

# Scientific achievements of 2019

## FIRST-EVER PICTURE OF A BLACK HOLE

**APRIL:** Scientists unveil an image of a supermassive black hole containing a mass of 6.5 billion suns.

The flaming ring of starlight was captured by the **Event Horizon Telescope** project, a collaboration of over 200 scientists and dozens of radio telescope dishes at 11 observatories around the world. When combined, this array acts like a telescope the size of Earth.

The black hole is 53 million light-years away, in the heart of a giant galaxy called **Messier 87**

**Singularity**  
Centre of black hole

**Event horizon**  
Matter and energy cannot escape black hole's gravity

— **Accretion disk**  
Superheated gas and dust produce X-rays, optical, infrared, and radio radiation

## QUANTUM SUPREMACY MILESTONE

**OCTOBER:** Google announces in the journal **Nature** that it has achieved the milestone of “**quantum supremacy**.”

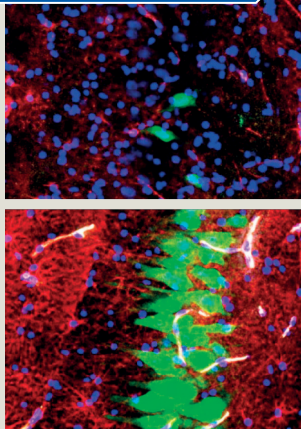
The **Sycamore** microchip performed a calculation in 200 seconds that would take today's most advanced classical computer some 10,000 years.

Unlike computers which use bits to represent either zeros or ones, quantum bits, or qubits, can stand for both at the same time

## FLUTTER OF LIFE BACK INTO DEAD BRAINS

**APRIL:** Neuroscientists led by **Nenad Sestan** of Yale University develop a system called **BrainEx** to restore circulation and molecular functions in pig brains four hours after death.

The top image shows untreated brain tissue. The lower image shows the result of BrainEx treatment – green shows functioning neurons, red indicates astrocytes, which provide nutrients to neurons, and blue shows cell nuclei



## NEW FOSSIL SHAKES OUR FAMILY TREE

**AUGUST:** A stunning fossil skull from the Afar region of Ethiopia is the oldest and most complete specimen of **Australopithecus anamensis**, an enigmatic human ancestor known from fragmentary remains.

The fossil known as MRD is a nearly complete skull of this long-vanished member of the hominin group, which includes **Homo sapiens** and its close extinct relatives. The specimen is 3.8 million years old, making it the oldest Australopithecus skull ever found.

A. anamensis is a predecessor of “**Lucy**,” **Australopithecus afarensis**



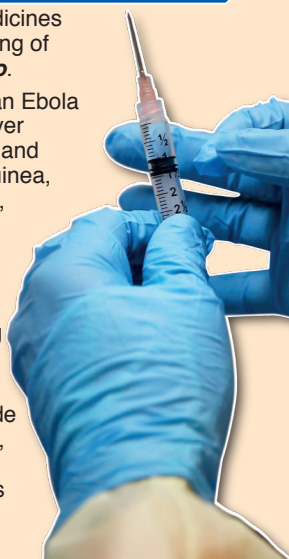
## WORLD'S FIRST-EVER EBOLA VACCINES

**OCTOBER:** The European Medicines Agency (EMA) approves licensing of **Merck's Ebola Vaccine, Ervebo**.

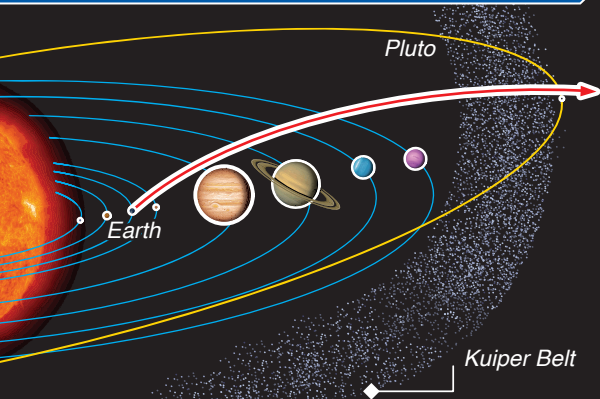
During the West African Ebola outbreak of 2014, with over 28,000 suspected cases and 11,000 deaths across Guinea, Sierra Leone and Liberia, there were no vaccines or treatments.

Just five years later there is an approved and safe vaccine. Developing vaccines traditionally takes 10 to 20 years.

A second vaccine made by **Johnson & Johnson**, which is not yet licensed, will soon be used in parts of Congo where Ebola is not actively spreading



## FURTHEST FLYBY EVER CONDUCTED



**JANUARY:** NASA's **New Horizons** spacecraft celebrated the new year by relaying images of an icy object from the far reaches of the Solar System.

Kuiper Belt object **2014 MU69** – 1.6 billion kilometres beyond Pluto – holds clues as to how planets form

