

NEWS IN FOCUS

BIOTECHNOLOGY Bulls are being engineered to produce sperm from other fathers **p.292**

OCEANOGRAPHY Sea walls get wired up to measure flood risks in real time **p.294**

MATHEMATICS Soap-bubble pioneer is first woman to win Abel prize **p.295**



DRUG RESEARCH Trials test ways to dispose of problem proteins **p.298**

HENRY ROMERO/REUTERS



Hundreds of young people took part in climate protests in Mexico City.

GLOBAL WARMING

Thousands of scientists back kids' climate strike

Researchers the world over sign statements supporting school walkouts.

BY MATTHEW WARREN

Hundreds of thousands of young people around the world walked out of school on 15 March to demand that adults do more to combat climate change. In about 2,000 cities in more than 120 countries — from Nepal to Vanuatu — schoolchildren went on strike to express their anger at society's inaction against global warming. And although

some politicians have objected to children walking out of class, thousands of scientists worldwide have thrown their support behind the student movement.

The coordinated protests — which participating groups suggest were attended by 1.4 million people — marked the biggest moment yet for a grassroots movement that began last year and has since grown into a global phenomenon. Social-media

hashtags such as #fridaysforfuture and #YouthStrike4Climate have aided its spread.

"I hope the strike is just like a massive, massive wake-up call for policymakers and CEOs of massive corporations," says 18-year-old student Ummy Hoque, who learnt about the strikes through friends and social media and joined a demonstration in London, where an estimated 20,000 protested. She hopes that the strikes will dispel stereotypes that young ▶

► people are lazy, and encourage governments to make climate change — which will have its worst effects on future generations — their top priority.

“The idea of a climate strike is innovative. It’s provocative, and I think it’s the right form of non-violent civil disobedience,” says Gail Whiteman, a social scientist at Lancaster University, UK, and one of many academics who have voiced their support for the strikes.

GLOBAL SUPPORT

More than 12,000 scientists have signed a statement started by researchers from Germany, Austria and Switzerland in support of the strikes. The letter says that the countries are not doing enough to keep global warming well below 2 °C — the aim of the 2015 Paris climate accord. Young people’s concerns are “justified and supported by the best available science”, it says.

In New Zealand, more than 1,500 academics released a similar statement. And last month, a letter from 224 UK academics published in *The Guardian* newspaper stated that the young strikers “have every right to be angry about the future that we shall bequeath to them, if proportionate and urgent action is not taken”.

“As adults, we have abjectly failed,” says Kevin Anderson, a climate scientist at the University of Manchester, UK, and Uppsala University in Sweden, and a signatory of the *Guardian* letter. Before most of the children who went on strike were born, scientists knew

about climate change and how to respond to it, he says. But a quarter of a century later, people have collectively failed to act — and humanity is running out of time if it is going to restrict warming to 2 °C, he adds.

Most protestors have been inspired by Swedish teenager Greta Thunberg, who kick-started the movement when she began regularly walking out of classes in August 2018 to sit outside the Swedish parliament in Stockholm with a sign reading “school strike for climate”.

Following Thunberg’s example, thousands of young people from Belgium to Australia have taken part in strikes over the past few months. Friday’s event was the largest so far — a global effort spearheaded by young activists in each country.

Thunberg has become a high-profile figure-head for the youth protests. “You say you love your children above all else, and yet you are stealing their future in front of their very eyes,” she said in a speech at the 2018 United Nations climate conference in Katowice, Poland.

Vanessa Nakate, a 22-year-old who lives in the Ugandan capital of Kampala and protested on 15 March, told *Nature* that she found out about Thunberg after she talked to her uncle about how the climate was changing in Uganda, and researched the topic online. She has been spending Friday mornings on strike

The idea of a climate strike is innovative. It’s provocative, and I think it’s the right form of non-violent civil disobedience.

since January — sometimes alone and sometimes with her friends or siblings, coming in late to her job selling car batteries.

SCHOOL SCEPTICS

Not everyone is so enthusiastic about the strikes. Some politicians — including UK Prime Minister Theresa May — and school leaders have expressed concern that the protests are interfering with children’s education. “While we support the right of young people to express themselves, first and foremost, pupils should be in school during term time,” said Sarah Hannafin, senior policy adviser for the United Kingdom’s National Association of Head Teachers, in a statement. School leaders can’t condone children missing out on education, she says, and schools provide a safe platform for teaching children about positive social action.

Whiteman is surprised by the “stuffy” responses of some of those objecting to the strikes. “Education happens in many places,” she says. Teachers could use the moment to discuss relevant aspects of literature or history with their students — who are making history themselves, she says.

Hoque, who also attended a strike in February, says that her teachers have backed the students, and have even asked them to tell the class about their experiences when they return to school. “Young people can be the motivators, but at the end of the day, we don’t have the ultimate power. It’s the policymakers,” she says. ■

GENE EDITING

Bulls engineered to produce sperm from another father

‘Surrogate sires’ could help to spread desirable traits rapidly in some livestock.

BY HEIDI LEDFORD

Reproductive biologists are developing an unusual way to produce farm animals with desirable traits: injecting surrogate fathers — whose own sperm production has been wiped out by gene editing — with sperm-producing stem cells from another male that pass along ‘elite’ genes to offspring. From then on, the surrogate sire’s offspring will genetically be not its own, but the donor’s.

The goal is to spread genes for desirable traits, such as disease resistance or heat tolerance, through a population of animals in fewer generations than is possible with conventional breeding. If scientists can surmount lingering

technical hurdles, the technique could prove invaluable for pigs, chickens and other livestock that are tricky to breed using artificial insemination. “There’s a lost opportunity to improve genetics,” says Jon Oatley, a reproductive biologist at Washington State University in Pullman.

The technique could also aid efforts to conserve species for which semen storage is difficult, including many birds.

In the US dairy industry, the practice of artificially inseminating cows with sperm collected from elite bulls, along with careful genetic selection, has yielded cows that produce four times more milk than animals did in the 1940s, before the practice was

introduced. But artificial insemination is not often used in beef cattle, because the animals are allowed to roam freely over pasture, making it hard to track down cows at the right stage of their reproductive cycle. And the technique doesn’t work well for pigs because their sperm often die in storage.

WHO’S YOUR DADDY?

Oatley and his colleagues are now developing surrogate pig sires. In 2017, the researchers reported that they had used the gene-editing tool CRISPR–Cas9 to disable a gene called *NANOS2* in pigs. Pigs that carry two copies of the knocked-out gene can’t produce sperm, but are otherwise unaffected, making them