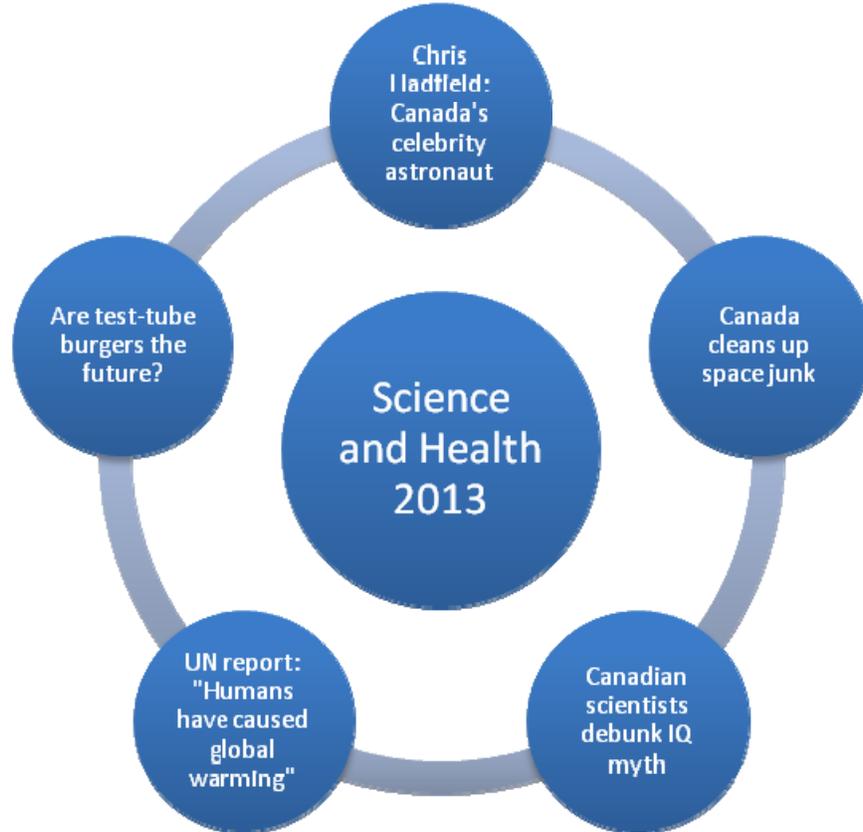


A Look Back at Science and Health 2013



Fascinating personalities, discoveries and controversies of the scientific world captured the imagination of Canadians in 2013. Canadian astronaut Chris Hadfield spent five months aboard the International Space Station, and soaring above all expectations, he became a virtual rock star through his expert use of social media. In another success story, Canada launched its first military satellite, a piece of hardware that will play traffic cop to the more than 22 000 bits of space junk found orbiting the Earth. Another big Canadian science headline saw Western University researchers call into question the belief that IQ tests accurately measure intelligence. On the international front, a panel of UN scientists went further than ever before in asserting that global warming is caused by human activity. And a Dutch biologist offered food critics a taste test of the world's first hamburger created in a petri dish.

Pre-viewing

1. If you were choosing the top scientific stories that had great impact in 2013, what three criteria would you use in your selection?

VIDEO REVIEW

Chris Hadfield: Canada's celebrity astronaut

1. How many people followed Chris Hadfield on Twitter?
 8 000 80 000 800 000
2. How many views were there of a video of Hadfield opening a can of nuts in space?
 5 000 000 50 000 000 500 000
3. What was the biggest impact of Chris Hadfield's mission to space?
 a) He made people excited about science.
 b) He made people interested in space exploration.
 c) His popularity may assist the Canadian Space Agency.
 d) All of the above.

Canada cleans up space junk

4. Satellites operate the following technology. Check all that apply.
 Cell phones Weather forecasts Traffic lights Bank machines GPS
5. Why is space junk a threat to satellite technology?

6. What is Sapphire?

Canadian scientists debunk IQ myth

7. Why does a team of scientists at Western University now consider that IQ tests are not a good measure of intelligence?

8. Gamers are better at what skills? Check all that apply.
- Reasoning Short-term memory Written communication
9. Researchers are studying cultural intelligence by measuring how long a baby pays attention to puppets speaking different languages and in different colours.
- True False

UN report: "Humans have caused global warming"

10. Some people are sceptical of the degree and causes of climate change.
- True False
11. According to the UN's Intergovernmental Panel on Climate Change (IPCC), what is causing the earth's warming temperatures?
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Are test-tube burgers the future?

12. Which of the following are drawbacks to consumption of hamburger meat?
- a) Cattle consume more protein than they give back as food.
- b) Cattle use vast amounts of farmland.
- c) Cattle produce methane, a greenhouse gas.
- d) All of the above.
13. The beef from the "lab burger" was never a cow. How was it created?
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Post-viewing

Do you think a different scientific story should have been considered as important in 2013? Why?

TASK

Read the summaries of these five notable science and health stories from 2013 and complete the visual organizer that follows.

Chris Hadfield: Canada's celebrity astronaut

By the time he crash-landed in a field in Kazakhstan, Chris Hadfield had orbited around the earth 2 500 times. During his five months on the International Space Station — two as its commander — Hadfield used social media like Twitter, Facebook and YouTube to great effect, a practice that helped him gain exceptional celebrity status as an astronaut.

Highlights that he shared with his many followers and fans of all ages:

- His regular posts of short video clips answered practical scientific questions such as why astronauts can't cry in zero gravity or how they manage to brush their teeth;
- His conversation with William Shatner, the Canadian actor who played *Star Trek's* original Captain Kirk, was highly publicized;
- His performance of David Bowie's 1969 hit song *Space Oddity* was viewed over a million times in less than 24 hours.

On a more serious note, during the flight, Hadfield and his crew had to repair an ammonia leak that threatened to shorten the mission.

Chris Hadfield was born in Milton, Ontario in 1960. At age 53, he was the first Canadian to command the International Space Station and the first Canadian to walk in space. This was his third mission into space. His dream to become an astronaut began when at age 9 he watched American astronaut Neil Armstrong walk on the moon. He describes his quest to fulfil his dream



in his newly published book, *An Astronaut's Guide to Life on Earth*:

// I hadn't been an obvious candidate. I was a pilot. I didn't have much leadership experience to speak of at all. Worse: I was a Canadian pilot without much leadership experience. Square astronaut, round hole. But somehow, I'd managed to push myself through it, and here was the truly amazing part; along the way, I'd become a good fit. It had only taken 21 years. **//**

Hadfield recently retired and has spent a lot of his time on tour as a motivational speaker and writer. In 2014, he takes on a new job as adjunct professor in the University of Waterloo's aviation program.



Canada cleans up space junk

In the 56 years of space flight, 15 000 metric tons of human-made space objects have re-entered the earth's atmosphere. No known injuries or significant property damage have been reported, unlike the damages associated with large meteorites. However, there is concern about future potential collisions between space debris and the satellites that assist us in everyday living.

This year, Canada contributed two important satellites to aid in the detection of asteroids and space debris. The NEOSat (Near-Earth Object Surveillance Satellite) is designed to detect and track Aten asteroids. These near-Earth asteroids orbit the sun elliptically and periodically cross Earth's orbital path. The Canadian satellite will help to project the year or decade that an asteroid will cross Earth's orbit so that emergency measures can be taken, if required.

The second Canadian satellite of 2013 was named Sapphire. It is Canada's first military satellite. Sapphire will be used to support Canadian and international military operations such as NORAD. It will also be used to help track space debris that is larger than 10 cm. There is an estimated 22,000 pieces of space debris floating above the earth's atmosphere. Sapphire cost \$65 million to create.

Canadian scientists debunk IQ myth

Intelligence Quotient (IQ) tests have been around since the early 1900s. They were developed as a way to measure a person's general intelligence. There has always been controversy around the notion of general intelligence and whether or not such a thing can be accurately measured. IQ tests have been used for placement purposes in education and in job screening, but the tests have been criticized as culturally biased. Some scientists point out that health, hard work, motivation and a good education are required in order to take advantage of inherent brainpower. Research has concluded that people that score high on IQ tests file more patents, publish more academic papers and earn higher incomes but scoring well doesn't predict success. Average or lower scores don't predict a terrible life either. Traditional IQ tests focus on math and verbal skills, and some scientists argue that other types of skills should be measured, such as the ability to visualize.



Scientists from Western University in Ontario released research this year that contradicts the concept of general intelligence. The team conducted the largest ever online intelligence survey — involving more than 100 000 people. They concluded that how well people performed on the test could only be explained with three distinct components: short-term memory, reasoning and verbal ability. No single measure could account for how well, or how poorly, people did. They hypothesize that human intelligence is made up of many components that must be considered independently.



UN report: "Humans have caused global warming"

A 3 000 page report outlining the work of 800 scientists and reviewed by 2 500 scientific experts details extensive evidence for human-caused global warming. The document was released at the U.N.'s Intergovernmental Panel on Climate Change (IPCC) in September 2013. It was the fifth such assessment paper to be produced and released by the IPCC. The burning of fossil fuels is the cause of most of the temperature increases in recent decades.

Governments are urged to act now to cut carbon pollution or face such catastrophic possibilities such as the Arctic vanishing, coastal urban cities like Miami and Shanghai being buried under water, increased droughts in Africa and millions of refugees fleeing climate-related catastrophes.

Are test-tube burgers the future?

In 2013 a one 140 gram hamburger was taste-tested to see how it compared to regular hamburger. It was declared bland but revolutionary. What was so unique about this burger? This hamburger had been grown from stem cells in a lab at a cost of \$330,000. Mark

Post, a scientist at Maastricht University in the Netherlands, developed this meat by extracting the muscle cells of 2 organic cows. He placed the cells into a nutrient solution where they developed into muscle tissue and finally into the 20,000 small strands of meat required to make one patty.

What is Post's motivation in this experiment? Ultimately he is interested in creating a viable and tasty meat substitute. Scientists estimate that if people consumed "lab meat" instead of raising animals to be slaughtered for food there would be a 99.7% reduction in land use, 94% reduction in water use and 98.8% fewer greenhouse gases produced. In addition to these positive effects, bio fabricated meat could help to feed a growing world population. At the present time the "tube burger" will not be commercially available for decades, but scientists are pushing forward with innovative ways to think about food security. For two of the story summaries on the previous pages, synthesize the facts by recording the type of scientific knowledge examined, the results of the scientific study, and the possible social, economic, political or other impact of the scientific study/advancement.

For two of the preceding story summaries, use the following graphic organizer to synthesize the facts by recording the type of scientific knowledge examined, the results of the scientific study, and the possible social, economic, political or other impact of the scientific study/advancement.

