region was correctly assembled, even if the chance of misassembly is only 1 in 100."

The wider message is that as biology becomes more analytical and interdisciplinary, the skills required to design experiments and interpret results have inevitably changed. Nevertheless, one fundamental point remains: human skill and judgement are needed to determine whether a set of results confirms expectations, whether it indicates that further investigation is needed, or whether it requires revision of the existing orthodoxy. Ultimately, whatever tools are available

and whatever technological advances are made, innovation and originality of the human spirit will still determine what makes science brilliant.

REFERENCE

Halperin I, Glazer DS, Wu S, Altman RB (2008) The FEATURE framework for protein function annotation: modeling new functions, improving performance, and extending to novel applications. *BMC Genomics* **16**: S2

Philip Hunter is a freelance journalist in London, UK.

EMBO reports (2011) **12**, 401–404.
doi:10.1038/embo.2011.57

Reading the tea leaves of Congress

With a new Republican majority in the House of Representatives, scientific research in the USA might face budget cuts

Melissa Suran

In 2009, Barack Obama became the 44th President of the USA, amid hopes that he would fix the problems created or left unresolved by his predecessor. However, despite his positive mantra, "Yes we can," the situation was going to get worse: the country was spiralling towards an economic recession, a collapsing residential real-estate market and the loss of millions of jobs. Now, the deficit lingers around US\$14 trillion (US Department of the Treasury, 2011). In response to these hardships and the presence of a perceived 'socialist' president in office, a new political movement started brewing that would challenge both the Democrats and the Republicans—the two parties that have dominated US politics for generations. Known as the Tea Party, this movement has been gaining national momentum in its denouncement of the status quo of the government, especially in relation to federal spending, including the support of scientific research.

The name is a play on the Boston Tea Party, at which more than 100 American colonists dumped 45 tonnes of tea into Boston Harbour (Massachusetts, USA) in 1773 to protest against the British taxation

of imported tea. Whereas the 18th century Boston Tea Party formed to protest against a specific tax, the Tea Party of the 21st century protests against taxes and 'big' government in general.

Tea Partiers tend to be especially critical when it comes to spending tax dollars on bank bailouts and health care, but anything goes when [...] cutting [...] public spending—even science

Many view Tea Party followers as modern muckrakers, but supporters claim their movement is fundamentally about upholding the US Constitution. Tea Party Patriots, a non-partisan organization, considers itself to be the official home of the Tea Party movement. Fuelled by the values of fiscal responsibility, limited government and free markets, Tea Party Patriots believe, these three principles are granted by the Constitution, although not necessarily upheld by the administration.

"If you read the Constitution, the limits of government involvement in society [are]

pretty well-defined and our government has gone farther and farther beyond the specific limits of the Constitution," said Mark Meckler, one of the co-founders of Tea Party Patriots. "Our Constitution is not designed as an empowering document, but as a limiting document... [and] was intended to be used as a weapon by the people against the government to keep it in the box." Tea Partiers tend to be especially critical when it comes to spending tax dollars on bank bailouts and health care, but anything goes when it comes to cutting back on public spending—even science. "We believe everything needs to be on the table since the government is virtually bankrupt," Meckler said. "We need to cut the waste, cut the abuse [and] get rid of the departments that shouldn't exist."

On 19 February 2011, the US House of Representatives, which is currently controlled by the Republicans, passed a federal-spending bill for the remainder of the 2011 fiscal year budget. Among other cuts, the bill called for billions of dollars to be slashed from the budgets of federal science agencies. If the bill is signed into law, the National Institutes of Health (NIH) will have \$1.6 billion cut from its budget—a 5.2% decrease—and the Department of Energy (DOE) will experience an 18% cut in funding for its Office of Science. Other agencies targeted include the Environmental Protection Agency (EPA), the National Aeronautics and Space Administration (NASA), the National Institute of Standards and Technology (NIST) and the National Science Foundation (NSF; Anon, 2011; Cho, 2011). Although the US Senate, which has a Democratic majority, must consider the bill before any definite amendments to the budget are made, it is likely that there will be some cuts to science funding.

Although the House is in favour of science-related cuts, President Obama supports spending more on science education, basic research and clean-energy research. He has also proposed an 11.8% increase in the budget of the DOE, as well as an 8% increase in the NSF budget (Office of Management and Budget, 2011).

Joann Roskoski, acting assistant director of the Biology Directorate at the NSF, said her institute is strongly in favour of President Obama's budget proposal. "President Obama is a very strong supporter of fundamental research and STEM [science, technology, engineering and mathematics]

education because he perceives it as investing in the future of the country," she said. "These are just difficult budgetary times and we'll just have to wait and see what happens. As they say, the president proposes and Congress disposes."

Karl Scheidt, a professor of chemistry at Northwestern University (Evanston, Illinois, USA), has four grants from federal agencies. "A couple of my grants expire this year, which is happening at the worst, worst possible time," explained Scheidt, whose grants are funded by the NIH and the NSF. He added that although many politicians either do not understand or believe in the fundamentals of science, they still preach to the masses about what they 'think' they know. "I think it's an absolute travesty that many people don't understand science and that many of the Republicans who don't fully understand science perpetuate incorrect assumptions and scientific falsehoods when speaking in public," he said. "It makes the US less competitive and puts us collectively at a disadvantage relative to other nations if we don't succeed in scientific education and innovative research in the future."

Although the Tea Party is not technically associated with the Republican Party, all Tea-Party representatives and senators ran as Republican candidates in the last election. While only one-third of seats in the Senate are on the ballot every two years for a six-year term, all House seats are for a two-year term. In the most recent Senatorial election, 50% of Tea Party-backed candidates won; 10 in total. 140 candidates for seats in the House of Representatives were backed by the Tea Party—all of whom were Republicans—but only 40 won. Nevertheless, with around 100 new Republicans in office, a House controlled by a Republican majority and most Congress-based Republicans in agreement with Tea Party ideals, the Tea Party actually has a lot of sway on the voting floor.

The House is in favour of science-related cuts, but President Obama is in favour of spending more on science education, basic science and clean-energy research

Of course, as a fundamentally grassroots movement, their influence is not limited to the halls of power. Since just before the November election last year,

...part of the challenge is that many scientists do not properly articulate the importance of their work to the public, and there is limited representation on behalf of science in Washington

Tea Party-backed politicians have received more scrutiny and media exposure, meaning more people have listened to their arguments against spending on science. In fact, Republican politicians associated with the Tea Party have made critical and sometimes erroneous comments about science. Representative Michelle Bachman, for example, claimed that because carbon dioxide is a natural gas, it is not harmful to our atmosphere (Johnson, 2009). Representative Jack Kingston denounced the theory of evolution and stated that he did not come from a monkey (The Huffington Post, 2011). When asked how old he believes the Earth to be, Senator Rand Paul refused to answer (Binckes, 2010). He also introduced a bill to cut the NSF budget by 62%, and targeted the budget of the Center for Disease Control and Prevention.

Scheidt believes part of the challenge is that many scientists do not properly articulate the importance of their work to the public, and there is limited representation on behalf of science in Washington. "It's difficult sometimes to advocate for and explain the critical importance of basic research and for the most part, Congress may not always appreciate the basic fundamental mission of organizations like the NIH," Scheidt said. "Arlen Specter was one of the few people who could form coalitions with his colleagues on both sides of the aisle and communicate why scientific research is critical. Why discovering new ways to perform transplants and creating new medicines are so important to everyone."

Specter, a former senator, was Republican until 2009 when he decided to switch political parties. During the last Democratic primary, he lost the Pennsylvania Senate nomination after serving in Congress for more than four decades. The Democratic nominee, Joe Sestak, eventually lost the coveted seat to Pat Toomey, a Tea Party Republican who sponsored an amendment denying NIH funding for some grants while he was a House member. Toomey is also against funding climate science and clean-energy research with federal dollars.

Specter was considered a strong supporter of biomedical research, especially cancer research. He was the catalyst that pushed through a great deal of pro-science legislation, such as adding approximately \$10 billion to NIH funding as part of the stimulus package in 2009, and doubling NIH funding in the 1990s. As scientific research was so important to him, he served on the US Senate Committee on Appropriations Subcommittee on Labor, Health and Human Services, Education, and Related Agencies and on the Senate Committee on Environment and Public Works. Specter was a popular political champion of science not only because of all he had accomplished, but also because so few scientists are elected to office.

Among those Democrats who lost their seats to Tea Party Republicans was Congressman Bill Foster. Foster, who once worked for the Fermi National Accelerator Laboratory (Fermilab)—which is funded by the DOE—represented Batavia, Illinois, which is also where Fermilab has its headquarters. "The new representative in the district where Fermilab resides is Randy Hultgren, a Republican, who has been very supportive of the laboratory since he's been elected," said Cindy Conger, Chief Financial Officer at Fermilab. "He's very interested in us and very interested [...] in us having adequate funding."

...the best approach is to educate as many people as possible to understand that scientific research is a necessity, not a luxury

However, Fermilab is suffering financially. "We will [...] have some level of layoffs," Conger said. "Inadequate federal funding could result in more layoffs or not being able to run our machines for part of the year. These are the things we are contemplating doing in the event of a significant budget cut. Nothing is off the table [but] we will do everything we can to run the [Tevatron] accelerator."

But Fermilab's desperate appeal for \$35 million per year for the next three fiscal years was denied by the Obama administration and not included in the 2012 White House budget request. As a result, the most powerful proton-antiproton accelerator in the USA, the Tevatron, is

shutting down indefinitely near the end of this year.

Another pro-science Republican is former Congressman John Porter, who studied at the Massachusetts Institute of Technology. He encouraged the federal funding of science while serving as chair of the House Subcommittee on Labor, Health and Human Services, and Education, as well as on the House Committee on Appropriations and Related Agencies. Like Scheidt, Porter said a problem is that not many members of Congress really understand science or what goes into scientific research.

"Many members of Congress don't realize that the money appropriated for the funding of scientific research through NIH, NSF [...] is sent out to research institutes in their districts and states where the research is conducted," said Porter, who retired from Congress in 2001 after serving for more than 20 years. "They simply haven't been exposed to it and that's the fault of the science community, which has a great responsibility to educate about the mechanisms on how we fund scientific research."

Today, Porter is vice-chair of the Foundation for the NIH and also chairs Research!America, a non-profit organization which aims to further medical, health and scientific research as higher national priorities. He also noted that industry would not fund scientific research in the way the government does because there would essentially be no profits. Therefore, federal funding remains essential.

"Let's take away the phones, iPads and everything else [those against the federal funding of science] depend on and see what's left," Porter said. "The US is the world leader in science, technology and research and the way we got there and the way we have created the technology that makes life easier [...] is a result of making investments in that area."

For now, Scheidt said the best approach is to educate as many people as possible to understand that scientific research is a necessity, not a luxury. "We unfortunately have a very uneducated population in regard to science and it's not 100% their fault," he said. "However, if people took a real interest in science and paid as much attention to stem-cell or drug-discovery research as they did to the Grammy Awards or *People* magazine I think they would appreciate what's going on in the science world."

Instead, the USA is lagging behind its competitors when it comes to STEM education. According to the 2009 Program for International Student Assessment (PISA), the USA is ranked 17th on science and 25th on maths out of 34 countries (US Department of Education, 2010). "We're in a cluster now, we're no longer the leading country," said D. Martin Watterson, a molecular biologist who sits on NIH peer-review committees to evaluate grant proposals. The reason, according to Watterson, is that the first things to be cut after a budget decrease are training grants for continuing education efforts. Moreover, the USA already lacks highly trained workers in the field of science. "In some disciplines, employers now look to other places in Europe and Asia to find those trained personnel," Watterson said.

Ultimately, most people at least want a final budget to be passed so that there is sufficient time to plan ahead. However, Georgetown University political science professor Clyde Wilcox thinks that a compromise is not so simple. "The problem is that it's a three-way poker game. People are going to sit down and they're going to be bargaining, negotiating and bluffing each other," he said. "The House Republicans just want to cut the programs that they don't like, so they're not cutting any Republican programs for the most part."

As a result, institutions such as the EPA find themselves being targeted by the Republicans. Although there is not a filibuster-proof majority of Democrats in the Senate, they still are a majority and will try to preserve science funding. Wilcox said that it is not necessarily a good thing to continue negotiating if nothing gets

done and the country is dependent on continuing resolutions.

Although there is not a filibuster-proof majority of Democrats in the Senate, they still are a majority and will try to preserve science funding

"What the real problem is, when push comes to shove, someone has to blink," he said. "I don't think there will be deep cuts in science for a number of reasons, one is science is consistent with the Democratic ideology of education and the Republican ideology of investment. And then, we don't really spend that much on science anyway so you couldn't come remotely close to balancing the budget even if you eliminated everything."

Although during his time in Congress representatives of both parties were not as polarized as they are today, Porter believes the reason they are now is because of the political climate. "The president has made [science] a very important issue on his agenda and unfortunately, there are many Republicans today that say if he's for it, I'm against it," Porter said. In fact, several government officials ignored repeated requests or declined to comment for this article.

"It's time for everybody from both parties to stand up for the country, put the party aside and find solutions to our problems," Porter commented. "The American people didn't just elect us to yell at each other, they elected us to do a job. You have to choose priorities and to me the most important

priority is to have our children lead better lives, to have all human beings live longer, healthier, happier lives and to have our economy grow and prosper and our standard of living maintained—the only way to do that is to invest where we lead the world and that's in science."

REFERENCES

- Anon (2011) Train wreck, anyone? *Science* **331**: 993
- Binckes J (2010) Rand Paul passes when asked about the age of the Earth (VIDEO). *The Huffington Post* http://www.huffingtonpost.com/2010/06/29/rand-paul-passes-when-ask_n_629185.html
- Cho A (2011) House cuts to DOE national labs would also hamstring industry. *Science* **331**: 997–998
- Johnson B (2009) Stumped by science: Michele Bachmann calls CO₂ 'harmless,' 'negligible,' 'necessary,' 'natural'. *The Wonk Room* <http://wonkroom.thinkprogress.org/2009/04/24/bachmann-harmless-co2/>
- The Huffington Post (2011) Jack Kingston: 'I came from God not from a monkey' (VIDEO). *The Huffington Post* http://www.huffingtonpost.com/2011/01/30/jack-kingston-evolution_n_815909.html
- Office of Management and Budget (2011) *The President's Budget for Fiscal Year 2012*. <http://www.whitehouse.gov/omb/budget>
- US Department of Education (2010) *Highlights from PISA 2009: Performance of US 15-Year-Old Students in Reading, Mathematics, and Science Literacy in an International Context*. Washington, DC, USA: US Department of Education
- US Department of the Treasury (2011) *Debt to the Penny*. <http://www.treasurydirect.gov/NP/BPDLogin?application=np>

Melissa Suran is a journalist in Chicago, Illinois, USA.

EMBO reports (2011) **12**, 404–407.
doi:10.1038/embor.2011.59