

► rights. “If somebody violated your patent and you found out that they are marketing a product that is very similar to the one that you hold a patent to, what court would you go to? Where would you sue?” asks Payan.

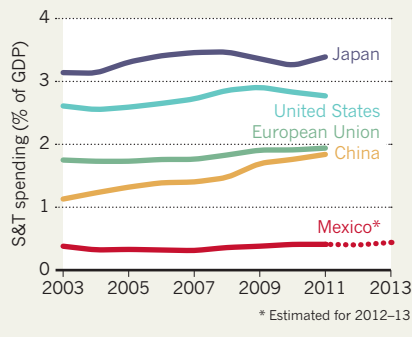
Another problem is Mexico’s massive brain drain. The reason why many scientists leave the country is clear enough: jobs are hard to come by. Scientists tend to stay in their jobs for as long as possible, because leaving means giving up most of their salaries. “We don’t retire,” says Bolívar. “We don’t free some positions for young scientists.”

To that end, the Congress is working on a bill that would boost pensions for retiring researchers. Félix says that the process might take some time. “We don’t want to harm the rights of the professors, but we need a reform so the new generations can have access and refresh the system,” he says. CONACYT also plans to create 500 new science jobs for young researchers in 2014. The jobs will be in fields such as climate research, disaster mitigation, diabetes and plant genetics. Bolívar says that the government plans to follow the first batch with 500 more each year.

However, Payan says that it will take a long time to achieve a culture of innovation, and that merely replacing the old with the young will not suffice. “You can retire a bunch of guys and you can put in the new people to work,” he says.

PESO POWER

Mexico is trying to reach a goal of spending 1% of gross domestic product (GDP) on science and technology (S&T).



“That doesn’t mean they’re going to innovate.”

By itself, a boost in public spending on science will not be enough for Mexico to achieve its goal of 1% of GDP; private investment is also needed. To encourage this, Bolívar has enlisted the help of Enrique Cabrero Mendoza, who was appointed head of CONACYT in January. A competitiveness expert at the Center for Research and Teaching in Economics in Mexico City, Cabrero has identified cities throughout the country that are ripe for investment as technology hubs. The government wants to offer corporate tax breaks

to encourage investment in these hubs — although tax breaks have been controversial in the past because they have been abused.

Peña Nieto has started to run into opposition to this and other parts of his agenda. Major reforms in education and energy policy — such as compulsory teacher evaluations and opening up the state-owned oil company to private investment — have sparked large protests in the streets, supported by powerful unions.

Even if Peña Nieto has trouble enacting all of his research agenda, his symbolic actions have already impressed Dutrénit. She points out, for instance, that in September the president reconvened a high-level scientific advisory body — the General Council for Scientific Research, Technological Development and Innovation — headed by himself and nine ministers, as well as officials from CONACYT, universities and businesses. The council was created in 2002 to help set national science and innovation policy. It is supposed to meet twice yearly, but had met only three times in the past ten years.

The government’s renewed focus on science is spurring a sense of responsibility among Mexico’s scientific elite, Dutrénit adds. “We are not only asking for increases in public and private investment,” she says. “We also have to answer for those investments.” ■

SOURCE: OECD/CONACYT

JOURNALS

PLOS profits prompt revamp

Incoming boss plans peer-review shake-up at Public Library of Science.

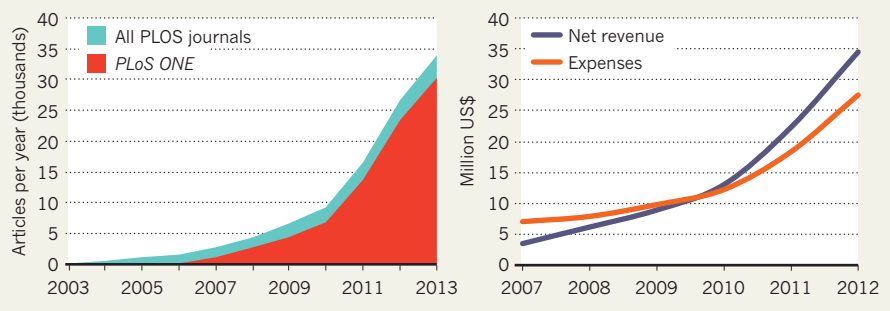
BY RICHARD VAN NOORDEN

The Public Library of Science (PLOS) is not accustomed to having spare cash. Founded by scientists in 2000 as a grassroots organization advocating open scholarly communication, PLOS reinvented itself as an open-access journal publisher in 2003 with the help of philanthropic grants. It has spent much of the decade since then “skating on thin financial ice”, in the words of co-founder and board member Michael Eisen, a geneticist at the University of California, Berkeley.

Now PLOS is part of the establishment: open-access publishing has entered the mainstream. The non-profit operation, based in San Francisco, California, broke even for the first time in 2010; in 2012, it reported a surplus of US\$7 million on net revenues of \$34.5 million. Its cash-generating engine is the world’s largest journal, *PLoS ONE*, which is on course to publish more than 30,000 articles this year (see ‘World’s largest journal’), although its growth rate shows

WORLD’S LARGEST JOURNAL

By quickly expanding the size of its megajournal *PLoS ONE* (left), the Public Library of Science (PLOS) began to see revenues exceed expenses from 2010 (right).



signs of slowing. The ‘megajournal’ business model has been mimicked by many others.

PLOS is now seeking a new vision to match its new profitability. In May, it announced the departure of chief executive Peter Jerram and the recruitment of his replacement, Elizabeth Marincola. She says that the future of science

publishing is not in branded, highly selective titles. Instead, she sees a world in which article metrics and community judgements help the cream of research to rise to the top. “The packaging of a journal will become less and less important,” she says.

That idea is the opposite of an open-access

SOURCE: PLOS

competitor of which Marincola was previously chair: *eLife*, an elite journal funded with more than £15 million (US\$24 million) from the Wellcome Trust in London, the Max Planck Society in Munich, Germany, and the Howard Hughes Medical Institute in Chevy Chase, Maryland. “Their appeal is that there is quality inferred from the brand,” notes Marincola.

“We are working to evolve all of PLOS towards a world where papers are only rejected when they are scientifically invalid,” says Eisen. *PLoS ONE* already adopts that approach, but the publisher has six more-selective journals, including *PLoS Medicine* and *PLoS Biology*. Marincola will not be drawn on whether these might become less selective, although she says that in the longer term, “we would like very much to be able to move away from our current system of peer review altogether”. The organization’s research arm, PLOS Labs, founded this year, aims to develop and test concepts for peer review after papers have published.

Others have different priorities. “One of the areas I would love to see PLOS push is doing open science cheaper,” says Jonathan Eisen, Michael’s brother and an evolutionary biologist who is on the editorial board of *PLoS Computational Biology*. Reducing the \$1,350 author fee for its lowest-cost journal, *PLoS ONE*, also makes sense tactically, says Joseph Esposito, a publishing consultant based in New York City, because it will make it harder for new entrants to break into the megajournal market. “Right now, PLOS is by far the scale leader. They should play that card now and play it aggressively,” he says. But Marincola says that PLOS has not raised its prices in four years, and waived about \$4.3 million in publishing fees last year.

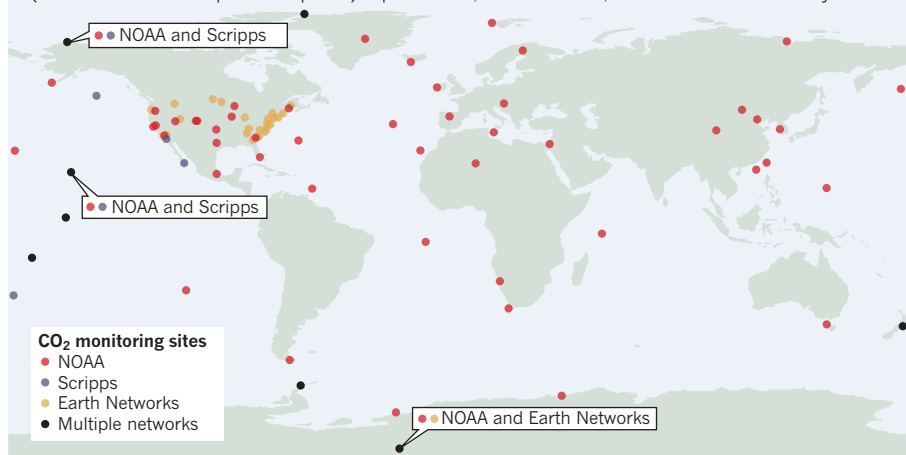
Making everything as cheap as possible is not a pressing priority, agrees Damian Pattinson, editorial director of *PLoS ONE*. Like Marincola, he thinks the immediate focus will be on iterative improvements to the publishing process. “For years, journals have got away with treating authors like scum,” he says. Open access focuses publishers’ minds on giving authors services they value, such as faster turnaround, better websites and metrics on who is viewing articles, he adds.

To Michael Eisen, some of the most visible manifestations of innovation are with other publishers — such as F1000 Research in London, which already uses open peer review after papers are published. “They are doing lots of things that PLOS should have done five years ago,” he says. “PLOS has created the landscape that has enabled others to flourish, which is great. The question is, how can it continue to be innovative?” ■

“The packaging of a journal will become less and less important.”

GREENHOUSE GRID

Scientists who monitor the build-up of carbon dioxide in the atmosphere depend on data collected by the Scripps Institution of Oceanography and the US National Oceanic Atmospheric Administration (whose networks overlap in some places). A private firm, Earth Networks, runs a smaller US-based system.



SOURCE: SCRIPPS INST./NOAA/EARTH NETWORKS

CLIMATE CHANGE

Budget crunch hits Keeling’s curves

Scientist struggles to maintain long-standing carbon dioxide record and more recent atmospheric-oxygen monitor.

BY JEFF TOLLEFSON

Late last month, officials at California’s Scripps Institution of Oceanography turned to Twitter seeking donations to maintain the iconic ‘Keeling curve’, a 55-year record of rising atmospheric carbon dioxide levels. An appeal for funds launched in July had attracted only a few small contributions, not nearly enough to keep the programme going.

Scripps geochemist Ralph Keeling, who took over the CO₂ measurements started by his father Charles, is neither surprised nor disappointed. “That’s more a fishing expedition than anything,” he says of the nascent crowdsourcing at Scripps in La Jolla. But he is worried.

For years, he has struggled to cobble together enough cash to support the CO₂ programme and an atmospheric-oxygen record that he pioneered in 1989. Bouncing between grant programmes designed to fund short-term projects, not long-term monitoring, he has cut staff and streamlined operations to keep the records going.

But now, with his funds running dry, he wonders about the future. “Things have never been this dire before,” he says.

Much has changed since 1958, when Charles Keeling took his first CO₂ measurements atop

Mauna Loa in Hawaii. The programme he started now monitors CO₂ at 13 sites, from the South Pole to Alaska (see ‘Greenhouse grid’). The National Oceanic and Atmospheric Administration (NOAA) runs a larger network that overlaps with the Scripps system, helping both teams to ensure that their measurements are correct. These data, along with other measurements from researchers around the world, flow into models designed to study how carbon moves through the environment.

The complement to the Keeling curve is Ralph Keeling’s atmospheric-oxygen record, which NOAA does not replicate. Keeling has documented a decrease in oxygen levels that is due to fossil-fuel combustion, which uses up oxygen and releases CO₂. By accounting for both CO₂ and oxygen levels in the atmosphere, scientists have calculated that oceans and plants each absorb roughly one-quarter of humanity’s CO₂ emissions, leaving half to build up in the atmosphere.

“We expected an answer close to that, more or less, but Ralph Keeling was the first to provide the measurements,” says Pieter Tans, who heads NOAA’s carbon-cycle and greenhouse-gas group in Boulder, Colorado.

Keeling says that he received around US\$700,000 annually for the CO₂ programme through paired support from the National ▶