

in venture funding and 100 employees, including scientists who used to work for COSMIC and NOAA. Its business plan includes the radio tracking of ships and airplanes, but, Spire CEO Peter Platzer says, “the weather data is probably going to be the largest piece of the pie.” After the eight Lemurs go up on the Soyuz, Platzer says the company will launch eight more next month, with regular launches after that. By the end of the year, Platzer hopes the firm will be gathering more than 10,000 profiles daily. Spire competed in NOAA’s first small pilot program last year, delivering hundreds of daily profiles to the agency. Platzer says Spire is now delivering profiles to another customer, but declined to say whether that customer is public or private.

GeoOptics, whose team has some industry heavy hitters, including Lautenbacher, a former NOAA administrator, initially planned a fleet of 100-kilogram satellites. But the allure of the tiny CubeSat approach won out. The first of its new satellites, slimmed down to 10 kilograms, launched last month on an Indian rocket and is going through engineering checkout. With the launch of three more of its satellites this week, GeoOptics will be in a position to compete with Spire on the quality and reliability of their observations. “Government likes competition,” Lautenbacher says. “Both of us are better off.”

Congress has instructed NOAA to spend several million dollars on pilot commercial data programs. Each pilot round will pay more—and demand more, in terms of data quantity and quality. “It’s closer and closer to a commercial contract,” Platzer says. NASA and the U.S. Air Force have also indicated that they will be open to buying GPS-RO data.

Schreiner says he and other scientists worry that the shift from public to private sources could hamper the use of weather data in research. “You really want to understand how the data were tracked in detail,” he explains. “Whenever there is a commercial project there is a tendency to not share as much information.”

And although GeoOptics says it plans to release the data freely to researchers, weather agencies have thornier issues to work out to license the data. The companies are betting on selling their data to multiple customers, public and private, but weather agencies have long depended on the free exchange of data gathered from their satellites.

Schreiner says there’s probably room for both approaches: core, public systems like COSMIC that share data freely, and private ones that can sell data to agencies as an exclusively licensed supplement. “It’s great to have as much radio occultation data as possible.” ■

SCIENCE AND SOCIETY

A trans-Atlantic transparency gap on animal experiments

As institutions in the United Kingdom and elsewhere publicize their research, many U.S. universities stay quiet

By Meredith Wadman

Last month, a London-based group that supports the use of animals in biomedical science began inviting the public to take an unusual digital tour of laboratories at four U.K. research institutions. At LabAnimalTour.org, users can watch a monkey with a bolt in its skull forage in its cage in a University of Oxford neuroscience lab and a technician check on some of the 8000 mice housed in one room at the Medical Research Council’s Harwell Institute. Another video shows researchers preparing

that targeted a veterinary scientist, there was “complete positivity” about putting their animal research on display, says Maggie Leggett, the university’s director of communications. “We believe in openness. We are using taxpayers’ money. People have a right to know.”

Such views contrast starkly with practices at many U.S. research institutions, which have been reluctant to publicly describe and defend their animal experiments. But the emerging European experience suggests that might be the wrong approach, says Tom Holder, UAR’s head of campaigns. He argues that “being more open doesn’t result



A pig at the University of Bristol in the United Kingdom is prepared for surgery to insert an artificial blood vessel. Researchers hope to replace veins used in human heart bypass operations with more durable vessels.

a pig for surgery at the University of Bristol.

The tour—created by the nonprofit Understanding Animal Research (UAR), which is funded by groups including universities, companies, and charities—is part of a growing push by research institutions and funders in the United Kingdom and some European countries to open up about animal experiments. Faced several years ago with polls showing declining public support for animal research, institutions there began shedding their traditional queasiness about discussing the sometimes controversial work. At the University of Bristol, where just 2 decades ago animal rights activists planted one bomb that damaged a major building and another

in greater attacks from animal rights groups, but instead builds resilience in an institution and trust with the public.”

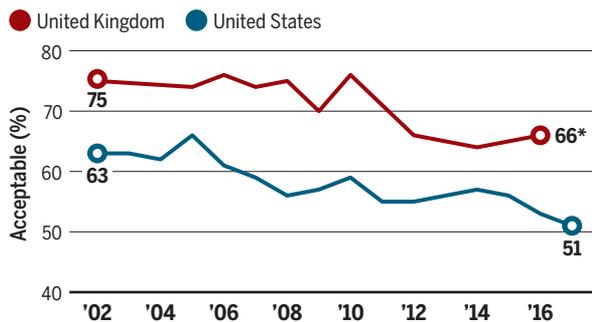
Opponents of animal research counter that the new transparency is merely public relations. “A whitewash web page that includes content they choose to show—it’s just propaganda,” says Justin Goodman, vice president for advocacy and public policy at the White Coat Waste Project, a Washington, D.C.-based group that lobbies for transparency in U.S.-funded animal research.

In the United Kingdom, one catalyst for the transparency push was a sudden drop in public acceptance of animal research between 2010 and 2012—a decline of

10 percentage points, to 66%, according to a government-commissioned poll. UAR, the London-based Science Media Centre, research institutions, and funders including the Wellcome Trust and the Medical Research Council began discussing responses. The result was a 2014 Concordat on Openness on Animal Research in the United Kingdom, now signed by 116 life science organizations, including 42 universities. The signatories pledge to improve communication about their research by detailing when, how, and why they use animals, and by launching projects that pull in the public. Last October, for the first time, the top 10 U.K. research universities joined together to publicize the number of animal experiments they conducted the previous year. Since the concordat was launched, public support for animal research has stabilized in the

Slipping support

Pollsters have periodically asked U.K. adults whether they “accept animal experimentation” for medical research, and U.S. adults whether “medical testing on animals” is “morally acceptable.”



* Question changed slightly in 2016.

United Kingdom, although showing cause and effect is difficult.

Similar efforts are underway elsewhere in Europe. In Spain, 90 institutions and societies last year signed an animal research transparency agreement. Institutions in Belgium, France, and Germany are exploring ways to emulate the U.K. model.

In the United States, few research players have adopted proactive communication strategies, according to Speaking of Research (SoR), a group based in London and Washington, D.C., that advocates for biomedical research. It monitors websites of institutions that conduct or fund animal research in a dozen countries, and grades their transparency efforts. To make SoR's list, an organization must at a minimum maintain a public web page with a position statement on animal research.

Although at least 1000 U.S. research facilities use animals, SoR's list includes just

65 U.S. universities, as well as 39 other groups, including charities, government labs, and drug companies. Just two universities—the University of Michigan in Ann Arbor and the University of Wisconsin in Madison, along with several federally funded National Primate Research Centers—earn SoR's top marks. More than half of the universities—including private research powerhouses such as Harvard, Stanford, and Johns Hopkins universities—get low grades because they don't present case studies, videos, or extensive public-facing information about their animal research on a dedicated website. (Johns Hopkins says that it works hard to communicate its animal work by highlighting it in press releases, and that it lacks a dedicated animal research web page because its web content is decentralized. Stanford pointed to a three-paragraph on-line statement on animal research that notes achievements such as the isolation of insulin. Harvard says it is treading a fine line between openness and keeping its scientists safe.)

Some research advocates worry the anemic U.S. outreach is allowing animal research opponents to define the debate, and may be contributing to a slide in public support for animal studies. Approval of animal research hit a new low in a U.S. Gallup poll released in May; 51% said “medical testing on animals” is “morally acceptable,” down from 65% in 2001. Disapproval was highest among adults younger than 35. Such numbers suggest that “in the

U.S. there has not been enough proactive communication,” says Kirk Leech, executive director of the London-based European Animal Research Association.

One group, Americans for Medical Progress (AMP) in Washington, D.C., wants to change that. Last month it launched a website, Come See Our World. It provides photos and videos of research animals, along with background information on the experiments. Individual U.S. scientists are becoming more willing to publicly discuss their animal work, says Paula Clifford, AMP's executive director. But “the sticking point is the risk assessment of the higher-ups” at research institutions, she says.

Leech, for one, believes U.S. institutions must become more tolerant of the risks of openly describing their animal work. If research advocates keep “sticking our heads in the sand and hoping [animal rights activists] will go away,” he predicts, “we will fail.” ■

BIOFUELS

A push for low-carbon fuels pays off in California

But new EPA rule would cut federal support for advanced biofuels like biodiesel

By Robert F. Service

With its strict environmental rules, California has led the United States in cutting pollution and greenhouse emissions from cars. Now, the state is taking aim at the fuels they burn. A new progress report from California's air regulators shows that its low-carbon fuel standard (LCFS) is sharply boosting the use of biodiesel and other “advanced” biofuels—fuels that have a gentler impact on climate than gasoline and even corn ethanol.

That is good news for companies and researchers striving to produce low-carbon fuels more efficiently. But California's efforts could be undercut by the administration of U.S. President Donald Trump, which last week announced plans to reduce federal quotas for advanced biofuel production under the renewable fuel standard (RFS). Some observers worry that the administration, with its tight connections to the oil and gas industry, may eventually eliminate the RFS altogether, crippling biofuel production and isolating California's efforts. “If they end the RFS, the LCFS would be in serious trouble,” says Sonia Yeh, a biofuels engineer at the University of California (UC), Davis.

Under the California LCFS, adopted in 2009, regulators score the carbon intensity (CI) of different fuels over their full life cycle, accounting not just for the carbon emitted when a fuel is burned, but also for the carbon expended in its production. Whereas gasoline has a CI score of 100 grams of carbon dioxide equivalent per megajoule of energy, corn ethanol has an average CI of 79. The cleanest option—biomethane captured from landfill emissions—has an average score of 25. Regulators mandate an average CI for the total automotive fuel sold in the state, and ratchet down the number each year. Refiners and fuel suppliers with a CI below the

Science

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Science **357** (6347), 119-120.
DOI: 10.1126/science.357.6347.119

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