). It is awarded by the longevist organization SENS to a person who manages to make a mouse live longer than any other mouse. This prize [has not been awarded since 2004](#).

### **Average lifespan - maximum lifespan, two less and less different concepts for humans**

A few centuries ago maximum lifespan bore no resemblance to average lifespan. Indeed, 30-60% of individuals died in infancy. A century ago, in rich countries, the death of children was already relatively rare but infectious diseases and other causes of death killed the majority of people before old age. Today, in rich countries, dying before the age of 75 is often referred to as "premature death". The average age of death is 80 and the median age is even higher.

In other words, today in the majority of deaths, what ends our lives are diseases and conditions related to what was yesterday, the extreme longevity of a small minority.

## **Those who say that we will never cross certain lines may be right.**

If we project the changes of the past into the future, a baby born today in a rich country should live on average about 110 years. This is considering that we already live on average 80 years and that we have gained about 30 years of life in the last 110 years.

But to do this, we would first have to break a glass ceiling. Currently, even for the most promising research (senolytics, metformin, NAD+, ...), it is mainly a question of gaining years of healthy human life within our current biological limits. Maximum life expectancies do not seem to be exceeded, both for humans and animals.

### **Optimistic longevists may be right**

As Richard Feynman, quoted at the beginning of this letter, wrote, there is no impassable biological boundary equivalent to the wall of sound or the maximum speed of light. But there is the genetic code. This genetic code that means that a man has never lived to be more than 116 years old, a woman 122 years old, a Galapagos tortoise about 200 years old and a mouse just over 4 years old. However, this genetic code, we can modify it through gene therapy. In fact, we are already changing it for a number of diseases, even in adults.

This perhaps ultimate barrier to health could one day also be overcome by other means, for example by the production of proteins normally expressed by certain genes related to aging.

And the day this frontier is crossed, first in mice and then in humans, it could be like the conquest of flight at the very beginning of the 20th century, like [the discovery of insulin in 1922](#) or like the [use of penicillin](#) at the end of the Second World War. A time before and a time after, that is to say, this time, relating to the frontiers of longevity, extended radically beyond the century.

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## **News of the month: "Rejuvenation" of the rat epigenetic clock thanks to a plasma. Collective progress in the fight against Covid-19**

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An [article](#) on the use of plasma given to old rats has generated [considerable enthusiasm in the longevist community](#). Two-year-old rats were given blood plasma and their physiological indicators during the test became almost those of 6-month-old rats. If true, this is an extremely promising discovery. Moreover, this article is signed in particular by two renowned scientists ([Steve Horwath](#), specialist in epigenetics and [Harold Katcher](#), of the University of Maryland).

Unfortunately:

- No actual longevity tests have been done (only longevity markers)
- Only 6 rats were treated
- The article has not yet been peer-reviewed
- The composition of the plasma is not known

Let's hope that the enthusiasm will translate into the announced longevity tests. Or that it will encourage further research for radical rejuvenation.

In the fight against the coronavirus, hundreds of research projects are underway. The majority of the authorities and groups that speak out insist on the pooling of research and its future availability to all. "Thanks" to the virus, attention to health and protection of the immune system, especially of the elderly, is greater than ever. On 19 May, the World Health Organization General Assembly [adopted a resolution](#) to respond to Covid-19.

A [WHO press release](#) announces the creation, by May 29, of a platform to centralize data, knowledge and intellectual property related to existing and new health products against Covid-19. The aim is, following a proposal by Costa Rica, to make global public health products available to all people in all countries.

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**To find out more:**

- See in particular: [heales.org](http://heales.org), [sens.org](http://sens.org), [longevityalliance.org](http://longevityalliance.org) and [longevity.org](http://longevity.org).
- [Source of the image](#).