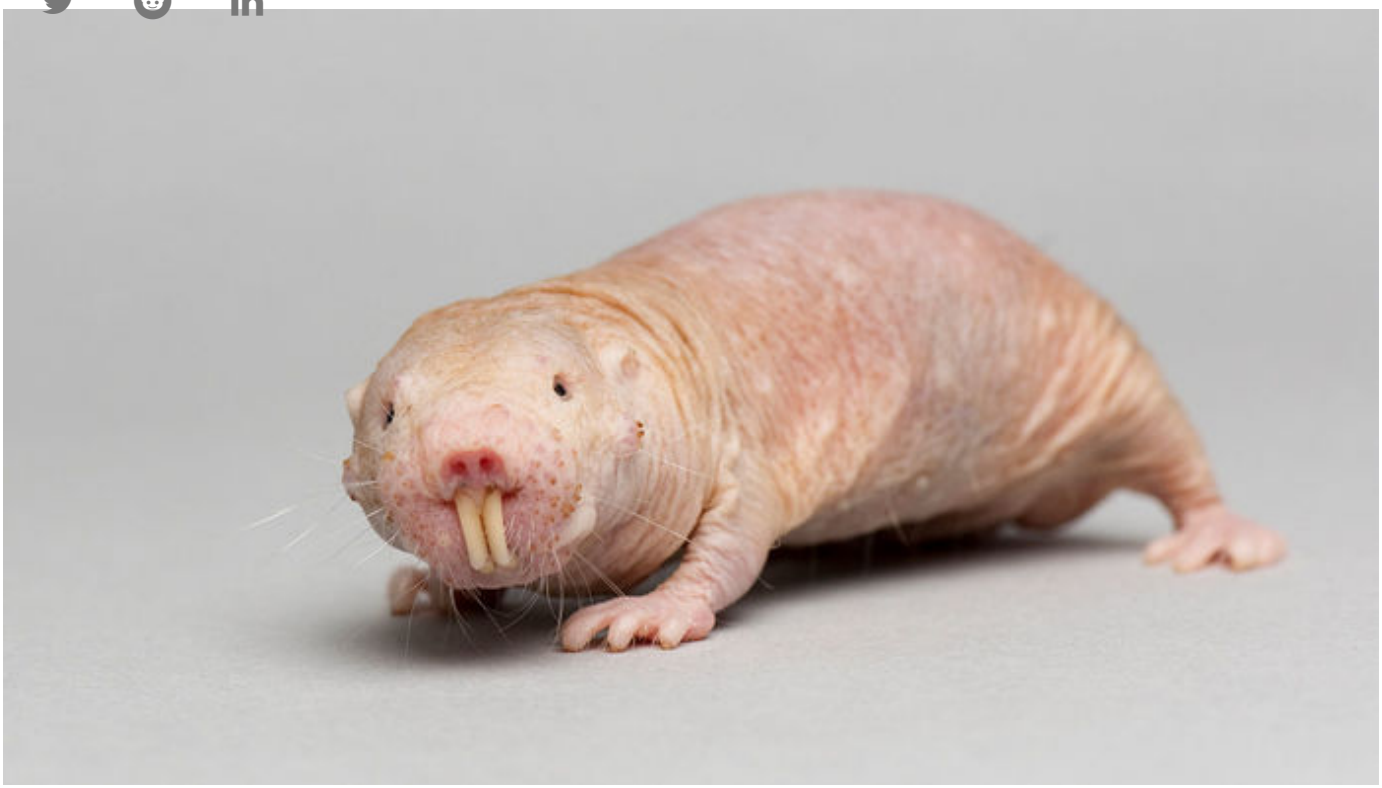

Adult naked mole rats have a daily chance of dying of about one in 10,000. NATIONAL GEOGRAPHIC CREATIVE/ALAMY STOCK PHOTO

Naked mole rats defy the biological law of aging

By **Kai Kupferschmidt** | Jan. 26, 2018 , 5:30 PM

In the world of animal models, naked mole rats are the supermodels. They **rarely get cancer**, are resistant to some types of pain, and can **survive up to 18 minutes without oxygen**. But perhaps their greatest feat, a new paper suggests, is that they don't age.

The first study to analyze the life histories of thousands of naked mole rats has found that their risk of death doesn't go up as they grow older, as it does for every other known mammalian species. Although some scientists caution against any sweeping conclusions, many say the new data are important and striking.

“This is remarkably low mortality,” says Caleb Finch, a biogerontologist at the University of Southern California in Los Angeles who was not involved in the new study. "At advanced ages, their mortality rate remains lower than any other mammal that has been documented.”

Scientists have long noted that naked mole rats—burrowing rodents with wrinkled, pink skin and large protruding teeth that live in large, subterranean colonies—show few signs of aging and far surpass the life span expected of a rodent this size. Mice in captivity live at most 4 years; based on their size, naked mole rats would not be expected to live past 6 years. Instead, some live beyond 30 years, and even at that age breeding females stay fertile.

Comparative biologist Rochelle Buffenstein has studied the animals for more than 30 years and has, quite literally, collected a lifetime's worth of data. For each animal in her care, she recorded the date of birth and when it died, and whether it was killed for an experiment or given away to other researchers.

What she found was astonishing, says Buffenstein, who works at the longevity-focused Google biotech spinoff Calico in San Francisco, California: Naked mole rats seem to flout the Gompertz law, a mathematical equation that describes aging. In 1825, British mathematician Benjamin Gompertz found that the risk of dying rises exponentially with age; in humans, for instance, it doubles roughly every 8 years after the age of 30. The law applies to all mammals after adulthood, says João Pedro De Magalhães, a gerontologist at the University of Liverpool in the United Kingdom.

But Buffenstein did not see this trend in her lab animals. After they reached sexual maturity at 6 months of age, each naked mole rat's daily chance of dying was a little more than one in 10,000. It stayed the same the rest of their lives and **even went down a little**, Buffenstein reports this week in *elife*. "To me this is the most exciting data I've ever gotten," says Buffenstein. "It goes against everything we know in terms of mammalian biology."

Studies have shown that naked mole rats have very active DNA repair and high levels of chaperones, proteins that help other proteins fold correctly. "I think the animals keep their house really neat and clean, rather than accumulate damage" that causes the physical deterioration associated with age, Buffenstein says.

But Finch cautions against overinterpreting the data. Because most animals were either killed or moved to other labs, fewer than 50 animals in the study lived past 15 years of age. (The oldest animal currently living in Buffenstein's lab is 35.) More—and older—mole rats are needed to be sure that the risk of dying really is flat, Finch argues. But Buffenstein says the data simply do not show the typical aging pattern seen in mammals or any other animals. "If you look at any rodent aging study, 100 animals is all you need to see Gompertz aging," she says. "Here we have 3000 data points and we're not seeing it."

It's also possible that aging does happen, but much, much later than usual in mammals, Magalhaes points out. "I think it's too early to say naked mole rats are nonaging animals," he says. Indeed, the big mystery now is what happens in naked mole rats after 20 or 30 years, says Matthias Platzer, a biologist at the Leibniz Institute on Aging in Jena, Germany. "Maybe aging happens really fast then? Even Rochelle Buffenstein does not have the data on this." But Platzer is happy that data on some of the world's largest and oldest lab colonies of naked mole rats are now available.

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Kai Kupferschmidt

Kai is a contributing correspondent for *Science* magazine based in Berlin, Germany.
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