

Daily briefing: Coronavirus vaccine — where we are now

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Catch up on the status of the more than 135 vaccines in development against the SARS-CoV-2 virus, ponder the biology and physics of free will and learn how scientists helped win the battle over evolution in US classrooms.

Lab-grown cells mimic crucial moment

Gastruloids, embryo-like structures created from stem cells, are the first to form a 3D assembly that lays out how the body will take shape. The gastruloids developed rudimentary components of a heart and nervous system, but lack the components to form a brain, as well as cell types that would make them capable of becoming a viable fetus. The artificial structures avoid ethical concerns about doing research on human embryos. They could shed light on the causes of pregnancy loss and early developmental disorders, such as congenital heart conditions and spina bifida.

Bizarre star offers clues to mystery signals

For a fraction of a second in late April, a hyper-magnetized star in the Milky Way suddenly blasted out radio energy. Now scientists say that this sudden, strange blip could help to explain one of astronomy's biggest puzzles: what powers the hundreds of other mysterious fast radio bursts (FRBs) that have been spotted much farther away in the Universe. Many astronomers think that fast radio bursts — brief but powerful cosmic flashes that flare for just milliseconds — come from magnetars, but haven't found the link. "Here is something that gets close to the insane intensity of cosmic FRBs, but that is happening not so far away," says astronomer Sarah Burke. "It's a fantastic opportunity to learn about at least one of the sources that could be causing FRBs."

Call to include cis women in HIV clinical trials

Gilead's PrEP (pre-exposure prophylaxis) drugs, which protect against HIV infection, are causing an uproar among patient advocates and experts because they exclude cisgender women. A recent clinical trial of a Gilead experimental drug called cabotegravir — an antiretroviral injection given every two months — enrolled only cisgender men and transgender women. This followed the US Food and Drug Administration's approval of another Gilead drug, Descovy, for use by cisgender men and transgender women only. Gilead says it is now planning a new clinical trial focusing on cisgender women. "You never get to 'end the epidemic'" as long as some women are left behind, says Dazon Dixon Diallo, the founder of advocacy organization SisterLove.

Coronavirus vaccine: where we are now

There are more than 135 vaccines in development against the SARS-CoV-2 virus. Only one, from pharmaceutical firm AstraZeneca and the University of Oxford, is starting phase III clinical trials that will test whether it actually works. A pleasantly visual vaccine tracker from The New York Times enumerates the status of all the vaccines that have reached trials in humans, along with a selection of promising vaccines that are being tested in cells or animals.

Coronavirus research highlights: 1-minute reads

Huge number of viral imports seeded the UK outbreak

The new coronavirus has jumped into the United Kingdom more than 1,300 times — mostly from France and Spain. Researchers analysed nearly 30,000 SARS-CoV-2 genomes to track the virus's spread. People coming from China accounted for less than 0.1% of introductions.

Reference: *Virological* preprint (not yet peer reviewed); <https://virological.org/t/preliminary-analysis-of-sars-cov-2-importation-establishment-of-uk-transmission-lineages/507>

Virus conscripts a pair of human proteins to invade cells

Researchers have found a second protein that SARS-CoV-2 uses to enter human cells. The SARS-CoV-2 protein called Spike has been known to attach to a human protein called ACE2, which allows the virus to enter cells. Two teams of researchers have now found that the human protein neuropilin-1 aids viral invasion. This finding could potentially offer a new target for vaccines and drugs.

Reference: *bioRxiv* preprint (not yet peer reviewed); <http://doi.org/dx5c>

People who feel fine can unwittingly spread the virus

A massive coronavirus-testing campaign in Vietnam has found evidence that infected people who never show any symptoms can pass on the virus. Early in the global COVID-19 outbreak, Vietnam began to repeatedly test people at high risk of infection. Of roughly 14,000 people tested between mid-March and early April, 49 were infected, 30 of them were monitored and 13 developed symptoms. Researchers say that it's "highly likely" that two of the asymptomatic participants were the source of infection for at least two other people.

Reference: *Clinical Infectious Diseases* paper; <https://doi.org/10.1093/cid/ciaa711>

Features & opinion

How we boosted evolution in US classrooms

A decades-long effort, aided by the scientific community, to support the teaching of evolution in US schools is bearing fruit, writes Ann Reid, the executive director at the National Center for Science Education in California. The proportion of US secondary-school biology teachers who present creationism as a scientifically valid alternative to evolution fell from 32% in 2007 to 18% in 2019. And the amount of class time devoted to human evolution shot up by almost 90%. Reid lays out how scientists helped to make it happen, and how we can tackle the next challenge: climate science.

The biology and physics of free will

Reductionism is the belief that every phenomenon can be broken down to the fundamental laws of physics that govern the smallest constituents of matter: these laws then cause everything from the bottom up and make the future predictable, as embodied in Pierre-Simon Laplace's 'demon'. But in the brain, learning changes macroscopic structure, and affects the microscopic details of the brain in a top-down fashion, argues physicist George Ellis in this essay. And this has implications for free will — without which ethics do not exist, he thinks. "If you seriously believe that fundamental forces leave no space for free will, then it's impossible for us to genuinely make choices as moral beings."

Cautionary tale of past economic rebounds

The calamitous contraction of the global economy means that, by the end of the year, emissions are likely to be 8% less than the 2019 level — the largest annual percentage drop since the Second World War. The big question is how to reinvigorate economies without unpicking that silver lining. "In this crisis, any climate-mitigation plan must deliver on the public's immediate needs or it will not fly," write energy researchers David Victor, Ryan Hanna and Yangyang Xu, in their analysis of rebounds since the 1970s. Sweet spots that can save hundreds of thousands of jobs include investing in renewables and energy efficiency, and preserving the existing fleet of zero-emission nuclear power plants. Definitely no coal.

Make retractions more transparent

Last year, Quan-Hoang Vuong, who researches scientific-data management, analysed more than 2,000 retraction notices and found that many only included paltry information about why they had been retracted; around 10% gave no reason at all. Vuong recommends that four pieces of information be provided with all retractions, to encourage them when warranted: who initiated it; the cause; whether there is consensus between editors and authors about it; and whether post-publication review was involved.

Quote of the day

"Please don't waste any empathy and sympathy on me ... I am too old, too tired, too bruised, and too bitter to fix. Rather, remember that antiracism and fighting racism starts at home. My wish is that we don't let my experience become the experience of any other students or faculty of color."

Integrative biologist Tyrone Hayes talks about some of the many racist moments he has endured as a student at Harvard and his 31 years at the University of California, Berkeley.

<https://rothfelslab.berkeley.edu/2020/06/04/the-rothfels-lab-stands-against-racism-everywhere/>

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