

Human life span may have few limits, analysis of supercentenarians suggests



In 1875, *Harper's Weekly* declared one Lomer Griffin of Lodi, Ohio, to be, “in all probability,” the oldest man in the union. His age, allegedly, was 116.



There were doubters. Lomer's own wife, for instance,

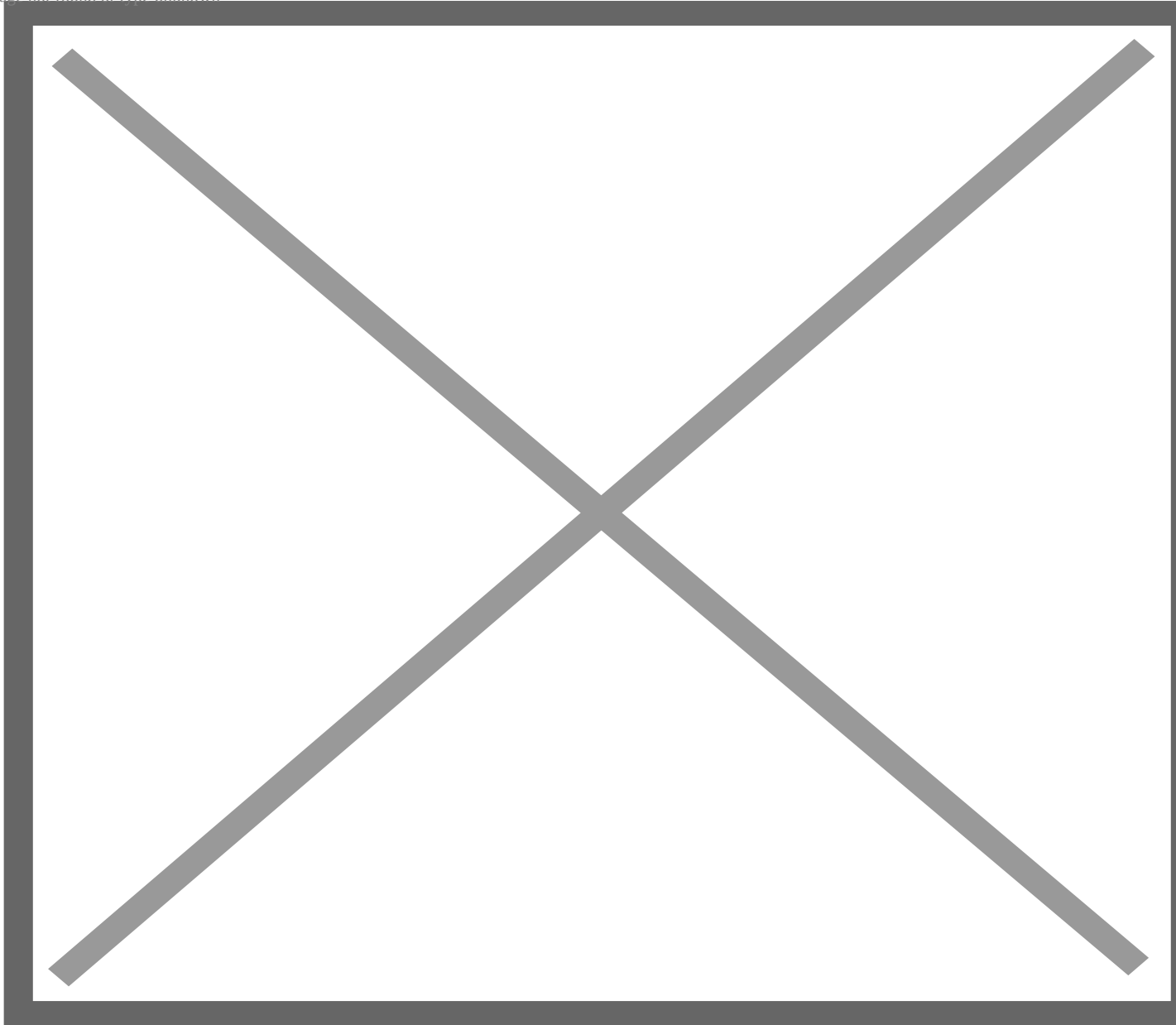
said he was only 103. And William John Thoms, an English author and demographer who had just written [a book on human longevity](#), expressed skepticism of all such centenarian claims. A human's maximum life span was about 100, Thoms asserted. Certainly no claim of an age over 110 had ever been verified.

“Evidence of any human being having attained the age, not of 130 or 140, but of 110 years ... will be found upon examination utterly worthless,” he wrote.

Centuries of expert testimony (not to mention insurance company data) had established 100 years as the longest possible human lifetime, Thoms insisted — apart from a few “extremely rare” exceptions. He expressed bewilderment that some medical authorities still believed that a lifetime might exceed nature's rigorously imposed limit.

Yet even today, almost a century and a half after Lomer Griffin's death in 1878 (at age 119 by some accounts), scientists still dispute what the oldest human age could ever be — and whether there is any limit at all. After all, more [than a dozen people](#) are alive today with validated ages over 110 (and many more that old are still around, just not documented). Yet in only one verified case has anyone lived beyond 120 — the French woman Jeanne Calment, who died in 1997 at age 122.

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In 1875, Harper's Weekly identified Lomer Griffin as "the oldest man in the Union, in all probability." Though his actual age was debatable, he was held up as an example of an extremely long life. Credit: Southern Medina Post

"The possible existence of a hard upper limit, a cap, on human lifetimes is hotly debated," write Léo Belzile and coauthors in [a paper to appear](#) in *Annual Review of Statistics and Its Application*. "There is sustained and widespread interest in understanding the limit, if there is any, to the human life span."

It's a question with importance beyond just whether people lie about their age to get recognized by Guinness World Records. For one thing, absence of an upper age limit could affect the viability of social

security and pension systems. And determining whether human lifetimes have an inviolate maximum might offer clues to understanding aging, as well as aiding research on [prolonging life](#).

But recent studies have not yet resolved the issue, instead producing controversy arising from competing claims, note Belzile, a statistician at the business university HEC Montréal in Canada, and colleagues. Some of that controversy, they suggest, stems from incorrect methods of statistical analysis. Their own reanalysis of data on extreme lifetimes indicates that any longevity cap would be at least 130 years and possibly exceed 180. And some datasets, the authors report, “put no limit on the human life span.”

These analyses “suggest that the human life span lies well beyond any individual lifetime yet observed or that could be observed in the absence of major medical advances.”

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Such conclusions contradict the old claims of Thoms and others that nature imposed a strict limit to lifetime. Thoms supported that view by quoting the 18th century French naturalist Georges-Louis Leclerc, Comte de Buffon. Lifetime extremes did not seem to vary much from culture to culture despite differences in lifestyles or diets, Buffon pointed out. “It will at once be seen that the duration of life depends neither upon habits, nor customs, nor the quality of food, that nothing can change the fixed laws which regulate the number of our years,” he wrote.

Thoms’ own investigation into reports of superlong lifetimes found that in every instance mistakes had been made — a father confused with a son, for instance, or a birth record identified with the wrong child. And of course, some people simply lied.

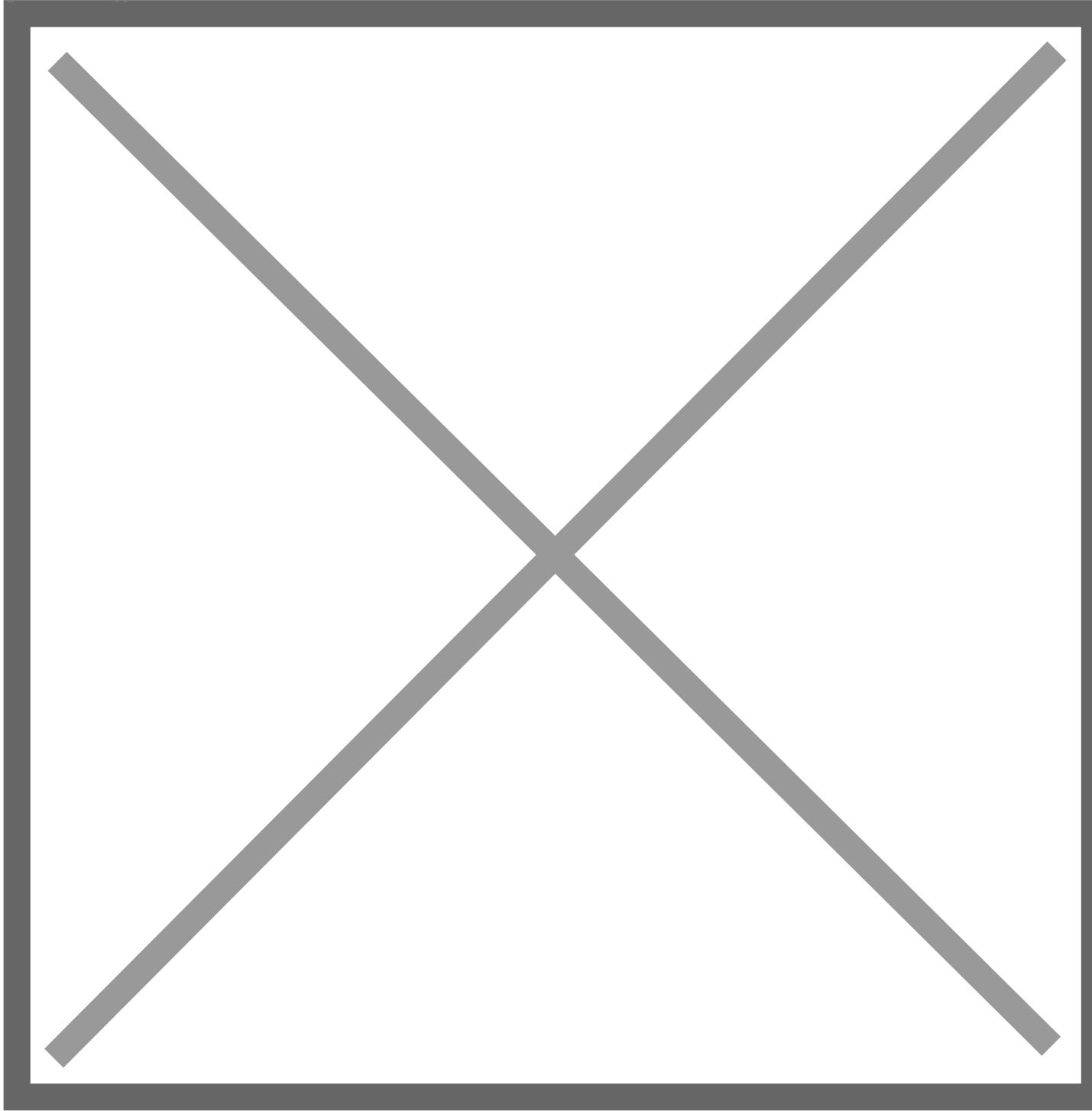
Even today, the lack of high-quality data confounds statistical attempts to estimate a maximum life span. “Age overstatement is all too frequent, as a very long life is highly respected, so data on supercentenarians must be carefully and individually validated to ascertain that the reported age at death is correct,” write Belzile and coauthors.

Fortunately, some collections provide verified data on the oldest of the old. One such collection, the [International Data Base on Longevity](#), includes information from 13 countries on supercentenarians (those living to age 110 or beyond) and for 10 countries on semisupercentenarians (those reaching 105 but not making it to 110).

Analyzing such datasets requires skillful use of multiple statistical tools to infer maximum longevity. A key concept in that regard is called the “force of mortality,” or “hazard function,” a measure of how likely someone reaching a given age is to live a year longer. (A 70-year-old American male, for instance, has about a 2 percent chance of dying before reaching 71.)

Of course, the hazard of dying changes over time — youngsters are generally much more likely to live another year than a centenarian is, for instance. By establishing how death rates change with age, statistical methods can then be applied to estimate the maximum possible life span.

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The “hazard function” is a measure of how likely someone reaching a given age will live another year, shown here by looking at the probability of dying within the year. A 10-year-old faces a very small chance of dying before reaching 11, for example, compared with an 80-year-old’s chance of dying before 81. But the probability of dying among the very oldest people appears to level off. By establishing how death rates change with age, statistical methods can then be applied to estimate the maximum

possible life span.

From age 50 or so onward, statistics show, the risk of death increases year by year. In fact, the death rate rises exponentially over much of the adult life span. But after age 80 or so, the rate of mortality increase begins to slow down (an effect referred to as late-life mortality deceleration). Equations that quantify changes in the hazard function show that it levels off at some age between 105 and 110. That means equations derived from lower age groups are unreliable for estimating life span limits; proper analysis requires statistics derived from those aged 105 and up.

Analyses of those groups suggest that by age 110 or so, the rate of dying in each succeeding year is roughly 50 percent (about the same for men as for women). And the data so far do not rule out an even smaller annual chance of death after that.

Depending on the details of the dataset (such as what age ranges are included, and for what country), a possible longevity cap is estimated in the range of 130–180. But in some cases the statistics imply a cap of at least 130, with no upper limit. Mathematically, that means the highest ages in a big enough population would be infinite — implying immortality.

But in reality, there's no chance that anybody will beat Methuselah's Biblical old age record of 969. The lack of a mathematical upper bound does not actually allow a potentially infinite life span.

"Every observed lifetime has been and always will be finite," Belzile and coauthors write, "so careful translation of mathematical truths into everyday language is required."

For one thing, a 50 percent chance of living to the next year makes the odds pretty slim that a 110-year-old will live to 130 — about one chance in a million. (That's the equivalent of tossing coins and getting 20 heads in a row). Nevertheless, if the math is correct in indicating no true longevity cap, the old-age record could continue to climb to ages now unimaginable. Other researchers have pointed out that, with an increasing number of supercentenarians around, it's conceivable that someone will reach 130 in this century. "But a record much above this will remain highly unlikely," Belzile and colleagues note.

As for Lomer Griffin, claims of reaching age 119 were clearly exaggerated. By his (third) wife's reckoning he was 106 when he died, and his tombstone agrees, giving his dates as 1772–1878. Alas, his birth record (recorded in Simsbury, Connecticut) shows that Lomer (short for his birth name, Chedorlaomer) didn't really reach 106 at all. He was born April 22, 1774, making him a mere 104 at death. But he still may very well have been the nation's oldest citizen, because anyone claiming to be older was probably lying about their age as well.

Tom Siegfried is a science journalist and author of *The Number of the Heavens: A History of the Multiverse and the Quest to Understand the Cosmos*. Tom can be found on Twitter [@tom_siegfried](#)

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