

# Cyborgs will replace humans and reshape the world, famed scientist says

For tens of thousands of years, humans have reigned as our planet's only intelligent, self-aware species. But the [rise of intelligent machines](#) means that could change soon, perhaps in our own lifetimes. Not long after that, *Homo sapiens* could vanish from Earth entirely.

That's the jarring message of a new book by James Lovelock, the famed British environmentalist and futurist. "Our supremacy as the prime understanders of the cosmos is rapidly coming to end," he says in the book, "Novacene." "The understanders of the future will not be humans but what I choose to call 'cyborgs' that will have designed and built themselves."

James Lovelock Sandy Lovelock

Lovelock describes cyborgs as the self-sufficient, self-aware descendants of today's robots and [artificial intelligence systems](#). He calls the looming era of their dominance the Novacene — literally, the "new new" age.

These days, there's no shortage of modern-day Luddites warning that technology will soon overwhelm us. But Lovelock's bold predictions stand apart. Unlike technoskeptics, including University of Louisville computer scientist Roman Yampolskiy, Lovelock thinks it unlikely that our [machines will turn against us](#), Terminator-style. And unlike utopians like futurist Ray Kurzweil, he doesn't envision humans and machines merging blissfully into a union that some call the singularity.

Rather, Lovelock views the rise of technology through an evolutionary lens, in keeping with his decades of research and thinking about ecological and biological systems. He also brings the unique perspective of a scientist who just marked his 100th birthday, with a deep awareness of changing scientific fashions and with nothing left to prove. It's an outlook that pushes him to conclusions at once optimistic and deeply disturbing.

## The end is already beginning

The first stages of the Novacene are already underway, Lovelock argues. He cites the [example of AlphaZero](#), a computer program that taught itself to play the game Go — and then quickly went on to become the world's best Go player. Today's computers can already process data far faster than we can; with fully independent artificial intelligence, he says, tomorrow's cyborgs will easily become a million times smarter than we are.

Lovelock imagines cyborgs filling every evolutionary niche on the planet. "I think of cyborgs as another kingdom of life," he says. "They will stand to us in much the same way as we ourselves, as a kingdom of animals, stand to plants."

What would cyborgs look like? Lovelock is intentionally vague because he expects that they'll rethink the basic rules of design in ways that we puny humans cannot imagine. "Cyborgs would start again; like Alpha Zero they would start from a blank slate," he writes in his book. He speculates that they might look like spheres, though when pressed he says, "It's entirely possible they would have no form at all," existing mostly as virtual forms inside computers.

Whatever their form, the cyborgs will be so far beyond us in intellect that they may dismiss us as part of the planet's background landscape. Alternatively, they might appreciate us in much the way that we appreciate plants. This possibility appeals to Lovelock, who likes to spend days in the garden around his cottage home in Dorset, England. "Think about the way you go to a great arboretum," he says.

Once established, the cyborgs will remain dominant on our planet. "The Novacene," Lovelock says, "will probably be the final era of life on Earth."

## Path to the Novacene

This isn't the first time Lovelock has rocked the scientific world with a big, controversial argument. His new idea about an impending cyborg takeover draws on a sweeping idea that originally made him famous, the so-called [Gaia hypothesis](#) that he and biologist Lynn Margulis developed in 1974.

In the Gaia view, our planet behaves as a single, self-regulating organism. Over the four billion years since the dawn of life, biological processes have steadily modified the atmosphere, land and oceans to keep Earth habitable. The sun has grown brighter, volcanoes have erupted, asteroids have struck, and yet our planet has steadily maintained the right conditions for liquid water and carbon chemistry: the essentials of life.

Initially, many researchers took a dim view of the Gaia hypothesis. But in recent years it's become respectable.

"The concept of Gaia is quite key to our growing understanding about life in the universe," says David Grinspoon, an astrobiologist at the Planetary Science Institute in Tucson, Arizona. Paul Davies, a physicist at Arizona State University in Tempe, calls Gaia "a useful concept in stressing how biological and geological cycles are coupled."

The skeptics are back regarding Lovelock's latest prognostications. "Nobody knows how this will unfold, because we don't know how brains work or what consciousness is," Grinspoon says. "And specific predictions about artificial intelligence and its future impact seem to depend on specific, untested, unverified answers to these big questions."

But Lovelock believes that advances like AlphaZero mean we don't have to look to the distant future to see how the story will unfold. "The crucial step that started the Novacene was, I think, the need to use computers to design and make themselves," he writes. "It now seems probable that a new form of intelligent life will emerge from an artificially intelligent precursor made by one of us, perhaps from something like AlphaZero."

## Living in the age of cyborgs

Once we get used to being treated like houseplants, the early days of the Novacene might



