# Science presents the great unsolved scientific mysteries of our time

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***Special issue marks the journal's 125th anniversary***

What is the universe made of? What is the biological basis of consciousness? Can the world continue to sustain a growing population and growing consumption? In celebration of its 125th anniversary, Science has taken stock of some of the most important, yet-unanswered scientific questions and delved into 25 of them for a closer look at just what we do and don't yet know about our universe.
Questions like these show us how far science has come in explaining the natural world, and they also fuel the discoveries of the future, writes author and journalist Tom Siegfried in an introduction to the special 1 July issue of *Science*, published by AAAS, the nonprofit science society.

In the special issue, Science's editors have identified 125 "big questions" that scientists have yet to answer. Rather than a comprehensive inventory, this list is a significant sampling of the major questions facing science today. Science's news team has also focused on 25 of these questions in a special package of essays.

"Today, science's most profound questions address some of the largest phenomena in the cosmos and some of the smallest. We may never fully answer some of these questions, but we'll advance our knowledge and society in the process of trying," said Donald Kennedy, Science's editor-in-chief.

"As Science celebrates its 125th birthday, we've recognized that an

examination of science's outstanding mysteries also reflects its tremendous accomplishments," he added.

Founded by Thomas A. Edison, Science debuted on July 3 1880, with 12 pages of articles on the possibility of electric-powered railroads, the latest observations of the Pleiades and advice to science teachers on the importance of studying animal brains. Issues over the following decades included articles by Albert Einstein, Edwin Hubble, Louis Leakey and other great scientific thinkers.

Over time, the prominence of the journal's coverage of science and science policy has increased, according to Science's news editor, Colin Norman.

"The worlds of research and policy have become thoroughly intertwined, and when we report on scientific developments, the distinction between the two is often very blurry. The journal's news section is now a section for all of science, for both scientists and policymakers," he said.

When Norman joined Science in 1981, he and his colleagues, based almost entirely in Washington D.C., punched out articles on typewriters and sent the final pages off to the typesetter. Today, Science's correspondents based around the world file stories on their laptops.

To honor the journal's 125th anniversary, Science's editors had initially intended to select just 25 questions that would reveal the remaining gaps in our scientific knowledge. But with the help of the Board of Reviewing Editors and the Senior Editorial Board, they compiled well over 100 candidate questions that were just too interesting to discard.

"Some of the questions were naturals, just really fascinating, others we chose based on how fundamental they are -- whether answering them would provide insights across several areas in science. Some were central

to current social policy, for example relating to HIV or climate change," Norman said.

Ultimately the editors selected 125 questions for their list and focused on 25 that there was a chance of solving – or at least knowing how to approach solving – in the next 25 years. These 25 questions include:

-- What is the universe made of? In the last few decades, cosmologists have discovered that the ordinary matter that makes up stars and galaxies is less than 5 percent of everything there is. What is the nature of the "dark" matter that makes up the rest?

-- What is the biological basis of consciousness? In contrast to René Descartes' 17th-century declaration that the mind and body are entirely separate, a new view is that whatever happens in the mind arises from a process in the brain. But scientists are only just beginning to unravel those processes.

-- Why do humans have so few genes? To biologists' great surprise, once the human genome was sequenced in the late 1990s, it became clear that we only have about 25,000 genes – about the same numbers as the flowering plant Arabidopsis. The details of how those genes are regulated and expressed is a central question in biology.

-- How much can human life span be extended? Studies of long-lived mice, worms and yeast have convinced some scientists that human aging can be slowed, perhaps allowing many of us to live beyond 100, but others think our life spans are more fixed.

-- Will Malthus continue to be wrong? In 1798, Thomas Malthus argued that human population growth will inevitably be checked, for example by famine, war or disease. Two centuries later, the world's population has risen sixfold, without the large-scale collapses that Malthus had

predicted. Can we continue to avoid catastrophe by shifting to more sustainable patterns of consumption and development?