Climate Change



Almost all scientists now agree that human activity is causing global warming, which is driving increasingly extreme weather and environmental degradation. Recent decades have seen temperatures soar, allied to melting ice in polar regions. Rising sea levels have led to stronger storm surges, while hotter, drier summers have resulted in more savage wildfires. If left unchecked, both the human and ecological cost of these trends could prove devastating.

Warmest average global ocean surface temperature
In 2019, the heat content for the upper 2,000 m (6,560 ft) of the world's oceans rose above the 1981–2010 average by 228 zettajoules – or 228 billion trillion Joules. This equates to a temperature rise of 0.075°C (0.135°F). That may sound like a tiny increase, but its effects on marine ecosystems are already taking their toll, particularly in coastal waters (see p.42).

Highest temperature on Earth
On 10 Jul 1913, a reading of 56.7°C (134°F) was registered at Greenland Ranch in Death Valley, California, USA. There is some debate about the accuracy of such old data, though. On 16 Aug 2020, a temperature of 54.4°C (129.9°F) was *reliably* registered at Furnace Creek in Death Valley.

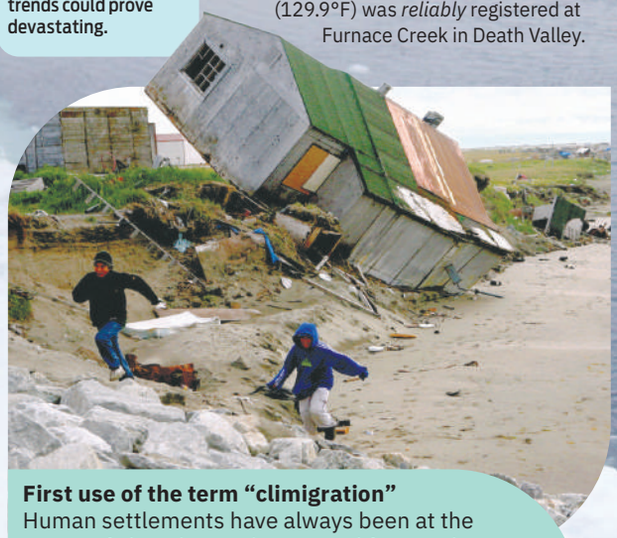
Heat extremes in 2020 were not limited to Death Valley. The **greatest temperature range at one location** is 105°C (188°F) in the Russian town of Verkhoyansk, spanning from a low of -68°C (-90°F) in 1892 to a high of 37°C (98°F) in 1982. On 20 Jun 2020, this range may have extended as Verkhoyansk reportedly hit 38°C (100.4°F). This would also beat the **highest Arctic temperature** (see below). Both 2020 readings are still awaiting verification by the World Meteorological Organization (WMO).

Highest dewpoint temperature
The "dewpoint" marks the temperature to which air must be cooled to become saturated with water vapour, and is one method of determining humidity. At 3 p.m. on 8 Jul 2003, Dhahran in Saudi Arabia logged a dewpoint of 35°C (95°F) with an air temperature of 42°C (108°F). This resulted in an apparent temperature (i.e., "what it feels like") of 81.1°C (178°F).

Highest "low" temperature in one day
Across a 24-hr period on 26 Jun 2018, the air temperature in the Omani coastal city of Quriyat did not drop below 42.6°C (108.7°F). The previous highest low was 41.7°C (107.1°F), recorded at Khasab Airport – also in Oman – on 27 Jun 2011, and equalled in Death Valley on 7 Jul 2012.

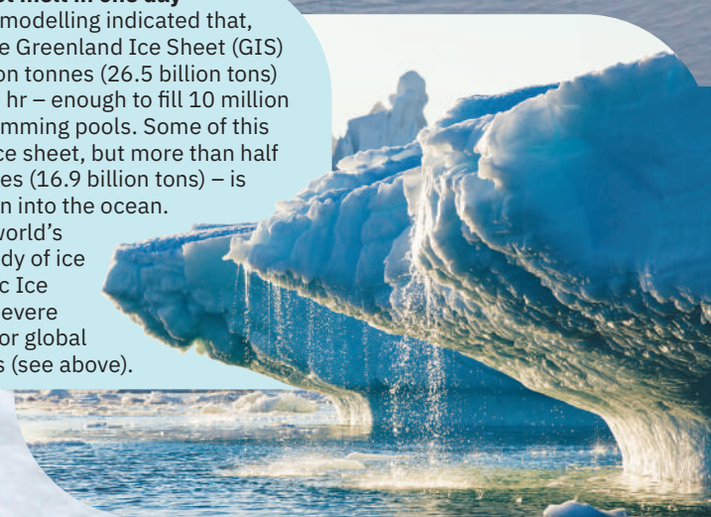


Highest sea-level rise
The year 2019 marked the greatest rise in sea levels since satellite altimetry observations began in 1993. The global average was 87.61 mm (3.4 in) above that of 1993, according to the National Oceanic and Atmospheric Administration (NOAA) – an increase of 6.1 mm (0.24 in) from 2018. Kiribati (pictured) is a low-lying atoll in the Pacific particularly at risk; rising oceans may soon force its 100,000-plus population to relocate.



First use of the term "climigration"
Human settlements have always been at the mercy of changing environmental factors, but the recognition that we could be partly driving these changes only really gained traction in the late 20th century. In 2009, lawyer Robin Bronen (USA) coined the term "climigration" to describe the forced movement of people as a result of climate change. She included it in a report on indigenous Alaskan villages (such as Shishmaref, above), whose residents had to relocate owing to vanishing sea-ice and thawing permafrost.

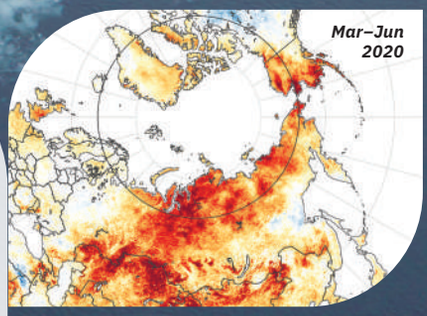
Greatest ice-sheet melt in one day
Observations and modelling indicated that, on 31 Jul 2019, the Greenland Ice Sheet (GIS) generated 24 billion tonnes (26.5 billion tons) of meltwater in 24 hr – enough to fill 10 million Olympic-sized swimming pools. Some of this refroze on to the ice sheet, but more than half – 15.3 billion tonnes (16.9 billion tons) – is thought to have run into the ocean. As the GIS is the world's second-largest body of ice (after the Antarctic Ice Sheet), this has severe ramifications for global sea levels (see above).

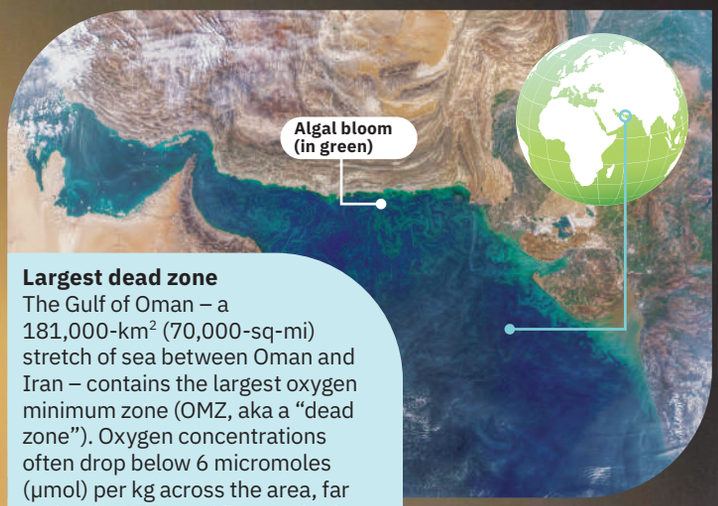




Polar bears feed mostly on seals, but reduced sea-ice is driving their prey farther afield, jeopardizing the bears' future.

Lowest Arctic sea-ice extent
Each winter, the Arctic Ocean freezes and forms sea-ice that shrinks the following summer. Only 3.41 million km^2 (1.31 million sq mi) of ice remained at the end of the Arctic summer in 2012, as recorded on 16 Sep. The next-lowest levels – 3.74 million km^2 (1.44 million sq mi) – were seen in 2020, when it's likely the Arctic experienced its highest-ever temperatures (pending WMO ratification). The inset NASA heat map shows 2020's uncommonly hot spring season, particularly in northern Russia and Alaska, USA.





Largest dead zone
The Gulf of Oman – a 181,000-km² (70,000-sq-mi) stretch of sea between Oman and Iran – contains the largest oxygen minimum zone (OMZ, aka a "dead zone"). Oxygen concentrations often drop below 6 micromoles (µmol) per kg across the area, far under the 120 µmol/kg required to sustain many forms of life. There has always been an OMZ here, but since the 1990s it has grown and intensified, owing to warming seas. This has led to a huge decline in biodiversity, allowing vast algal blooms (above) to form.



Largest climate-change protest
The Global Climate Strike in Sep 2019 was a week-long mobilization calling for more action on the climate crisis. It was spearheaded by Fridays For Future and School Strike 4 Climate – championed by Greta Thunberg – working with grass-roots activists, NGOs and charities. Across the two main strikes (20 Sep and 27 Sep), an estimated 7.22 million people in more than 160 countries took part (above is London, UK, on 20 Sep). There was even a rally in Antarctica, the **most southerly climate protest** (see p.28).

Largest iceberg
According to NOAA's National Ice Center, which monitors major icebergs using live satellite data, iceberg A23A was 40 nautical mi long and 34 nautical mi wide (74 x 63 km; 46 x 39 mi) as of 8 Jan 2021. Located in the Weddell Sea off Antarctica, it had an area of *c.* 4,000 km² (1,540 sq mi) – similar to the US state of Rhode Island. The previous record holder – A68A – broke into several fragments as it neared the island of South Georgia in late 2020.

Largest ozone hole
The ozone layer is a thin section of Earth's atmosphere that absorbs most of the Sun's harmful UV radiation. Certain air pollutants deplete ozone molecules, causing thinning or even gaps in this natural shield. On 9 Sep 2000, a 29.9-million-km² (11.5-million-sq-mi) hole – about three times the size of the USA – appeared above Antarctica. Despite shrinking to less than half that size in Oct 2019, the following year it had grown back to 24.8 million km² (9.6 million sq mi).

Most named tropical storms in one year
Storm events are grouped into categories based on their wind speed; they receive a name once they reach the status of "tropical storm", with sustained winds of 33 knots (61 km/h; 38 mph) or higher. The all-time record goes to 1964, when 38 named cyclones were logged in the West Pacific; of these, 26 escalated into typhoons.

The Atlantic witnessed its most intense storm season ever in 2020. In total, there were 30 named storms, 13 of which became hurricanes (as typhoons are called in the northern hemisphere). The season ended with Hurricane Iota (pictured is the Colombian isle of Providencia, post-Iota). It is only the second-known Category 5 hurricane to occur in November; the first was back in 1932.



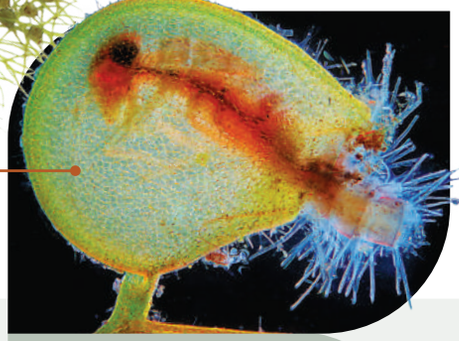
Largest injection of smoke into the stratosphere by a wildfire event
Between Dec 2019 and Jan 2020, fierce bushfires burned some 5.8 million ha (14.3 million acres) of Australia – an area larger than Croatia. They also spawned a series of huge pyrocumulonimbus clouds. Around 400,000 tonnes (440,000 tons) of aerosol particles (a mix of carbon, smoke and condensed water) – similar in quantity to that produced by a moderate volcanic eruption – rose some 35 km (22 mi) into the sky. Millions of animals perished and air quality as far away as South America was affected. Global warming makes bushfires more frequent and more intense: less rainfall results in drier forest and grassland, far more susceptible to catching alight.

Scorched Earth: 2020's fire outbreak
Australia was not the only place to see unprecedented wildfires in 2020. Drier and hotter climates are turning ever more terrain into a tinderbox.
- **California, USA** (below): 1.77 million ha (4.37 million acres) razed
- **Brazil**: *c.* 25% of the Pantanal (**largest wetland**) burned, along with nearly 2.2 million ha (5.4 million acres) of the Amazon (**largest rainforest**)
- **Siberia, Russia**: fires emitted around 250 megatonnes (275 million tons) of CO_2

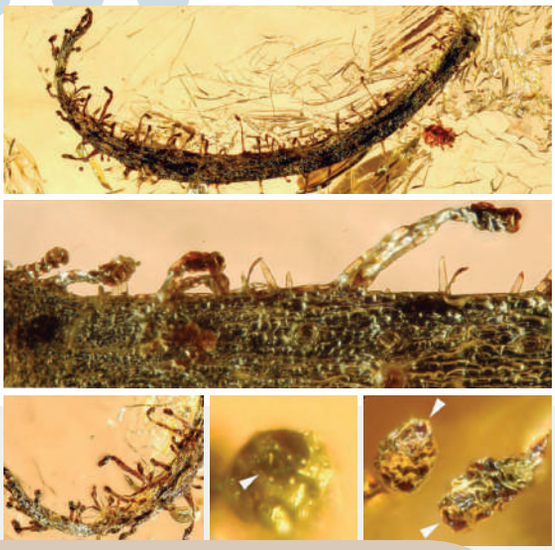


Carnivorous Plants

Some plants have evolved a startling strategy to secure nourishment: they catch live animals and then slowly digest them! Sundews catch insects in honey-sweet mucus; pitchers trap unsuspecting animals in vats of digestive fluid; other species use lightning-fast leaves. Their unusual diet means that meat-eating plants can often thrive in places that other plants would perish.



Fastest predatory plant
Aquatic bladderworts (*Utricularia*) use suction-based traps (i.e., bladders) with hair-triggered trapdoors to capture prey such as small crustaceans and insect larvae. The southern bladderwort (*U. australis*) has been recorded ensnaring victims in a mere 5.2 milliseconds, sucking in water at accelerations of up to 600 *g*! By comparison, the Venus flytrap (see opposite) takes around 20 times longer to catch its prey.

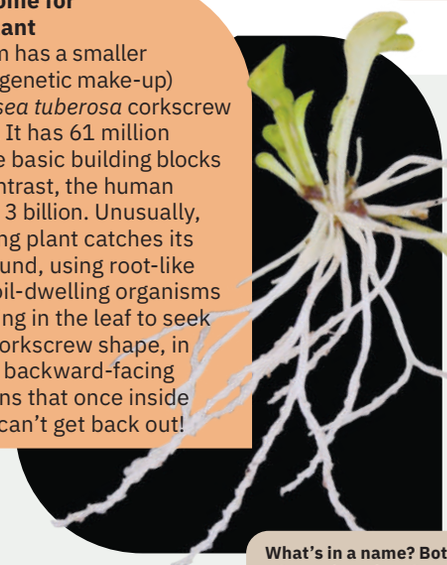


Oldest carnivorous plant fossil
As reported in 2015, carnivorous leaf fragments have been found dating to 35–47 million years ago (MYA) in the Eocene period. Fossilized in Baltic amber from the Yantarny mine near Kaliningrad in Russia, they have trapping organs akin to those of today's flycatcher bushes (*Roridula*) of South Africa. The leaves likely exuded a gluey excretion from the tips of tentacles (see arrows) to catch their prey. There have been claims of even earlier fossil evidence of carnivorous plants – perhaps as old as 125 MYA – but these are currently disputed by palaeobotanists.

Largest genus of carnivorous plants
As of Sep 2020, both the sundews (*Drosera*) and bladderworts (*Utricularia*) comprise around 248 species. The two also share the title of **most widely distributed carnivorous plants**, occurring on every continent bar Antarctica. Overall, there are around 860 known species of carnivorous plant, from *c.* 18 genera. Sundews use sticky mucilaginous (snot-like) secretions on their leaves to catch insects, while bladderworts employ vacuum-powered hollow sacs with touch-sensitive trapdoors (see above).

The record for **smallest carnivorous plant family** is shared by two families, each with a single species. Cephalotaceae is represented only by the Albany pitcher plant (*Cephalotus follicularis*) of Australia, while Drosophyllaceae's monotypic species is the dewy pine (*Drosophyllum lusitanicum*), native to the western Mediterranean.

Smallest genome for a flowering plant
No angiosperm has a smaller genome (total genetic make-up) than the *Genlisea tuberosa* corkscrew plant of Brazil. It has 61 million base pairs (the basic building blocks of DNA); by contrast, the human genome has *c.* 3 billion. Unusually, this meat-eating plant catches its prey underground, using root-like leaves. Tiny soil-dwelling organisms enter an opening in the leaf to seek food but the corkscrew shape, in tandem with backward-facing hairs, means that once inside they can't get back out!



Largest carnivorous plants
There are various contenders for this title, depending on the criteria, but in terms of overall plant size they would all belong to the genus *Nepenthes*. These tropical pitcher plants are found mostly in parts of south-east Asia, notably Indonesia, Malaysia and the Philippines. Often seen as massive vining plants, some climb as high as 25 m (82 ft) into the rainforest canopy, forming huge, clumped growths.

Of all the carnivorous plants, those that digest the **largest prey** also belong to the Nepenthaceae family, of which *Nepenthes* is the sole genus (see below left).

What's in a name? Botanical nomenclature
- **Genus/species**: *Sarracenia flava* (or *S. flava*)
- **Hybrid**: a cross between two or more species, e.g., *Sarracenia leucophylla* x *flava*
- **Cultivar**: a formally described plant (can be a pure species or hybrid) to have been registered, e.g., *Sarracenia* 'Leah Wilkerson'
- **Unregistered selection**: an unassessed hybrid not yet recognized by the botanical community at large, e.g., *Nepenthes* "Leviathan"

Largest carnivorous plant traps (volume)
All pitcher plants use beaker-shaped leaves filled with digestive juices ("pitfall traps") to capture prey. The giant montane pitcher (*Nepenthes rajah*) of Malaysian Borneo can hold 3.5 litres (0.9 US gal) of water and stand up to 41 cm (1 ft 4 in) tall. *N. insignis*, *N. merrilliana* and some forms of *N. rafflesiana* grow traps of similar proportions. Frogs, small birds and even rodents number among their prey.

Highest carnivorous plant
The sticky-leaved *Pinguicula calyptrata*, a butterwort native to the Andes in South America, is found at elevations up to 4,200 m (13,780 ft). There is evidence that the alpine butterwort (*P. alpina*, right) reaches similar heights up to 4,100 m (13,450 ft) in the Himalayas. It's worth noting that *P. calyptrata* grows closer to the Equator, where high-elevation sites are not so frigid.



Tallest carnivorous plant traps
Predominantly found in wetland areas of North America, *Sarracenia* are distinguished by their slender, trumpet-shaped pitchers. Those of the yellow pitcher plant (*S. flava*) and crimson pitcher plant (*S. leucophylla*) reach 120 cm (3 ft 11 in). Occasionally, larger cultivars arise: a selection of *S. leucophylla* x *flava* (=*S.* x *moorei*) hybrid, named 'Leah Wilkerson', has recorded pitchers up to 130 cm (4 ft 3 in) from ground to lid tip.

First carnivorous plant hybrid
The pitcher plant *N.* x *dominii* was first exhibited in Jun 1862 at the Royal Horticultural Society show in South Kensington, London, UK, and is reportedly still in cultivation to this day. It was a cross between *N. rafflesiana* and (most likely) *N. gracilis*, developed by the British horticulturalist John Dominy in the late 1850s. Pitcher plants of the genus *Nepenthes* were widely hybridized during the great Victorian stovehouse era, which saw a rising enthusiasm for tropical plants grown in hothouses.

First plant species discovered on Facebook
The magnificent sundew (*D. magnifica*) was identified by experts as a hitherto-unknown species in Jul 2015. Amateur researcher Reginaldo Vasconcelos had posted a photo of the plant that he had spotted three years earlier on a mountaintop in south-east Brazil. Leaves included, *D. magnifica* plants can grow to around 1.5 m (5 ft) long.

Most expensive carnivorous plant
In Jul 2019, a male-flowering specimen of the "Leviathan" pitcher plant (a hybrid of *N. rajah* x *peltata*) sold for $4,500 (£3,540) to an anonymous buyer in the USA. "Leviathan" is one of several hybrids developed by American carnivorous plant hobbyist Jeremiah Harris (see below).



Largest sundew
The largest discrete trapping leaves in the *Drosera* family are those of the king sundew (*D. regia*, above): each leaf grows up to 40 cm (1 ft 4 in) long and 1.2 cm (0.5 in) wide. It has a tiny range in South Africa. *Drosera erythrogyne*, a climbing species from Western Australia, produces a scrambling stem that can reach 3 m (9 ft 10 in) in total length.

Fastest terrestrial predatory plant
The pimpernel sundew (*D. glanduligera*) of southern Australia has sensitive "snap tentacles", which rapidly curl inward when triggered. They can capture small insects, such as ants, within 75 milliseconds, catapulting the bug on to shorter tentacles covered in sundews' trademark natural "glue". These leaves move the victim towards the centre of the plant to be digested.

Most southerly carnivorous plant
The sundew *D. uniflora* and the butterwort *P. antarctica* have both been found at 55.9°S in the Tierra del Fuego region (shared between Chile and Argentina) at the bottom of South America.

The **most northerly carnivorous plant** is the alpine butterwort (see opposite), which has been recorded at 79.3°N on the Norwegian archipelago of Svalbard, within the Arctic Circle. The only non-butterwort species that comes close to approaching this is the round-leafed sundew (*D. rotundifolia*).



Largest trap on a Venus flytrap
Arguably the most famous carnivorous plant is the Venus flytrap (*Dionaea muscipula*). Measuring the longest dimension of the trapping leaf blade, excluding the marginal spines, the traps are typically 2–3 cm (0.7–1.2 in) long. The largest assessed *Dionaea* trap is a specimen (inset below) of the cultivar 'Alien', verified to be 5 cm (1.96 in) on 13 Sep 2020. It was grown in Colorado Springs, USA, by Jeremiah Harris (USA, right), who founded the Colorado Carnivorous Plant Society in 2003.

Sultan Kösen

VITAL STATISTICS
Name: Sultan Kösen
Born: 10 Dec 1982
Birthplace: Mardin, south-east Turkey
Height: 251 cm (8 ft 2.8 in)
Weight: 150 kg (330 lb 11 oz; 23 st 8 lb)
Hand span: 30.48 cm (12 in)
Feet: 36.5 cm (1 ft 2 in), left foot

Towering over the rest of the human race is Sultan Kösen of Turkey, who, at 251 cm (8 ft 2.8 in) tall, is a giant among men – literally!

The category of **tallest living human** is a classic Guinness World Records title – arguably our most famous and iconic – but it's not one that changes (big) hands very often. For the past 12 years, the title has been held by Sultan, who was passed the baton in 2009 from the 236.1-cm-tall (7-ft 8.9-in) Bao Xi Shun of China. His incredible height confirmed Sultan as the first person measured in the 21st century to have exceeded 8 ft (243.8 cm), securing him membership of a rather exclusive club (see below).

Guinness World Records first met the 26-year-old Sultan on 11 Feb 2009, when his height was ratified at 246.5 cm (8 ft 1 in). But when he was re-assessed by our adjudicators just two years later, he had grown by 4.5 cm (1.7 in), proof that the tumour affecting his pituitary gland – the organ in the brain that regulates the production of growth hormone – was still present. Luckily, Sultan's new-found fame brought him to the attention of doctors at the University of Virginia Medical Center in the USA, who gifted him life-saving gamma-knife surgery and finally halted his growth.

Since then, Sultan has toured the world, astounding everyone with his stature. He is an unmissable ambassador for record-breaking, and a champion of those celebrating what it means to be unique. Thank you, Sultan!



1



2



3

Find out more about Sultan in the Hall of Fame section at **www.guinnessworldrecords.com/2022**





1. Finding clothes and shoes that fit is a struggle, but Sultan has struck up a friendship with the German cordwainer George Wessels (top left), who specializes in making bespoke footwear for giants.

2. Basketball would be the obvious sport of choice for Sultan, and he did sign briefly as a centre with Turkish team Galatasaray in 2002... but he proved too tall and too heavy to play!

3. Sultan also has the **largest hands**: 28.5 cm (11.2 in) from wrist to middle finger tip. They measure 30.48 cm (12 in) across at full span.

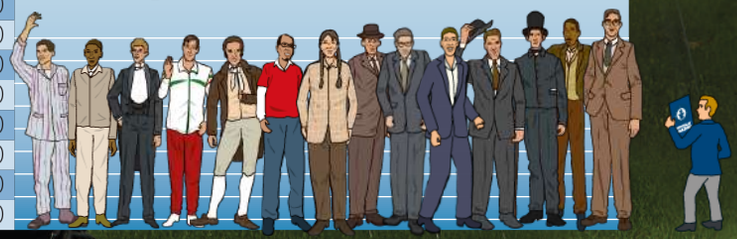
4. The giant jet-setter – who can barely contort himself into a taxi – is pictured here during his travels to London and New York.



The Eight-Foot Club

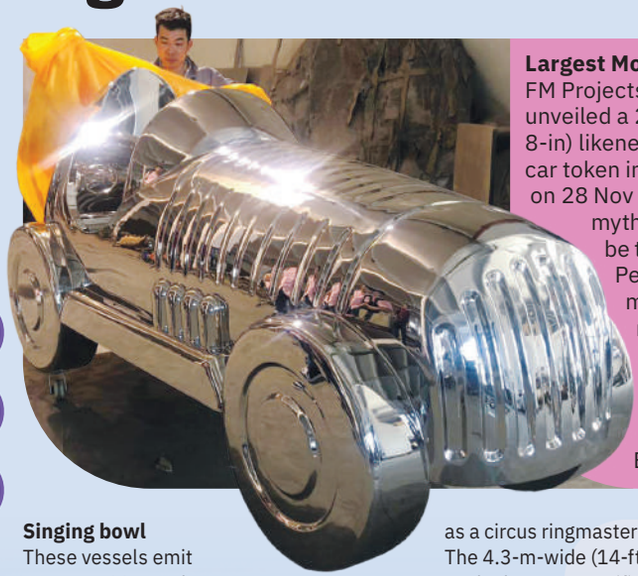
	Name (illustrated right to left)	Confirmed height
1	Robert Wadlow (USA, 1918–40)	272 cm (8 ft 11.1 in)
2	John William Rogan (USA, *c.* 1868–1905)	267 cm (8 ft 9 in)
3	John F Carroll (USA, 1932–69)	263.5 cm (8 ft 7.7 in)
4	Väinö Myllyrinne (FIN, 1909–63)	251.4 cm (8 ft 3 in)
5	Sultan Kösen (TUR, 1982–)	251 cm (8 ft 2.8 in)
=6	Don Koehler (USA, 1925–81)	248.9 cm (8 ft 2 in)
=6	Bernard Coyne (USA, 1897–1921)	248.9 cm (8 ft 2 in)
8	Zeng Jinlian (CHN, 1964–82; **tallest woman ever**)	247 cm (8 ft 1.75 in)
=9	Brahim Takioullah (MAR, 1982–)	246.3 cm (8 ft 1 in)
=9	Patrick Cotter, aka O'Brien (IRL, 1760–1806)	246.3 cm (8 ft 1 in)
11	Morteza Mehrzadselakjani (IRN, 1987–)	246 cm (8 ft 0.85 in)
12	Constantin, aka Julius Koch (DEU, 1872–1902)	245.8 cm (8 ft 0.8 in)
13	Gabriel Estêvão Monjane (MOZ, 1944–90)	245.7 cm (8 ft 0.75 in)
14	Sulaimān 'Ali Nashnush (LIB, 1943–91)	245 cm (8 ft 0.4 in)

Sultan is affected by both gigantism (extreme bone growth from early childhood) and acromegaly (continued excessive tissue growth in adulthood), both caused by the over-production of growth hormone. He's not unique in exceeding 8 ft (243.8 cm) but only 14 people – 13 men and one woman – have been ratified by Guinness World Records to have reliably exceeded this height. Meet the high-society members of the exclusive Eight-Foot Club!



Sultan has three brothers and a sister, all of whom are average sized. His rapid growth spurt didn't start until he was 10 years old.

Big Stuff



Largest Monopoly token
FM Projects Limited (CHN) unveiled a 2.96-m-long (9-ft 8-in) likeness of a Monopoly racing car token in Hong Kong, China, on 28 Nov 2019. In Monopoly mythology, the car is held to be the property of Milburn Pennybags, the game's moustachioed mascot. It may have been inspired by a 1940s Kurtis Kraft Midget car or vintage '30s racers, such as the Mercedes-Benz W25.



Largest jute bag
On 3 Jul 2019, Cotton Bag Co. (UK) presented a jute bag measuring 22.5 m (73 ft 9 in) tall and 14.6 m (47 ft 10 in) wide in Bradford-on-Avon, Wiltshire, UK. The attempt coincided with International Plastic Bag Free Day and Plastic Free July, and was arranged to encourage the wider adoption of reusable bags.

Singing bowl
These vessels emit a resonant tone when struck, or when a mallet is run along the rim. György Juhász (HUN) presented a bowl with a width of 2.33 m (7 ft 7 in) in Garáb, Hungary, on 28 Feb 2019.

Scissors
Tekbaş Şirketler Grubu (TUR) performed a ribbon-cutting ceremony at a new development in Adana, Turkey, on 12 Oct 2019 using a pair of 3.01-m-long (9-ft 10.5-in) scissors – more than 10 times the average size.

Christmas snowflake ornament
On 28 Oct 2019, Universal Studios in Osaka, Japan, topped their Christmas tree with a 3.19-m (10-ft 5-in) snowflake.

Googly eyes
Austin McChord, Ryan Sasloe and Ed Lundblad (all USA) unveiled two jiggly eyes with a 12-ft (3.66-m) diameter – larger than a MINI Cooper car – in Norwalk, Connecticut, USA, on 27 Aug 2019.

Papier-mâché sculpture (supported)
Carnival Magic Theme Park in Phuket, Thailand, created a 5.95-m-tall (19-ft 6-in) papier-mâché likeness of an elephant, dressed as a circus ringmaster and wearing a top hat. The 4.3-m-wide (14-ft) "chewed-up paper" pachyderm was verified on 8 Feb 2020.

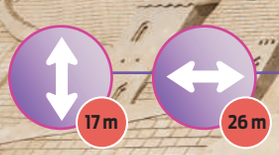
On the same day, Carnival Magic Theme Park displayed the **largest outdoor chandelier** – 11.69 m from top to bottom and 9.47 m in diameter (38 ft 4 in x 31 ft).

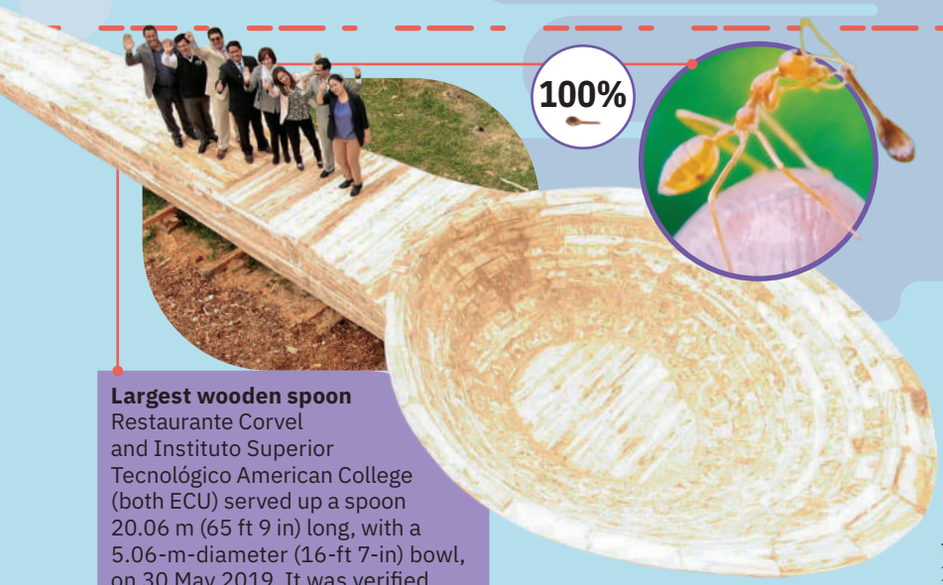
Model of a human organ
VPS Lakeshore – a hospital in Kochi, India – created a model of a heart measuring 9.69 m (31 ft 9 in) tall, as verified on 5 Jan 2019. It's around 80 times larger than the real thing. The giant installation was part of a health campaign.

Tallest sandcastle
On 5 Jun 2019, Skulptura Projects (DEU) unveiled a bonanza-sized beach attraction measuring 17.65 m (57 ft 11 in) tall at the 10th Sandskulpturen Festival in Binz, Germany. An international team of 12 sculptors and eight technicians worked for three-and-a-half weeks to complete the sandcastle. Its circular base had a diameter of approximately 26 m (85 ft 3 in). No additives were used in the water to bind the sand, and there were no internal support structures.



The colossal castle is made from 11,000 tonnes (12,125 tons) of sand, mixed only with water.

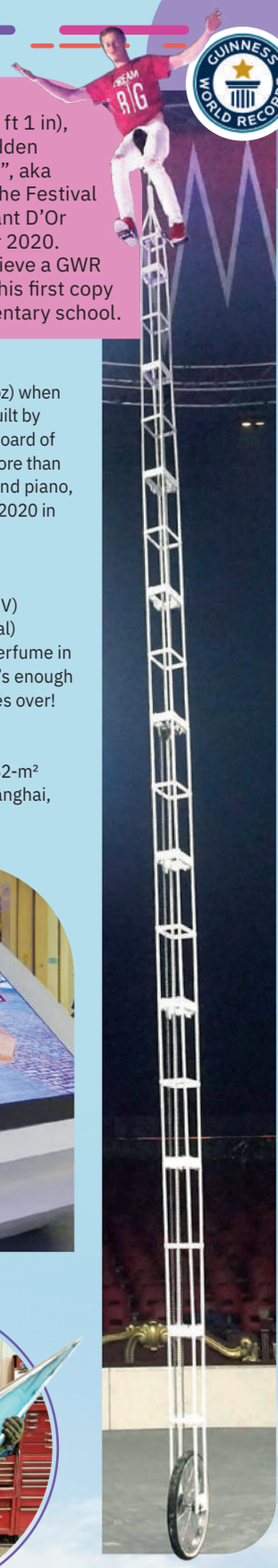




Largest wooden spoon
Restaurante Corvel and Instituto Superior Tecnológico American College (both ECU) served up a spoon 20.06 m (65 ft 9 in) long, with a 5.06-m-diameter (16-ft 7-in) bowl, on 30 May 2019. It was verified in Cantón Paute, Azuay, Ecuador.

The **smallest wooden spoon** (inset) is a mere 4.5 mm (0.18 in) long. It was presented by Gowrishankar Gummadidhala (IND) in Telangana, India, on 9 Apr 2020.

Tallest rideable unicycle
At a vertiginous 8.87 m (29 ft 1 in), the loftiest unicycle was ridden by the "One Wheel Wonder", aka Wesley Williams (USA), at the Festival Internacional Del Circ Elefant D'Or in Girona, Spain, on 11 Mar 2020. Wesley has wanted to achieve a GWR title ever since opening his first copy of the book in elementary school.



Jam jar (weight)
A colossal 1,005 kg (2,215 lb 10 oz) when empty, the heaviest jam jar was built by Tonic Life (MEX), assisted by the Board of Trustees of the Strawberry Fair. More than twice the weight of a Steinway grand piano, the giant jar was verified on 23 Mar 2020 in Irapuato, Guanajuato, Mexico.

Perfume bottle
On 22 Jan 2019, Dejan Levačić (HRV) displayed a 616.18-litre (162.77-gal) bottle of saffron-scented "Gold" perfume in Čakovec, Međimurje, Croatia. That's enough to fill an average bath-tub four times over!

Colouring book
Wanda Kids (CHN) presented a 15.52-m² (166.97-sq-ft) colouring book in Shanghai, China, on 22 Aug 2020.

Largest mobile gamepad
Made by Chinese consumer electronics firm OPPO, this mega-sized Gamepad C1 is slightly over 4 m (13 ft 1 in) long – around double the length of a king-size bed – as confirmed in Shenzhen, China, on 30 Nov 2019. It is fully operational and weighs some 500 kg (1,100 lb). Discover more upscaled gaming hardware on p.206.



Golf club (length)
Michael Furrh and Mike Rausch, aided by First Tee – Fort Worth (all USA), teed off using a driver with a 15.57-m (51-ft 1-in) shaft in Texas, USA, on 5 Jan 2020.

Bath (length)
To promote their building services, Koop-Brinkmann (DEU) unveiled a 19.47-m (63-ft 10-in) tub – longer than a bowling alley – in Drebber, Germany, on 7 Jul 2019.

Ball of stickers
On 11 Nov 2020, Sticky Brand Creative Group (USA) presented a 139.82-kg (308-lb 4-oz) sticker ball in Burlington, Vermont, USA. More than 91 hr in the making, the finished sphere had a circumference of 2.1 m (7 ft 1 in).



Largest fishing lure
Jessica Dew and Brad Pallister (both CAN) produced an outsized fishing lure 12.32 m (40 ft 5 in) long in Lacombe, Alberta, Canada, on 29 May 2019. It has a 2.46-m-wide (8-ft 1-in) hook and 2.92-m-wide (9-ft 7-in) spoon. The inset picture shows Ryan Riopel, the head welder on the project, holding one of the giant lure's eagle-claw hooks.

At the Poles: Antarctica



8

First solo crossing of Antarctica
On 18 Jan 1997, Børge Ousland (NOR) completed a 2,845-km (1,767-mi) kite-ski trek from Berkner Island in the Weddell Sea to McMurdo Sound. Ousland crossed both of the Ronne and Ross ice shelves, spending 64 days negotiating his 185-kg (408-lb) sled over glaciers and through sastrugi (ridges of hard snow). See pp.116–17 for Ousland's record-breaking exploits in the Arctic.



13 7

First women to cross the Antarctic landmass
In Nov 2000, Liv Arnesen (NOR) and Ann Bancroft (USA) set off on a crossing of Antarctica from the "Blue One" runway in Queen Maud Land. They arrived at the South Pole on 16 Jan 2001 but were hampered by unusually calm winds, which meant they could not use their kite sails. With rations running low, their 94-day odyssey came to an end at the edge of the Ross Ice Shelf. The duo had pulled their 113-kg (250-lb) sleds across 2,747 km (1,707 mi) of icy terrain.
Six years earlier, Arnesen had become the **first woman to reach the South Pole on a solo expedition**, completing her 50-day journey from Hercules Inlet on Christmas Eve 1994.

First unmotorized crossing of Antarctica
The 1990 International Trans-Antarctica Expedition travelled 6,048 km (3,758 mi) by dog sled from Seal Nunataks on the Larsen Ice Shelf to Mirny Station, via the South Pole. The 220-day trek (26 Jul 1989 to 3 Mar 1990) was intended to highlight the issue of climate change. The team was made up of Will Steger (USA), Jean-Louis Étienne (FRA), Geoff Somers (UK), Viktor Boyarsky (RUS), Qin Dahe (CHN) and Keizo Funatsu (JPN).



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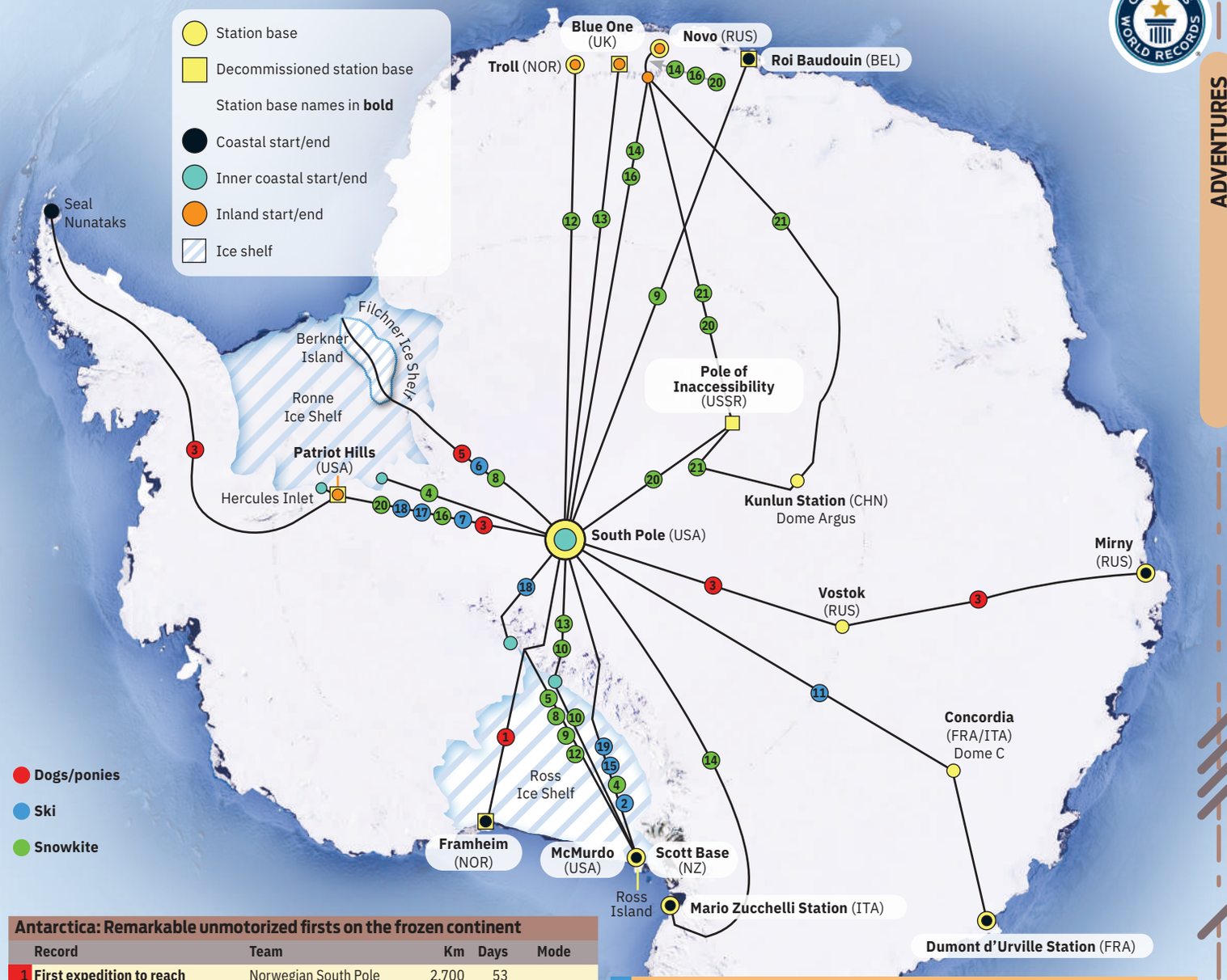
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First expedition to reach the South Pole
On 14 Dec 1911, Roald Amundsen (leader), Oscar Wisting (pictured), Helmer Hanssen, Olav Bjaaland and Sverre Hassel (all NOR) arrived at the South Pole following a 53-day march with dog sleds from the Bay of Whales. The party had pioneered a route up the previously unknown Axel Heiberg Glacier on to the Antarctic Plateau. They reached the Pole 34 days before the ill-fated expedition led by the UK's Robert Falcon Scott, in which all five men perished on their return journey.



First East Antarctica ski expedition
On 23 Nov 1999, Laurence de la Ferrière (FRA, b. MAR) departed the South Pole, on skis, for Dumont d'Urville on the coast, arriving on 6 Feb 2000. Along the route, she took core samples as part of a research project. This was not De la Ferrière's first time in Antarctica; three years earlier, she had made a 57-day solo trek from the Hercules Inlet to the Pole. She began her career as a mountaineer, and in 1992 climbed Everest without oxygen.

11



Antarctica: Remarkable unmotorized firsts on the frozen continent

	Record	Team	Km	Days	Mode
1	**First expedition to reach the South Pole** (1911–12)	Norwegian South Pole Expedition (led by Roald Amundsen)	2,700	53	
2	**First ski expedition to the South Pole** (1985–86)	Robert Swan, Roger Mear (both UK), Gareth Wood (CAN)	1,405	69	
3	**First unmotorized crossing of Antarctica** (1989–90)	International Trans-Antarctica Expedition (led by Will Steger (USA) and Jean-Louis Étienne (FRA))	6,048	220	
4	**First snowkite crossing of the Antarctic landmass** (1989–90)	Reinhold Messner (ITA), Arved Fuchs (DEU)	2,390	92	
5	**First crossing of the classic route from Berkner Island to Ross Island** (1990–91)	Sjur Mørdre, Simen Mørdre (both NOR)	2,845	91	
6	**First solo expedition to the South Pole** (1992–93)	Erling Kagge (NOR)	1,375	50	
7	**First solo expedition to the South Pole (female)** (1994)	Liv Arnesen (NOR)	1,200	50	
8	**First solo crossing of Antarctica** (1996–97)	Børge Ousland (NOR)	2,845	64	
9	**First snowkite crossing of East and West Antarctica** (1997–98)	Alain Hubert, Dixie Dansercoer (both BEL)	3,924	99	
10	**First ascent (new route) of the Shackleton Glacier to the South Pole** (1998–99)	Eric Philips, Jon Muir (both AUS), Peter Hillary (NZ)	1,450	84	
11	**First East Antarctica ski expedition** (1999–2000)	Laurence de la Ferrière (FRA, b. MAR)	2,776	75	
12	**First unsupported snowkite crossing of East and West Antarctica** (2000–01)	Rolf Bae, Eric Sønneland (both NOR)	3,800	107	
13	**First women to cross the Antarctic landmass** (2000–01)	Liv Arnesen (NOR), Ann Bancroft (USA)	2,747	94	
14	**First solo crossing of East Antarctica (male)** (2005–06)	Rune Gjeldnes (NOR)	4,804	90	
15	**First unsupported expedition to the South Pole from Ross Island** (2008–09)	Henry Worsley, Will Gow, Henry Adams (all UK)	1,480	66	
16	**First unguided snowkite crossing from Novo to Hercules Inlet** (2011–12)	Alberto Iñurrategi, Mikel Zabalza, Juan Vallejo (all ESP)	3,270	55	
17	**First unsupported return South Pole expedition** (2011–12)	Aleksander Gamme (NOR), James Castrission, Justin Jones (both AUS)	2,260	87	
18	**First solo ski crossing of Antarctica (female)** (2011–12)	Felicity Aston (UK)	1,744	59	
19	**First full return South Pole ski expedition** (2013–14)	Tarka L'Herpiniere, Ben Saunders (both UK)	1,795	105	
20	**First solo snowkite expedition to the South Pole via the Pole of Inaccessibility** (2014–15)	Frédéric Dion (CAN)	4,171	55	
21	**First unmotorized journey to reach Dome Argus** (2020–21)	Geoff Wilson (AUS, b. KEN)	5,179	58	

See also pp.128–29



Epic Journeys



Youngest person to visit every country in Europe
Mauritian Gevish Kumar Kheddo (b. 30 Nov 2000) completed a pan-European trek on 25 Jan 2020 at the age of 19 years 56 days. His adventure – which he fitted in around his full-time university studies! – lasted nearly two years, concluding in Reykjavik, Iceland. He's shown here during stopovers in Prague (Czech Republic, main picture), Athens (Greece, top) and Copenhagen (Denmark, right).



Fastest circumnavigation by single-seat, single-engine piston aircraft
Matt Jones, Steven Brooks and Ian Smith took turns piloting a World War II Supermarine Spitfire Mk IX around the world in 122 days, returning home on 5 Dec 2019. Geralt Jones, Lachlan Monro and Ben Uttley (all UK) provided support. Owing to the aircraft's limited instruments, flights took place only during daytime and in clear weather.



First circumnavigation by autogyro
On 22 Sep 2019, James Ketchell (UK) concluded a 175-day flight around the world, having travelled some 44,450 km (27,620 mi) in a Magni M16C autogyro. His open-cockpit aircraft has a top speed of 70 knots (129 km/h; 80 mph), around half that of the average helicopter. He broke his journey into 122 hops, as his autogyro has a limited range of *c.* 1,300 km (800 mi).

Fastest time to...
Cross the USA on foot (female): Sandra Villines (USA) walked across America in 55 days 16 hr 23 min from 11 Sep to 5 Nov 2017. She began in San Francisco, California, and ended in New York City.
Visit all 48 contiguous US states by bicycle (female): Paola Gianotti (ITA) cycled through all adjoining US states in 43 days between 1 May and 12 Jun 2016.
Travel to all Hong Kong MTR stations: On 1 Feb 2020, Jonathan Wong (CHN) took precisely 7 hr 36 min 10 sec to journey between each Mass Transit Railway (MTR) station in Hong Kong, China.

Longest journey by...

Vehicle	Distance	Holder(s)	End date
Kite buggy	1,015 km	Pete Ash, Kieron Bradley, Brian Cunningham (all UK)	21 Sep 2004
Milk float	1,659 km	Paul Thompson (UK)	20 Sep 2015
Pocketbike (minimoto)	2,504 km	S Ýr Unnarsdòttir (ISL), M Reid, C Fabre (both USA)	17 Sep 2016
Roller skis	2,783 km	Gerard Proteau (FRA)	28 Jun 2014
Land windsurfer	3,410 km	Robert Torline (USA)	16 Jun 2001
Stilts	4,804 km	Joe Bowen (USA)	26 Jul 1980
Excavator	5,649 km	Norman Bartie (AUS)	20 Apr 2019
Crutches	6,006 km	Guy Amalfitano (FRA)	6 Sep 2013
Cycle rickshaw (pedicab)	6,248 km	Len Collingwood (UK)	17 Sep 2018
Kick scooter	7,100 km	Kosuke Takizawa, aka Rake (JPN)	21 Apr 2020
Electric mobility vehicle (team)	8,609 km	J Duckworth, J Seamons, S Parrott, J Uren, G West (all UK)	17 Oct 2007
Skateboard	12,159 km	Rob Thomson (NZ)	28 Sep 2008
Tractor	25,378 km	Hubert Berger (DEU)	23 Oct 2016
Electric scooter	25,547 km	Song Jian, Yadea Technology Group (both CHN)	28 Dec 2020
Wheelchair (motorized, mouth-controlled)	28,000 km	Chang-Hyun Choi (KOR)	6 Dec 2007
Wheelchair (manual)	40,075 km	Richard Marvin "Rick" Hansen (CAN)	22 May 1987
Fire engine	50,957 km	Stephen Moore (UK)	10 Apr 2011
Quad bike/ATV	56,239 km	Valerio de Simoni, Kristopher Davant, James Kenyon (all AUS)	22 Oct 2011
Taxi	69,716 km	Leigh Purnell, Paul Archer, Johno Ellison (all UK)	11 May 2012
Bus	87,367 km	Hughie Thompson, John Weston, Richard Steel (all UK)	3 Dec 1989
Bicycle	646,960 km	Walter Stolle (UK)	12 Dec 1976





Fastest solo Munro-bagging
To "bag a Munro" involves ascending one of the 282 peaks over 3,000 ft (914 m) in Scotland. Solo Munroist Donnie Campbell (UK) bagged all 282 in just 31 days 23 hr 2 min, ending in the Highland county of Sutherland, UK, on 2 Sep 2020. He cycled 1,443 km (896 mi) between the Munros and ran a total distance of 1,422 km (883 mi), of which 126,143 m (413,854 ft) was ascent – the equivalent of climbing Everest from sea level more than 14 times!

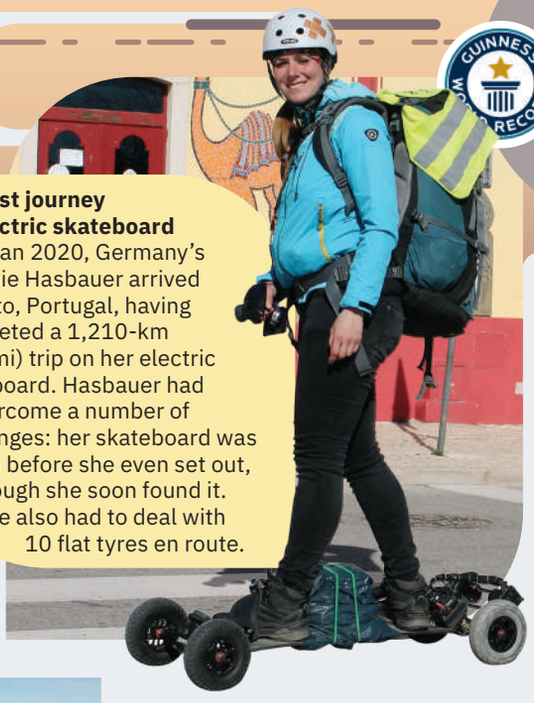




Fastest time to visit all Swiss cantons
On 22 May 2020, Gian-Luca Bähler (CHE) travelled between all 26 Swiss cantons (small territorial districts) in 15 hr 30 min, ending in Ticino. The idea arose over drinks with colleagues, when Bähler declared that he knew almost the entire public transport timetable of Switzerland by heart. He then decided to put his knowledge to the test.



First helicopter circumnavigation passing through antipodal points
The antipodes are points on Earth that are diametrically opposite to each other. From 8 Apr to 7 Aug 2017, Peter Wilson and Matthew Gallagher (both UK) flew a Robinson R66 around the world from Marlow in Buckinghamshire, UK, via the antipodes Palembang in Indonesia and Neiva in Colombia.



Longest journey by electric skateboard
On 6 Jan 2020, Germany's Stefanie Hasbauer arrived in Porto, Portugal, having completed a 1,210-km (751-mi) trip on her electric skateboard. Hasbauer had to overcome a number of challenges: her skateboard was stolen before she even set out, although she soon found it. She also had to deal with 10 flat tyres en route.

Fastest circumnavigation by car
The record for the **first and fastest man and woman to have circumnavigated the Earth by car** covering six continents under the rules applicable in 1989 and 1991 embracing more than an equator's length of driving (24,901 road miles; 40,075 km), is held by Saloo Choudhury and his wife Neena Choudhury (both India). The journey took 69 days 19 hours 5 minutes from 9 September to 17 November 1989. The couple drove a 1989 Hindustan "Contessa Classic" starting and finishing in Delhi, India.

Most countries visited by electric car on a single charge
On 8 Jul 2016, Frederik Van Overloop (BEL) travelled through seven countries in a Tesla Model S car without recharging.

The **greatest distance by electric scooter on a single charge** is 656.8 km (408.1 mi), by Liang Zhihao, Liang Zhiqi, Liu Haifan and Zhao Yangzi, in Luoyang, Henan, China, on 21 Oct 2020. The record was sponsored by the Dongguan Tailing Electric Vehicle Co., Ltd (all CHN).



First woman to complete the Four Poles Challenge
Vanessa O'Brien (UK/USA) summitted Everest on 19 May 2012, skied the last degree to the South and North Poles on 15 Dec 2012 (above) and 16 Apr 2013 respectively, and dived to the Challenger Deep on 12 Jun 2020 (see p.129). She thus became the first woman to visit the planet's highest and lowest points plus the two geographic poles.

Oldest person to visit both Poles
Dr Buzz Aldrin (b. 20 Jan 1930) reached the South Pole at the age of 86 years 314 days on 29 Nov 2016. He had earlier visited the North Pole on the Russian nuclear icebreaker *Sovetskiy Soyuz* in Jul 1998.

Dr Aldrin is best known for his participation in the **first crewed lunar landing**. He set foot on the Moon's surface at 3:11 GMT on 21 Jul 1969, preceded by Neil Armstrong (both USA).

Greatest vertical distance on foot in 24 hours (uphill and downhill)
Ben Wernick (UK) made 101 round trips up a hill in Glynogwr, Mid Glamorgan, UK, on 26–27 Sep 2020, each time logging a change in elevation of 224.52 m (736 ft 7 in). After 23 hr 43 min, he had travelled up and down a total of 22,676.52 m (74,398 ft).

Most extreme points visited on land
David Tait (UK) has visited two points on Earth separated by an elevation of 10,910 m (35,794 ft). He climbed Everest (8,848 m; 29,029 ft – see p.122) five times, most recently in 2013. Then, on 18 Mar 2019, he descended to 2,062 m (6,765 ft) below sea level in the Mponeng gold mine in Gauteng, South Africa.



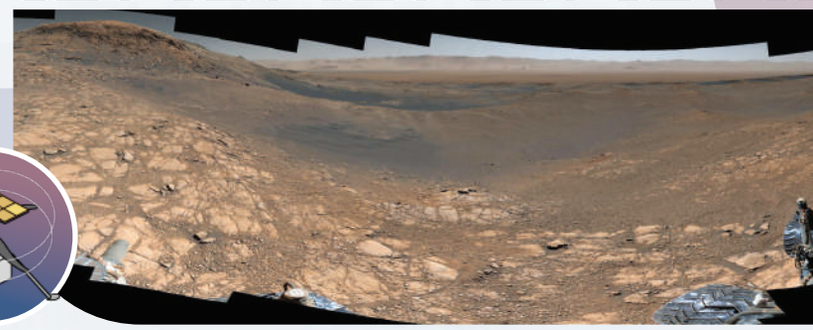
Longest motorcycle journey on ice (off-road)
Kevin Emans (UK) rode his KTM 500 EXC motorbike for 743.43 km (461.94 mi) over Lake Baikal in Siberia, Russia, ending on 22 Feb 2020. His vehicle had no modifications except for spiked tyres and protective adaptations for cold weather. Emans rode as part of the Baikal Project team – six motorcyclists who attempted to ride the entire length of this frozen body of water – the world's **deepest lake** (1,642 m; 5,387 ft).

As part of the same challenge, the project's leader, Gary O'Keeffe (IRL), also achieved the **greatest distance driven on ice in one week** (inset), covering 798.3 km (496 mi) from 16 Feb to 22 Feb 2020. He drove a 1976 four-wheel-drive Russian UAZ van, which incorporated a wood-burning stove.



Baikal's frozen surface posed a potential hazard to both record attempts. In some parts, it was only around 10 cm (4 in) thick.

Space Exploration



Most visited space station
As of 5 Nov 2020, the *International Space Station* (*ISS*) had received 241 different visitors from 19 countries, ranging from South Africa to Kazakhstan. On 2 Nov 2020, the crew on the *ISS* celebrated the station's 20th anniversary – the **longest continuous human presence in space**.

The **fastest trip to the *ISS*** was made by the crewed *Soyuz MS-17* on 14 Oct 2020. The spacecraft launched from the Baikonur Cosmodrome in Kazakhstan at 5:45 a.m. UTC (Coordinated Universal Time) and docked with the *ISS*'s *Rassvet* module at 8:48 a.m. – a journey time of 3 hr 3 min.

Closest orbit of a planetary body
On 6 Oct 2020, the NASA spacecraft *OSIRIS-REx* tightened its orbit around the asteroid 101955 Bennu, closing to an average altitude of 832 m (2,729 ft). This manoeuvre brought the spacecraft to within 374 m (1,227 ft) of the asteroid's surface at its closest point. On 20 Oct 2020, *OSIRIS-REx* descended from this transfer orbit to Bennu's surface and used an extendable arm to collect a sample.

Largest planetary rover
On 18 Feb 2021, the *Perseverance* rover touched down in the Jezero Crater on Mars. Designed and built by NASA's Jet Propulsion Laboratory, *Perseverance* is a 1,026.4-kg (2,262-lb 12-oz), 3-m-long (10-ft) nuclear-powered rover, tasked with finding signs of past microbial life on the Red Planet. In addition to its scientific instruments, *Perseverance* also carries the experimental *Ingenuity* helicopter (see pp.146–47).

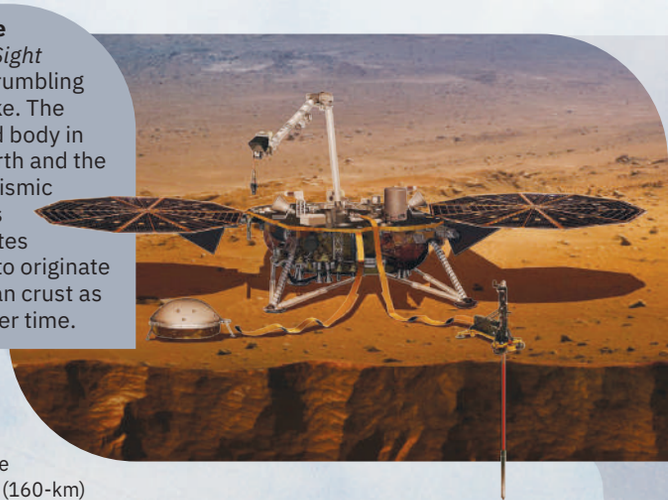


First commercial spacecraft to carry humans
On 30 May 2020, the SpaceX Crew Dragon Demo-2 mission blasted off from the Kennedy Space Center in Florida, USA. The private spacecraft transported NASA astronauts Doug Hurley and Bob Behnken on a 19-hr journey to the *ISS*, returning on 2 Aug 2020. The seven-person Crew Dragon capsule is based on a design that flew 19 missions to the *ISS* transporting cargo. The per-seat cost of a crewed flight on the Crew Dragon is around $55 m (£41.7 m).





First recorded marsquake
On 6 Apr 2019, NASA's *InSight* Mars lander detected the rumbling of a magnitude 2–2.5 quake. The Red Planet is only the third body in the Solar System, after Earth and the Moon, with measurable seismic activity. Unlike Earth, Mars possesses no tectonic plates – its quakes are thought to originate from contracting Martian crust as the planet cools over time.



First historic oasis found on another planet
NASA's *Curiosity* Mars rover has been exploring the Gale Crater, a 100-mi-wide (160-km) ancient impact basin where it landed in 2012. Research published on 7 Oct 2019 in *Nature Geoscience* revealed that this shallow hollow held water around 3.5 billion years ago. The geological map formed by *Curiosity*'s work shows a landscape that would have once looked like the Quisquiro salt flat in South America's Altiplano – a less hostile environment than is observed today.

First solar "campfires" observed
The European Space Agency's *Solar Orbiter* probe, launched on 10 Feb 2020, has confirmed the existence of solar flares that have been termed "campfires". Around the size of Germany, they are in fact much smaller versions of the sudden flashes of brightness on the Sun that can be observed from Earth.

Closest approach to the Sun by a spacecraft
Launched in 2018, the uncrewed *Parker Solar Probe* has been studying the Sun's outer corona. It harnessed Venus's gravity to perform a series of increasingly close flybys that exposed it to temperatures of around 1,377°C (2,510°F). On 27 Sep 2020, the probe approached to a distance of 13.5 million km (8.4 million mi) from the Sun's surface. It was moving at a heliocentric speed (i.e., relative to the Sun) of 466,592 km/h (289,927 mph) – also making it the **fastest spacecraft**.

Longest spaceflight by a woman
The debut mission of NASA astronaut Christina Koch (USA) ran for 328 days, from 14 Mar 2019 to 6 Feb 2020. Koch's stay on the *ISS* broke a record previously held by Peggy Whitson (see pp.154–55).



Highest-resolution panorama of Mars
In Nov and Dec 2019, NASA's *Curiosity* rover took more than 1,000 images of the Martian landscape. On 4 Mar 2020, the images were stitched together into a single panorama, 1.8 billion pixels in size. The images were taken between noon and 2 p.m. over several days to ensure consistent lighting.

Most accurate clock in space
NASA's Deep Space Atomic Clock is designed to keep time to within one-ten-millionth of a second over the span of a year. It was launched into space on 25 Jun 2019 and activated on 23 Aug. The toaster-sized mercury-ion atomic clock (near right) is housed within the OTB-1 (Orbital Test Bed) satellite (far right). This technology will play a key role in NASA's plan to build a GPS-like system for space exploration.



Most distant solar-powered spacecraft
NASA's *Juno* probe has been orbiting Jupiter on an elliptical path since 5 Jul 2016. In Jan 2017, the solar-powered spacecraft reached apojove – its farthest point from Jupiter – when the gas giant was itself at its farthest point from the Sun, or aphelion. *Juno*'s distance from the Sun was calculated at 824 million km (512 million mi). It has three enormous solar panels with 18,000 individual cells.

In 2019, *Juno* provided the first view of Jupiter's north pole. Nine cyclones, each larger than North America, were observed slowly rotating around it. This is the **most storms photographed orbiting a planet's pole**. A similar set of cyclones were seen on Jupiter's south pole, but only seven existed as of Dec 2019.

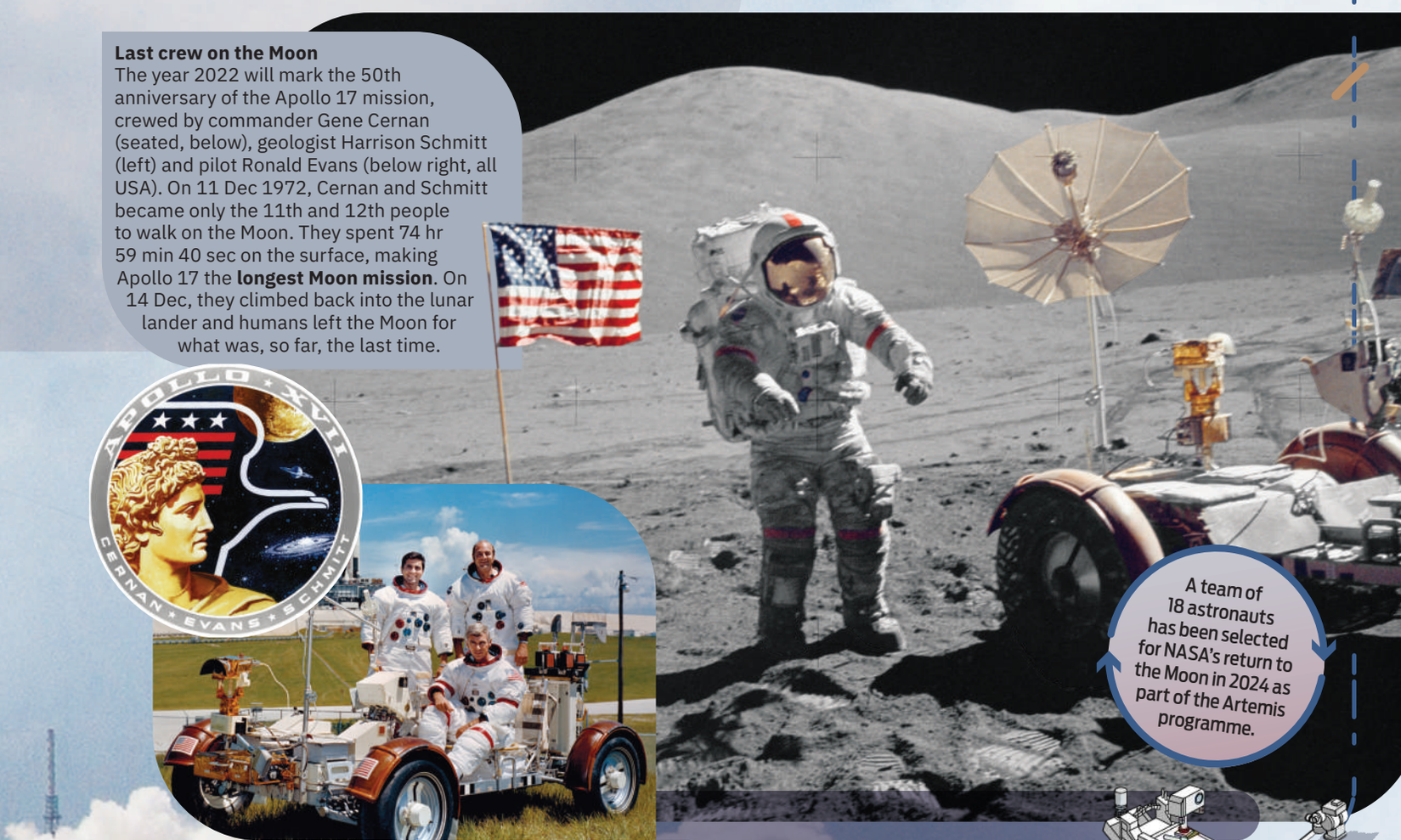


Longest time between spacewalks
On 5 Mar 2021, JAXA astronaut Soichi Noguchi (JPN) completed the fourth spacewalk of his career 15 years 214 days after his third. He spent 6 hr 56 min outside the *ISS*, upgrading solar power systems alongside NASA astronaut Kate Rubins. Noguchi's three previous spacewalks took place during the STS-114 mission to the *ISS*, with the last on 3 Aug 2005.

Most remote human-made object
Launched in 1977, *Voyager 1* and *Voyager 2* were sent to study the giant outer planets Jupiter, Saturn, Uranus and Neptune. Around 25 Aug 2012, *Voyager 1* became the **first probe to leave the Solar System** as it headed into interstellar space. As of 6 Nov 2020, *Voyager 1* was 22,684,987,276 km (14,095,797,590 mi) from Earth and still sending data to Mission Control in the USA.

First observation of the Solar System's "Plasma Shield"
In Nov 2018, *Voyager 2* left our Solar System, crossing the boundary known as the heliopause. The probe collected data showing that the heliopause is marked with a layer of higher-density plasma with temperatures reaching 50,000°C (90,000°F). This plasma protects our Solar System from harmful levels of cosmic radiation. For more on *Voyager 2*, see p.148.

Last crew on the Moon
The year 2022 will mark the 50th anniversary of the Apollo 17 mission, crewed by commander Gene Cernan (seated, below), geologist Harrison Schmitt (left) and pilot Ronald Evans (below right, all USA). On 11 Dec 1972, Cernan and Schmitt became only the 11th and 12th people to walk on the Moon. They spent 74 hr 59 min 40 sec on the surface, making Apollo 17 the **longest Moon mission**. On 14 Dec, they climbed back into the lunar lander and humans left the Moon for what was, so far, the last time.



A team of 18 astronauts has been selected for NASA's return to the Moon in 2024 as part of the Artemis programme.

Pandemics

Oldest contagious disease
Tuberculosis (TB) is a respiratory disease caused by *Mycobacterium tuberculosis*. The bacterium is thought to have existed in something similar to its modern form for more than 70,000 years, and may have been infecting humans since early prehistory.

First recorded pandemic
The Plague of Athens spread throughout the Mediterranean in 430–426 BCE. Between 75,000 and 100,000 people died, the worst affected areas being in what is now Libya, Egypt and Greece.

First quarantine
In 549 CE, the Eastern Roman emperor Justinian established the earliest legally enforced quarantine. During the pandemic known as the Plague of Justinian (which lasted from 541 to 549 CE), he passed a series of laws to bar plague-carrying "outsiders" of various kinds from the capital, Byzantium, and its environs.

Longest incarceration for an asymptomatic carrier
Typhoid Mary, aka Mary Mallon (USA, b. IRL; below) was quarantined for 26 years on North Brother Island, New York City. Mary was a "healthy carrier" of typhoid who infected others while working as a cook. She was initially detained from 1907 to 1910, but was released after promising to leave domestic service. In 1915, another outbreak was traced to her, now working as a cook under a fake name. She was returned to North Brother Island and stayed there until her death in 1938.



Longest-lasting pandemic
The Seventh Cholera Pandemic began in 1961 in Indonesia and spread widely. As of 2021, some 60 years later, it is still ongoing and infects some 3–5 million people annually. Cholera is a bacterial infection passed on when people drink water contaminated with the bodily fluids of infected individuals. This can be hard to avoid in areas without clean water and reliable sewage systems.

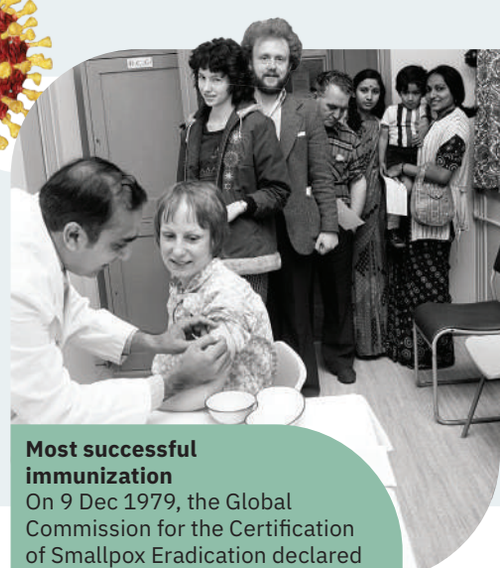


First modern vaccination
British doctor Edward Jenner performed the earliest modern vaccinations (which expose patients to a weakened version of the target virus) in 1796. He had noticed that dairy workers were often resistant to the lethal smallpox disease, and proposed that this was because they had previously recovered from the less harmful cowpox.

In May 1796, he infected eight-year-old James Phipps with cowpox, and later with smallpox, which the boy did not develop. Jenner coined the word "vaccine" (from the Latin *vacca* for "cow") in a paper published in 1798, a nod to the role that cowpox had played in his success.

Most infections traced to a single asymptomatic carrier
In Oct 1923, medical authorities in New Jersey, USA, reported that 107 people had been infected with typhoid by Tony La Bella, aka Frank Boni (USA, b. ITA). He had worked at several dairies in the greater New York metropolitan area. Unlike Mary Mallon (see above), Tony agreed to stop working in food preparation and escaped incarceration.

Fastest vaccine development
The Pfizer-BioNTech "Tozinameran" COVID-19 vaccine was authorized by the British Medicines and Healthcare Products Regulatory Agency on 2 Dec 2020, just 337 days after the disease had been identified. Pfizer-BioNTech released the results of the crucial Phase III clinical trials in Nov 2020, ahead of all their rivals.



Deadliest pandemic
The Black Death was a pandemic that spread across Europe, Asia and North Africa from 1346 to 1353. It is blamed on a particularly deadly strain of plague (a disease caused by the bacteria *Yersinia pestis*). Estimates for the resulting death toll vary from 25 million to 200 million, with most falling in the 50- to 100-million range – as much as a quarter of the world's population at that time. Pictured below is a burial trench for plague victims in east London, UK.





Most successful immunization
On 9 Dec 1979, the Global Commission for the Certification of Smallpox Eradication declared that the world was free of this lethal disease. Formerly one of the world's deadliest plagues, smallpox was eradicated by the availability of one type of vaccine that proved effective against all forms of the disease. Its elimination involved following up all of the contacts of every affected individual and vaccinating them.



Deadliest influenza pandemic
From 1918 to 1920, "Spanish flu" caused 50–100 million deaths worldwide. Its spread was aided by the movement of troop ships during the final year of World War I. Researchers are still unsure where the pandemic started. Its name derives from the fact that Spain provided extensive reporting on early cases, rather than it being the country of origin.



Worst outbreak of dancing mania
Tarantism (aka choreomania, or dancing plague) was first described in the 11th century, but was particularly prevalent in southern Italy between the 15th and 17th centuries. Victims were seized by an uncontrollable urge to dance, and would writhe around for hours, or even days, before collapsing of exhaustion. The worst outbreak was recorded in Aachen, Germany, in 1374, which at its peak saw around 15 people a day dancing themselves to death in the summer heat. The cause of this disease is unknown, but the leading explanation is mass hysteria – it typically occurred at times of great stress and hardship.

Most common infectious disease
The common cold is endemic to every inhabited continent, and only the most profoundly isolated communities can escape frequent infection. It is caused by a range of different viruses, most commonly rhinoviruses, and the average adult suffers from two to three infections per year.

Highest viral disease fatality rate
If not caught before symptoms appear, rabies has a fatality rate of effectively 100%, and kills around 17,000 people every year. There are only 14 known cases in which a patient has survived symptomatic rabies, even with aggressive treatment. The disease can be treated, however, if an infected person receives a vaccine shot after exposure but before symptoms appear.



Most contagious disease
Measles is caused by the *Measles morbillivirus* virus. Its reproduction number (R_0) is between 12 and 18 – i.e., an infected person will pass it on to an average of 15 others in unvaccinated populations. Around 140,000 people die from the disease every year. Measles was effectively ended by vaccines in developed nations, but declining vaccination rates have seen its return. It remains a common childhood illness in less developed nations.

Highest rate of HIV/AIDS infection
According to the most recent WHO figures (for 2019), the small African nation of Lesotho saw new HIV/AIDS infections in 6.43 out of every 1,000 citizens.

Lesotho is also the **country with the highest rate of tuberculosis infection**. Every year, 654 out of every 100,000 people there are diagnosed with the disease. The severity of the TB epidemic in Lesotho is a consequence of the AIDS epidemic, since AIDS weakens the immune system, leaving victims more susceptible to respiratory infections.



Coronaviruses are named for the crown (or "corona") of spike proteins that surround the spherical core of the virion (virus particle).



First coronavirus pandemic
On 11 Mar 2020, the World Health Organization (WHO) declared COVID-19 a pandemic, meaning that there were significant outbreaks around the world. There have been coronavirus epidemics in the past, including SARS (2002) and MERS (2012), but these were contained before they spread globally. COVID-19 is also the **deadliest coronavirus outbreak**, with 2,490,776 deaths as of 25 Feb 2021. The response to COVID-19 has included the **fastest development of a vaccine** (see opposite), the first non-trial dose of which was given to the UK's Margaret Keenan (right) on 8 Dec 2020.

Chinonso Eche

When this 11-year-old Nigerian soccer freestyler was gearing up to attempt a world record, he knew exactly what to do. Practise hard, believe in yourself and keep a level head at all times...

It worked out pretty well for him. Chinonso now holds the GWR title for the **most consecutive touches in one minute while balancing a soccer ball on the head**. He completed 111 touches in Warri, Nigeria, on 14 Nov 2019. You have to go the extra mile to earn the nickname "Amazing Kid Eche", but Chinonso more than earned the epithet. Watch the YouTube video of his feat and check out his phenomenal concentration and Zen-like calm. And he's not finished yet: find out about his plans for future records in his Q&A.



1



1. Chinonso points to the shirt he wore during his record-breaking feat. His GWR certificate and official letter confirming the record now take pride of place in his family home.



2

2. Chinonso counts his manager, Chukwuebuka Ezugha, among his freestyling idols, along with DJ Diveny, Séan Garnier and Erlend Fagerli.

3. A few shots of Chinonso in action during his record-breaking keepy-uppy performance at the Warri Township Stadium in 2019.



3

Chinonso has a wealth of soccer ambitions. One of them is to play for Nigeria's national team, the Super Eagles.





What are your earliest memories of soccer?
When I was around four years old, I used to love playing with every round object, even my father's cups! I started freestyle soccer at the age of eight.

Who are your favourite freestylers?
I'd have to include Lionel Messi and Ronaldinho, because they usually apply their freestyle skills while playing on the pitch and that's what I do too. I'm a midfielder and usually wear a number 8 or 10 shirt.

Tell us about the training that went into your record.
Once the date was fixed I stepped up my programme, increasing my juggling speed in order to beat the one-minute deadline.

Was there any point at which you felt like giving up, or that the record was out of reach?
No. I never felt discouraged because my team and family inspired me.

How did it feel to receive your official GWR certificate?
Really good! It's a dream come true to become the youngest Nigerian in the *Guinness World Records* book. My family was very proud of me.

Any plans for more soccer freestyle records that you can tell us about?
Plenty! Among other things, I want to run for the longest distance while balancing a ball on my head and juggle one ball for 2,000 touches while balancing another on my head.

Can you suggest any easy tricks that beginners can try?
First learn how to juggle a ball with both feet. Try using your knee too, then try balancing the ball on your back.

What advice would you give to any other kids dreaming of GWR glory?
Never give up! Always believe in yourself. And to the parents: learn to support and encourage your child's dream, as my family did.

Gui Khury

Skateboarding is one discipline where youngsters can compete with – and often outperform – their elders. For proof, look no further than Gui Khury from Curitiba, Brazil.

On 8 May 2020, the 11-year-old pulled off the **first skateboard 1080 on a vertical ramp**. That's three complete 360° rotations in the air. Tom Schaar (USA) had achieved the **first skateboard 1080** back in 2012, but he'd used a "mega ramp", which enabled him to build up speed before the manoeuvre.

How did Gui hone his skills? During the COVID-19 lockdown, he patiently mastered the trick on a ramp in his grandmother's garden!

As if that weren't enough, the previous year Gui (b. 18 Dec 2008) had become the **youngest X Games athlete**. He was just 10 years 225 days old when he competed in the Skateboard Vert elimination round on 31 Jul 2019 in Minneapolis, Minnesota, USA.



How does it feel to be the youngest X Games athlete of all time?
It feels like a dream come true! I still can't quite believe that I even went to X Games.

How did you celebrate after achieving your 1080?
With a delicious home-made pizza and cake!

What do your family and friends think about you becoming a record-breaker?
Actually, my parents were filming the 1080, while two of my friends were watching. They were stoked!

Are you now famous in your neighbourhood?
Well... skateboarding is very popular in Brazil. I'm known in the skateboard community and this week a guy said to me, "Are you Gui Khury?" and we took a selfie.

Who are your heroes – skateboarders or otherwise?
Tony Hawk, Bob Burnquist and Danny Way.

What other hobbies do you have outside skateboarding?
I like to spend time surfing, snowboarding, wakeboarding and playing soccer.

We hear you're now in training to take on the 1260 (three-and-a-half 360 spins). How's it going?
It's actually going really well and I'm still training every day so one day I can land it.

Finally: have you got any advice for other kids thinking of taking on a world record?
Never give up and always be determined to do it.







1. Gui is passionate about boarding of all kinds. He's also an avid surfer and snowboarder.

2. The skating sensation shows off his GWR certificates. Gui was performing on halfpipes at the age of just five. He was "the little one that drops in on the big ramps," says his father, Ricardo.

3. Gui is shown taking time out with world-famous US skaters Tony Hawk (left) and Kevin Staab. Tony – one of Gui's idols – pulled off the **first 900 on a skateboard** in 1999.

To discover more about record-breaking young achievers, visit **kids.guinnessworldrecords.com**

STAR WARS



Highest-grossing film series at the global box office
The 12 *Star Wars* movies had earned a collective $10,320,189,178 (£7.41 bn) as of 16 Mar 2021, according to The-Numbers.com. This figure includes re-issues and special editions. Based around three core trilogies known as the "Skywalker Saga" (above), the *Star Wars* series tells the continuing story of the battle between the Jedi and the Sith in a galaxy far, far away.



Largest personal fortune made from a film franchise
Star Wars creator George Lucas (USA) had a net worth of $6.4 bn (£4.8 bn) as of 11 Dec 2020, according to *Forbes*. He is pictured with Kathleen Kennedy (USA), the **highest-grossing film producer at the global box office (female)**. Kennedy-produced movies – which include five *Star Wars* titles – have earned a total of $12.8 bn (£9.6 bn).



Largest *Star Wars* costuming group
The ranks of the 501st Legion (USA) had swelled to 14,141 members as of 18 Nov 2020. More than 30,000 costumes had received official Legion approval. The group, formed by Albin Johnson in 1997 as a "stormtrooper fan club", now welcomes allies of the Galactic Empire and bounty hunters alike.



Steve Sansweet (USA) has amassed the **largest collection of *Star Wars* memorabilia**. Of his estimated 500,000 unique items at Rancho Obi-Wan in California, USA, "only" 93,260 items have been audited and catalogued.

Steve reckons his most expensive item to be a Darth Vader costume, parts of which appeared in the original 1977 *Star Wars* film.

In 2020, the lifetime revenue generated by *Star Wars* toys and other merchandise was estimated at $20 bn (£14.7 bn), making it the **most successful movie merchandising campaign**.



Largest personal insurance pay-out
Following Carrie Fisher's untimely passing on 27 Dec 2016, Lloyds of London had to pay out $50 m (£41.6 m) to Disney. The studio had taken out an insurance policy to protect it in the event that Fisher was unable to reprise her role as Princess Leia in any of the new *Star Wars* movies (Episodes VII, VIII or IX).

MINECRAFT

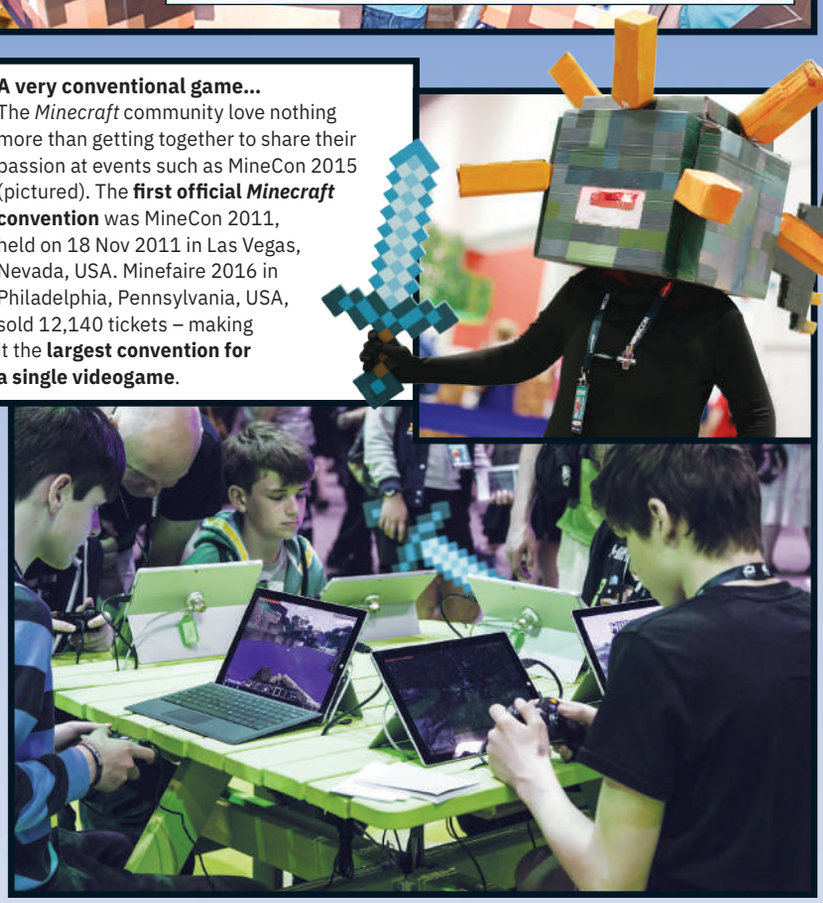


Largest gathering of people dressed as "Steve"
On 12 Sep 2015, a total of 337 *Minecraft* fans took on the guise of the game's first default player skin at MineVention, hosted by O'Brien Event Management in Peterborough, UK. "Steve" is only a nickname for the character, suggested by *Minecraft* creator Markus Persson. A second (female) player skin, Alex, was added in 2015.



The "DanTDM" channel of *Minecraft*-mad Daniel Middleton (UK) has the **most views for a dedicated *Minecraft* YouTube channel** – 17,832,739,882, as of 16 Mar 2021.

A very conventional game...
The *Minecraft* community love nothing more than getting together to share their passion at events such as MineCon 2015 (pictured). The **first official *Minecraft* convention** was MineCon 2011, held on 18 Nov 2011 in Las Vegas, Nevada, USA. Minefaire 2016 in Philadelphia, Pennsylvania, USA, sold 12,140 tickets – making it the **largest convention for a single videogame**.





Fastest time to make 10 cakes in *Minecraft* with a mouse and keyboard (Survival Mode)
On 3 Apr 2018, Joseph Garrett (UK) – aka YouTuber "stampylonghead" – whipped up 10 cakes in 3 min 51 sec at GWR HQ in London, UK. Joseph's YouTube career exploded when he started uploading *Minecraft* videos as "Stampy Cat". His channel had 9.79 million subscribers as of 2 Jan 2021.



Longest journey in *Minecraft*
Kurt J Mac (USA) has been documenting his passage to *Minecraft*'s Far Lands on YouTube since Mar 2011. On 31 Aug 2019, he pressed F3 to reveal that he had travelled 3,857,848 blocks (3,857 km; 2,396 mi) through the game. Amazingly, Kurt still has 70% of the way to go. He has uploaded more than 800 videos charting his trek, which is in aid of charity.

Best-selling videogame
In May 2020, Microsoft announced that sales of *Minecraft* (Mojang/Microsoft, 2011) had topped 200 million. It may be a decade old but the block-building videogame shows no sign of waning in popularity, with 126 million active monthly users. According to YouTube, *Minecraft* videos received 201 billion views in 2020 – three times that of *Fortnite* videos!





The **largest LEGO® *Minecraft* diorama** is this fantasy cityscape measuring 17.13 m² (184 sq ft) in area. It was constructed at the Brick 2014 exhibition in London, UK, on 27–30 Nov 2014.

FORTNITE



Ninja, aka Richard Tyler Blevins (USA), has the **most-followed Twitch channel**, with 16,632,966 fans as of 21 Jan 2021. The gamer, whose popularity soared when he began playing *Fortnite*, signed an exclusivity deal with the short-lived Mixer platform in 2019, but began streaming on Twitch again in 2020.

Most concurrently played videogame

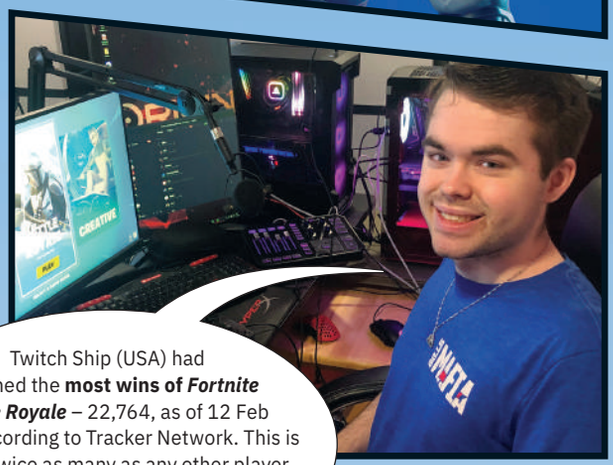
Fortnite is one of the few games to register simultaneous gamers into the tens of millions. The peak was reached on 1 Dec 2020, when the *Fortnite Galactus* event drew 15.3 million concurrent players. The special Marvel-themed mission allowed gamers to do battle against Galactus – the Devourer of Worlds – beside superheroes such as Iron Man and Wolverine.



Fuelling the ongoing success of *Fortnite* are prize battles such as the Winter Royales (pictured), which are open to players of any Arena rank.



According to Tracker Network's *Fortnite* stats, the **most eliminations in *Fortnite Battle Royale*** is 273,341, by BH nixxxay (CAN) as of 12 Feb 2021. He had a Kill/Death ratio of 9.39, placing him in the top 0.1%.



Twitch Ship (USA) had claimed the **most wins of *Fortnite Battle Royale*** – 22,764, as of 12 Feb 2021, according to Tracker Network. This is almost twice as many as any other player. Ship has a win ratio of 51.9% and is second only to BH nixxxay for eliminations (see left).

First battle-royale videogame with 250 million registered players

On 20 Mar 2019, Epic Games confirmed that *Fortnite Battle Royale* had a quarter of a billion registered players. This figure had doubled in the space of just nine months. The all-conquering free-to-play shooter continues to defy predictions that its popularity will wane. On 6 May 2020, Epic announced that they had reached 350 million registered players.

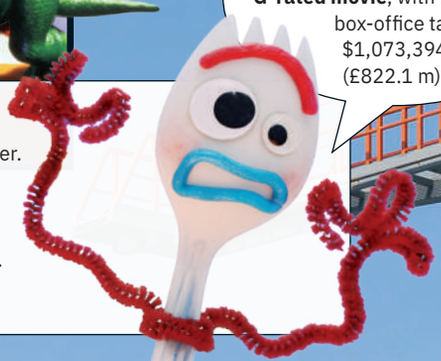


Released on 26 Sep 2017, *Fortnite Battle Royale* had a simple premise: 100 online players fight it out to be the last person standing. From this, the game has grown into a global franchise worth more than $4.5 bn (£3.3 bn).

TOY STORY



First feature-length computer-animated movie
Toy Story (USA, 1995) – the first film produced by the Pixar studio – was animated entirely on computer. The adventures of Woody and Buzz Lightyear (voiced by Tom Hanks and Tim Allen, respectively) was a smash hit with audiences, grossing more than $360 m (£232 m) and spawning three sequels. In Dec 2010, *Toy Story 3* (USA, 2010) became the **first animated film to make $1 billion**.

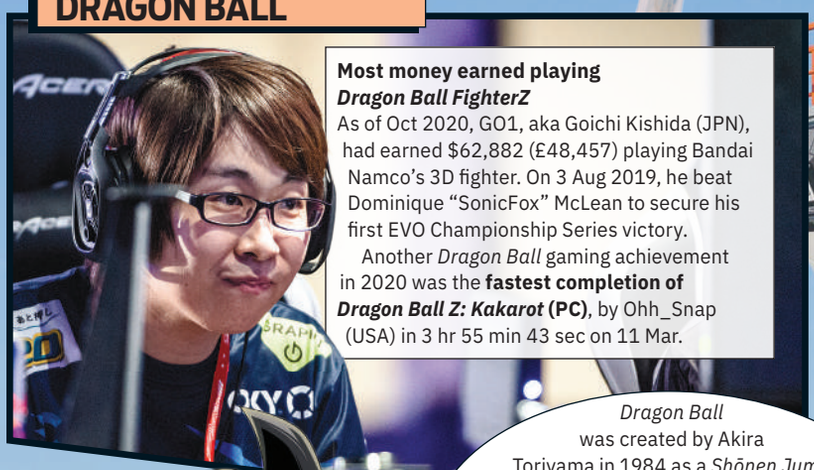


Toy Story 4 (USA, 2019) is the **highest-grossing G-rated movie**, with worldwide box-office takings of $1,073,394,813 (£822.1 m).

GUNDAM

Largest mobile humanoid robot
In Sep 2020, a towering Gundam robot measuring 18 m (59 ft) in height took its first public steps in Yokohama, Japan. It has since been filmed walking, flexing its fingers and even kneeling. The 22-tonne (24-ton) humanoid's design is based on the RX-78-2 Gundam from the original 1979 anime Japanese TV series *Mobile Suit Gundam*. It was built by GUNDAM GLOBAL CHALLENGE (JPN), an incorporated association that was launched in 2014 with a view to celebrating the franchise's 40th anniversary.

DRAGON BALL



Most money earned playing *Dragon Ball FighterZ*
As of Oct 2020, GO1, aka Goichi Kishida (JPN), had earned $62,882 (£48,457) playing Bandai Namco's 3D fighter. On 3 Aug 2019, he beat Dominique "SonicFox" McLean to secure his first EVO Championship Series victory.

Another *Dragon Ball* gaming achievement in 2020 was the **fastest completion of *Dragon Ball Z: Kakarot* (PC)**, by Ohh_Snap (USA) in 3 hr 55 min 43 sec on 11 Mar.



Dragon Ball was created by Akira Toriyama in 1984 as a *Shōnen Jump* manga series (see p.192), with a TV anime following a decade later. The franchise is now valued at *c.* $30 bn (£22 bn). Pictured is the series' main protagonist, Goku, a martial-arts warrior on a quest to seek out a series of orbs known as Dragon Balls, which contain wish-granting dragons.

Para Sport



Fastest 2,000 m single sculls para row (PR1)
On 1 Sep 2019, Roman Polianskyi (UKR) won the final of the PR1 men's single sculls event in 9 min 12.99 sec at the World Rowing Championships in Linz-Ottensheim, Austria. Polianskyi (pictured in 2020) took four seconds off the previous world-best time. Originally a para canoeist, he switched to rowing in 2013.



In addition to his two Paralympic gold medals in the long jump, Rehm has another in the 4 x 100 m relay.

Farthest long jump (T64, male)
"Blade Jumper" Markus Rehm (DEU) leapt 8.48 m (27 ft 9 in) on 25 Aug 2018 at the World Para Athletics European Championships in Berlin, Germany. This was farther than the winning jumps at the previous two Olympics. Rehm lost his lower right leg in a wakeboarding accident and competes using a carbon-fibre prosthesis.



First World Marathon Majors Grand Slam
Wheelchair racer Manuela Schär (CHE) won every leg of Series XII of the World Marathon Majors from 16 Sep 2018 to 28 Apr 2019, triumphing in Berlin, Chicago, New York City, Tokyo, Boston and London (pictured). She also set the **fastest wheelchair marathon (T54, female)** – 1 hr 35 min 42 sec – on 17 Nov 2019 in Oita City, Japan.

First para athlete to compete at an Olympic Games
Gymnast George Eyser (USA, b. DEU) competed with a prosthetic wooden left leg at the 1904 Olympic Games in St Louis, Missouri, USA. On 28 Oct, he won six medals in one day, including golds in the rope climbing, vault and parallel bars events.

The Paralympic movement was born on 29 Jul 1948, when a wheelchair archery event was organized to coincide with the opening of the London Olympics. The first Paralympic Games took place on 18–25 Sep 1960 in Rome, Italy. The **first Paralympian to compete at an Olympic Games** was Neroli Fairhall (NZ). She qualified for the women's individual archery event at the 1984 Olympics, having participated in two Summer Paralympics (1972 and 1980).

First Olympic and Paralympic medallist
In 1991, fencing Olympic bronze winner Pál Szekeres (HUN) was injured in a bus accident. He switched to wheelchair fencing and represented Hungary at five Paralympic Games from 1992 to 2008, winning three gold and three bronze medals.

Most Paralympic medals
Swimmer Trischa Zorn (USA) claimed 55 medals across seven Summer Paralympic Games between 1980 and 2004. Zorn, who was born visually impaired, won five bronze, nine silvers and 41 golds – the **most Paralympic golds**. In 2012, she was inducted into the International Paralympic Hall of Fame.

The **most Paralympic medals (male)** is 34, by Heinz Frei (CHE) between 1984 and 2016. His total included 15 golds. Frei competed at the Summer Paralympics in athletics and road cycling, and won a further eight medals in cross-country skiing at the Winter Paralympics.

Fastest wheelchair marathon (T54, male)
Heinz Frei won the Oita International Wheelchair Marathon in 1 hr 20 min 14 sec on 31 Oct 1999 in Oita City, Japan. This is the fastest men's wheelchair marathon on a record-eligible course. Marcel Hug won the 2017 Boston Marathon – which is not record-eligible, on account of its net downhill elevation and the distance between start and finish points – in 1 hr 18 min 4 sec. On 22 Oct 2020, Daniel Romanchuk completed a virtual New York City marathon in just 1 hr 13 min 57 sec. He raced alone on a course through central Illinois in the USA.



Fastest para cycling men's 200 m time trial (C1)
Ricardo Ten Argilés (ESP) cycled 200 m in 12.325 sec on 31 Jan 2020 at the Para Cycling Track World Championships in Milton, Ontario, Canada. A three-time Paralympic gold medallist in swimming, Ten Argilés only took up track cycling in 2017. He had both arms amputated, and one leg below the knee, following a childhood accident.

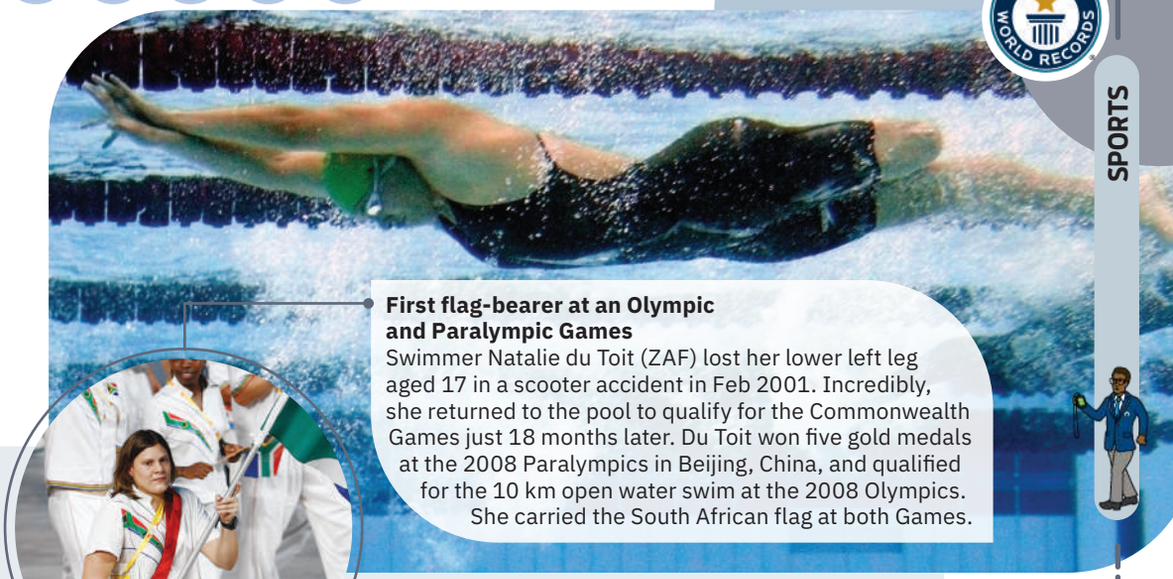
Ricardo Ten Argilés was awarded Spain's Gold Medal of the Royal Order of Sports Merit in 2019.

Farthest distance para cycling in one hour (C5, female)
On 28 Feb 2015, Sarah Storey (UK) cycled 45.502 km (28.273 mi) in 60 min in London, UK. She fell short of the absolute UCI Women's Hour record by just 563 m (1,847 ft). As of 2020, Storey had won 38 world titles and 14 Paralympic golds in swimming and cycling (road and track).

Most wins of the Women's Wheelchair Basketball World Championship
Canada are five-time world champions in women's wheelchair basketball. They won in 1994, 1998, 2002, 2006 and 2014.

The **men**'s record is six, by the USA.

Most World Wheelchair Rugby Championships
Originally known as "murderball" on account of the high level of physical contact, wheelchair rugby is a mixed team sport for quadriplegic athletes. The USA has won the world championships four times, in 1995, 1998, 2006 and 2010.



First flag-bearer at an Olympic and Paralympic Games
Swimmer Natalie du Toit (ZAF) lost her lower left leg aged 17 in a scooter accident in Feb 2001. Incredibly, she returned to the pool to qualify for the Commonwealth Games just 18 months later. Du Toit won five gold medals at the 2008 Paralympics in Beijing, China, and qualified for the 10 km open water swim at the 2008 Olympics. She carried the South African flag at both Games.



Para powerlifting

MEN	Weight Lifted	Name	Location	Date
-49 kg	183.5 kg	Lê Văn Công (VNM)	Mexico City, Mexico	4 Dec 2017
-54 kg	205 kg	Sherif Osman (EGY)	Dubai, UAE	6 Apr 2014
-59 kg	211 kg	Sherif Osman (EGY)	Rio de Janeiro, Brazil	9 Sep 2016
-65 kg	221 kg	Paul Kehinde (NGA)	Dubai, UAE	19 Feb 2018
-72 kg	229 kg	Roohallah Rostami (IRN)	Jakarta, Indonesia	9 Oct 2018
-80 kg	240 kg	Majid Farzin (IRN)	Rio de Janeiro, Brazil	12 Sep 2016
-88 kg	234 kg	Ye Jixiong (CHN)	Jakarta, Indonesia	11 Oct 2018
-97 kg	243 kg	Mohamed Eldib (EGY)	Dubai, UAE	18 Feb 2016
-107 kg	247 kg	Sodnompiljee Enkhbayar (MNG)	Nur-Sultan, Kazakhstan	18 Jul 2019
107+ kg	310 kg	Siamand Rahman (IRN)	Rio de Janeiro, Brazil	14 Sep 2016

WOMEN	Weight Lifted	Name	Location	Date
-41 kg	104.5 kg	Cui Zhe (CHN)	Nur-Sultan, Kazakhstan	13 Jul 2019
-45 kg	118 kg	Guo Lingling (CHN)	Nur-Sultan, Kazakhstan	13 Jul 2019
-50 kg	131 kg	Esther Oyema (NGA)	Gold Coast, Australia	10 Apr 2018
-55 kg	132 kg	Mariana Shevchuk (UKR)	Manchester, UK	25 Mar 2021
-61 kg	142 kg	Lucy Ejike (NGA)	Rio de Janeiro, Brazil	11 Sep 2016
-67 kg	140.5 kg	Tan Yujiao (CHN)	Jakarta, Indonesia	9 Oct 2018
-73 kg	150 kg	Souhad Ghazouani (FRA)	Aleksin, Russia	25 May 2013
-79 kg	142.5 kg	Bose Omolayo (NGA)	Manchester, UK	27 Mar 2021
-86 kg	150.5 kg	Folashade Oluwafemiayo (NGA)	Manchester, UK	28 Mar 2021
86+ kg	160 kg	Josephine Orji (NGA)	Rio de Janeiro, Brazil	14 Sep 2016

Heaviest para powerlift (-59 kg, male)
On 9 Sep 2016, Sherif Osman (EGY) won gold in the 59 kg weight class with a lift of 211 kg (465 lb) at the Paralympic Games in Rio de Janeiro, Brazil. Osman, who contracted polio at nine months old, is currently the only para powerlifter to hold world records in more than one category on the Paralympic programme (54 kg and 59 kg).

Most gold medals at the Winter Paralympics (country)
Norway won 136 golds at the Winter Paralympics from 1976 to 2018. The Scandinavian nation topped the medal table at four different Games: 1980, 1988, 1994 and 1998.

Norway's total is bolstered by the **most Winter Paralympic gold medals (individual)** – 22 – by Ragnhild Myklebust (far right) in cross-country skiing, ice sledge speed racing and biathlon from 1988 to 2002. She also won three silvers and two bronze, giving her the **most Winter Paralympic medals (individual)** – 27.





Extreme Earth Sports



Largest no-grip wingsuit formation (FAI-approved)
On 17 Oct 2015, a team of 61 skydivers led by Taya Weiss (USA) formed a colourful diamond shape 5,500 ft (1,676 m) above Perris Valley in California, USA. Judges from the Fédération Aéronautique Internationale (FAI) were on hand to check that the team maintained their designated flying spaces, without holding on to one another.



Fastest speed parachuting (female, FAI-approved)
On 6 Nov 2017, Amber Forte (NOR, b. UK) reached a speed of 283.7 km/h (176.2 mph) at the FAI World Cup of Wingsuit Flying in Overton, Nevada, USA. Wingsuits have fabric under the arms and between the legs to increase surface area. Once the parachute is deployed, pilots can unzip their arm wings to better control the descent.



Most wins of the Red Bull Cliff Diving World Series
Gary Hunt (FRA, b. UK) won the Red Bull Cliff Diving World Series eight times between 2010 and 2019. His lowest finish in the overall standings to date is second. In Sep 2020, Hunt switched nationality in the hope of competing for France in the 10 m diving event at the 2024 Olympic Games in Paris.



Fastest speed skiing (female)
On 26 Mar 2016, Valentina Greggio (ITA) skied at 247.083 km/h (153.530 mph) in Vars, France. This is faster than a high-speed *Acela* train. Speed skiing dates to the 19th century. Concerns about competitor safety have so far dashed hopes of its inclusion as an official event at the Winter Olympics.



Fastest...

Speed skiing
On 26 Mar 2016, Ivan Origone (ITA) was clocked at 254.958 km/h (158.423 mph) at the Speed Masters event in Vars, France. No human in a non-motorized vehicle has ever travelled faster on land. Ivan broke the mark set by his elder brother, Simone, skiing the 100-m timing stretch near the bottom of the course in 1.41 sec. The **female** record was broken on the same day at Vars (see above).

Speed sand skiing
Henrik May (NAM, b. East Germany) hit 92.12 km/h (57.24 mph) while skiing down the dunes of Swakopmund in Namibia on 31 May 2010. As a child, May was a Nordic combined skier. After emigrating to Namibia in 1998, he swapped snow for the sand of the Namib Desert. "It's similar to deep-snow skiing," he said, "but you don't sink as much."

Speed windsurfing
Antoine Albeau (FRA) achieved a speed of 53.27 knots (98.65 km/h; 61.3 mph) in Lüderitz, Namibia, on 2 Nov 2015. It is one of a host of speed-sailing records set on a purpose-built 800-m-long (2,625-ft) trench in Lüderitz, which offers a perfect combination of strong winds and flat water. Albeau's feat was verified by the World Sailing Speed Record Council (WSSRC).

The **female** record, also set at Lüderitz, is 46.49 knots (86.09 km/h; 53.49 mph), recorded by windsurfer Zara Davis (UK) on 22 Nov 2017.

Speed sailing (500 m)
On 24 Nov 2012, Paul Larsen (AUS) piloted *Vestas SailRocket 2* at 65.45 knots (121.21 km/h; 75.31 mph) in Walvis Bay, Namibia. He covered 500 m (1,640 ft) in 14.85 sec. Larsen's long-standing record may come under threat in 2022, when a team of Swiss engineers are hoping that their *SP80* hydrofoil vessel – which is propelled by a giant kitesail – will break the 80-knot barrier.



Most Marathon des Sables wins
First staged in 1986, the Marathon des Sables is a six-day, 250-km (155-mi) ultra-distance race through the Sahara Desert in Morocco. Lahcen Ahansal (MAR, right) triumphed 10 times, in 1997 and 1999–2007. Lahcen's brother Mohamad is a five-time winner who also holds the **fastest time** for the event: 16 hr 22 min 29 sec, in 1998.



Deepest no-limit freedive
Herbert Nitsch (AUT, below right) plunged 214 m (702 ft 1 in) on a sled off the Greek island of Spetses on 14 Jun 2007. This is the deepest recorded freedive in history. On 6 Jun 2012, during an attempt to beat his own record, Nitsch lost consciousness and suffered severe decompression sickness. He was in a wheelchair for six months. The no-limit freedive – in which divers can use any means to propel themselves deeper – has since been closed as a category by diving federation AIDA.



Largest wave surfed (female)
On 11 Feb 2020, Maya Gabeira (BRA) rode a 22.4-m-tall (73-ft 5-in) wave during the World Surf League's Nazaré Tow Surfing Challenge in Portugal. Nazaré's Praia do Norte has become a magnet for surfers ever since Garrett McNamara rode a then-record 23.77-m (78-ft) wave there in 2011. The monster waves are caused by a deep undersea canyon that squeezes and channels the swell as it heads for shore.



Freediving

MEN'S DEPTH DISCIPLINES	Depth	Name	Location	Date
Constant weight with fins	130 m (426 ft 6 in)	Alexey Molchanov (RUS)	Long Island, The Bahamas	18 Jul 2018
Constant weight with bi-fins	113 m (370 ft 8 in)	Alexey Molchanov (RUS)	Sharm el-Sheikh, Egypt	26 Nov 2020
Constant weight without fins	102 m (334 ft 7 in)	William Trubridge (NZ)	Long Island, The Bahamas	20 Jul 2016
Variable weight	150 m (492 ft 1 in)	Walid Boudhiaf (TUN)	Sharm el-Sheikh, Egypt	17 Jan 2021
No limit	214 m (702 ft 1 in)	Herbert Nitsch (AUT)	Spetses, Greece	14 Jun 2007
Free immersion	125 m (410 ft 1 in)	Alexey Molchanov (RUS)	Long Island, The Bahamas	24 Jul 2018

WOMEN'S DEPTH DISCIPLINES	Depth	Name	Location	Date
Constant weight with fins	114 m (374 ft)	Alenka Artnik (SVN)	Sharm el-Sheikh, Egypt	7 Nov 2020
Constant weight with bi-fins	92 m (301 ft 10 in)	Alenka Artnik (SVN)	Panglao, Philippines	11 Jun 2019
Constant weight without fins	73 m (239 ft 6 in)	Alessia Zecchini (ITA)	Long Island, The Bahamas	22 Jul 2018
Variable weight	130 m (426 ft 6 in)	Nanja van den Broek (NLD)	Sharm el-Sheikh, Egypt	18 Oct 2015
No limit	160 m (524 ft 11 in)	Tanya Streeter (USA)	Turks and Caicos Islands	17 Aug 2002
Free immersion	98 m (321 ft 6 in)	Alessia Zecchini (ITA, above)	Curaçao	16 Oct 2019

Speed parachuting (FAI-approved)
Travis Mickle (USA) flew at a speed of 325.4 km/h (202.1 mph) on 6 Nov 2017 at the FAI World Cup of Wingsuit Flying in Overton. See opposite for the **female** record, which was set on the same day.

Speed parachuting canopy piloting (FAI-approved)
Mario Fattoruso (ITA) flew a 70-m (230-ft) course in 1.943 sec on 23 Nov 2019 at the 10th FAI World Cup of Canopy Piloting in Pretoria, South Africa.

1 km Ice Swim
On 16 Feb 2019, Sven Elfferich (NLD) swam a kilometre (0.6 mi) in 3.6°C-water (38.4°F) in 11 min 55.4 sec at the Austrian Ice Swimming Championships in Altenwörth. He was 19 at the time. The race was held under International Ice Swimming Association regulations.

The **female** record is 12 min 48.7 sec, by Alisa Fatum (DEU) on 6 Jan 2019 at the Ice Swimming German Open in Veitsbronn. The water temperature was 1.4°C (34.5°F).

North Pole Marathon
Thomas Maguire (IRL) won the North Pole Marathon in 3 hr 36 min 10 sec on 15 Apr 2007, completing 10 laps of the course at a Russian ice base in the Arctic Ocean. Maguire ran in snowshoes, three layers of clothing, goggles and a balaclava. He described conditions as "extremely hard, like running in sand dunes".



Herbert Nitsch has set more than 30 freediving world records across eight different disciplines.



Fastest Antarctic Ice Marathon
On 13 Dec 2019, William Hafferty (USA, right) battled wind-chill temperatures of -15°C (5°F) to win the Antarctic Ice Marathon in 3 hr 34 min 12 sec, beating the race record by 35 sec. The location was Union Glacier, in the shadow of the Ellsworth Mountains.

The **fastest marathon on Antarctica** is 2 hr 54 min 54 sec, by Michael Wardian (USA, inset) on 23 Jan 2017. It was the first leg of the World Marathon Challenge, in which runners have a week to run a marathon on each of the seven continents.

