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Don't rush to rehabilitate Hwang

Nature's profile of a former fraudster's attempts to regain respectability should not be taken as an endorsement of the researcher's claims.

An article published on *Nature's* website last week has created quite a buzz in South Korea. It details efforts by former Seoul National University cloning specialist Woo Suk Hwang to rehabilitate his scientific career after he was found in 2006 to have been involved in fraud. Some in South Korea are taking the article as a sign that Hwang is now producing great science and is once again lauded by the scientific community. Stock prices of companies with connections to Hwang's work have apparently jumped. It is as if many of the people talking and writing about the article have not read it. They and others can do so now if they wish: it appears as a News Feature on page 468.

As readers will see, the article is not a show of support for Hwang's research. Nor is it an attack. It is the story of a rare event: a scientist attempting with some success to dig himself out from the depths of ignominy. It is a journalistic exercise, not a scientific endorsement. And it was commissioned to mark the ten-year anniversary of the first paper — now retracted — in which Hwang claimed to have created cloned human embryonic stem-cell lines.

The article highlights notes of caution for those who would rush to rehabilitate this disgraced researcher. Most worryingly, Hwang is pushing — with some success — to get recognition that his cells are indeed the world's first cloned human stem-cell line. That is not supported either by independent scientific evidence produced since he published his now-retracted paper, or by evidence from his own laboratory, which fabricated data after tests showed that the cell line was not cloned. Hwang has taken the unscientific path of getting patent offices and court rooms, rather than his expert peers, to judge his scientific claims.

Hwang's position panders to the views of many of his diehard supporters, who treat the matter as if a great scientist's great discovery had been somehow unfairly taken away; as if Hwang lost his reputation on a technicality. Indeed, the whistle-blower who endured persecution to set the record straight about Hwang's research has been portrayed online as a traitor who embarrassed the country, hampered a distinguished scientist and set back the progress of South Korea's biotechnology.

Nothing could be further from the truth. The evidence suggests that Hwang was not a great scientist. His claims to have done cloning work on cows in the late 1990s were backed up with photographs and promoted through political connections rather than scientific publications. What was the contribution to scientific knowledge of his human-cloning work? In May 2013, cell biologist Shoukhrat Mitalipov published results showing that he had finally achieved the human-cloning breakthrough that Hwang had claimed in 2004. Mitalipov told *Nature*: "I don't have much to say about Hwang; his studies in human somatic-cell nuclear transfer were not informative and did not affect me at all." Eggs were given in vain to Hwang's lab by around 120 donors. The potential of Hwang's claimed work was over-hyped even before the work was exposed as fraudulent, especially considering that superior technologies — such as stem cells made from

reprogrammed adult cells — were already in the offing.

The whistle-blower did not cause South Korea to lose anything. There was nothing to lose. What he did was cut short attempts to trumpet overblown and dishonest research. He helped to nip misguided efforts in the bud so that South Korean science could move on.

And it has. Undeterred by the Hwang scandal, the government has invested generously in stem cells and other scientific fields. The country's current work might not be that earthshaking, but great breakthroughs often come when one is neither expecting nor promising much.

If Hwang wants to rebuild his scientific reputation, which he seems intent on doing, and which his scientific colleagues seem willing to accept — some grudgingly — a good start would be jettisoning his patent claims and other legal efforts to be recognized as having created the first cloned human stem-cell line. People are asking, can we trust him? Part of the answer lies in how he resolves this issue. If he wants to start again, he should look there. ■

"The whistle-blower helped to nip misguided efforts in the bud so that South Korean science could move on."

A return to order

Members of the US Congress have taken a much-needed step to restore credibility.

There is big excitement on the US political scene this week with the news that Congress has finally passed a budget to fund the government for the remainder of fiscal year 2014 (see page 461). The good news for US scientists is that support for their work remains strong: most research-funding agencies (with the notable exception of the National Institutes of Health) have seen a partial restoration of funding after the across-the-board cuts mandated last year under the sequester.

But the better news for everyone is the existence of the settlement itself: it marks the first return in years to anything resembling a normal budget process. Given the poisonous partisanship that has dominated US politics in recent years, the simple act of funding the government — achieving what any other country would consider routine — has required gruelling negotiations and rare political courage. Better still, the success of those efforts offers at least some hope that they will be repeated in future years — that the stranglehold of the uncompromising, anti-government, largely Republican minority known as the Tea Party has at last been broken.

Credit for the budget's success goes in the first instance to

Representative Paul Ryan (Republican, Wisconsin) and Senator Patty Murray (Democrat, Washington), chairs of the House and Senate budget committees, respectively. In the aftermath of last autumn's government shutdown, Ryan and Murray negotiated an overall budget figure of US\$1.1 trillion that eases some of the sequester cuts beloved of Republicans while excluding unemployment benefits favoured by Democrats. In the process, they faced down claims of betrayal from both sides.

Arguably, even more credit is due to Representative Hal Rogers (Republican, Kentucky), who chairs the House appropriations committee, and Senator Barbara Mikulski (Democrat, Maryland), chair of the Senate equivalent. They had the unenviable job of allocating the overall budget among specific departments and programmes. These two politicians disagree on almost every issue. But they had the sense and judgement to agree on this: even leaving aside the disaster of the shutdown and the mindlessness of the sequester, Congress cannot keep on funding the government year to year with 'continuing resolutions' that avoid making choices, and instead keep programmes going on a yearly basis just as they were. The result is waste, turmoil and missed opportunities in the agencies, in which demoralized officials are forced to defer long-planned initiatives, hoard the money they do have and spend their days endlessly planning and replanning.

Once Ryan and Murray's overall budget number was in hand, Rogers, Mikulski and their staff worked almost non-stop to agree on allocations. They both had to deal with members of their own parties who wanted to attach amendments promoting this or that pet cause, and plenty of those measures did make it into the final bill. But they managed to fend off the worst of the 'poison pill' amendments that were designed to force the opposite party to vote against the final package — including one that would have blocked the Environmental Protection Agency from

regulating greenhouse-gas emissions to fight climate change.

Finally, credit is due to the rank-and-file members of Congress who passed the budget bill by overwhelming bipartisan majorities — despite threats from staunchly partisan political groups to use those votes against members in the upcoming November elections, when every Representative and one-third of Senators will face the voters.

The problem now is that the current spending agreement runs only until 1 October, the start of fiscal year 2015. If no new overall budget is agreed, the dreaded sequester will return, and with it the automatic, widespread budget reductions totalling roughly \$100 billion every year until 2023. Rogers and Mikulski have vowed to pursue a new agreement as part of their wider intention to continue Congress' return to normal procedure. But in an election year, it is not clear whether they will have enough time. To allow everyone ample opportunity to campaign, the House is scheduled to be in session for only 113 days this year, and the Senate for just less than 200. Nor is it clear how much courage anyone will maintain once the negative campaign adverts start flying.

Ultimately, it may come down to how well individual members of Congress learned the lessons of the shutdown, which sent public-approval ratings for their institution spiralling into the single digits late last year. If memories are short, and members sink back into a miasma of mistrust and gridlock, then sequestration looms.

Instead, if they can return to behaving like rational adults, then there is hope. Perhaps Congress can start making the kind of investments in research, education and infrastructure, such as broadband and smart grids, that both parties say are needed — and that foster the kind of economic growth that both parties say they want. ■

"It may come down to how well Congress learned the lessons of the shutdown."

A question of time

Timekeeping is boosted by the advent of an optical clock based on strontium atoms.

When the history of the twenty-first century comes to be written, one of the most puzzling questions asked will be why, well into the information age, millions of people still paid to dial a number on their phone to find out the time. Almost 80 years after its formation, the UK speaking clock, the world's original telephone time service, remains an essential part of British life. This is despite the near ubiquity of time displays — not least on the mobile phones that people discard to call 123 from a fixed line.

For some people, at some times, accuracy matters. Peaks in the use of the speaking clock come, for instance, on New Year's Eve, or when the clocks are put forward and back by an hour to mark, respectively, the start and end of British Summer Time.

There is another way, at least in Britain. BBC Radio regularly broadcasts the same time signal used to set the speaking clock — affectionately known as the pips. Indeed, it has become as much a feature of some shows as the content planned around it. Time is more than a British institution; it is woven into the cultural fabric of everyday life.

The pips are drawn from an atomic clock held at the National Physical Laboratory (NPL) in Teddington, near London. One of the most accurate in the world, the NPL clock is tuned to the regular bursts of light emitted by caesium atoms when they are excited by microwaves. The clock would lose roughly one second every 138 million years — a sufficient degree of accuracy for a bleary-eyed hour-late commuter who forgot to set their clock the night before, but not accurate enough for some.

In a paper published on *Nature's* website this week, time lords in the United States describe the latest advance in chronometry, and one that is as superior to the atomic pips as those pips were to the mechanical devices they replaced (B. J. Bloom *et al.* *Nature* <http://dx.doi.org/10.1038/nature12941>; 2014). The researchers have built a timepiece based not on caesium but on strontium. More importantly, it uses much higher, optical frequencies. This gives such devices, called optical clocks, greater accuracy than those that rely on microwaves. The new optical clock, for example, would not lose one second even if it were to run for 5 billion years.

It is also extremely stable — another key measure of timekeeping. (Accuracy defines how closely a clock's output matches the desired time signal, whereas stability is a measure of how steady that output is. A clock that loses precisely one second each day is inaccurate but stable, for example.)

The unveiling of the super-accurate strontium optical clock comes just a few months after a related group revealed a device based on ytterbium. Other laboratories across the world have their own designs. Inevitably, the increased precision and reliability of optical clocks are fuelling debate about whether they could be used to set the ultimate time, and redefine the second. (There are no official plans to do so, but plans are afoot to redefine other SI units.) These are heady times for metrology: a World View on page 455 describes attempts to measure another fundamental constant: Big G.

Nature has a particular stake in the race to develop new atomic clocks. Back in January 2003, we published a News Feature that surveyed the scene and tried to predict what would happen (D. Adam *Nature* **421**, 207–208; 2003). Within a decade, the piece suggested, optical clocks could rise to prominence and raise fresh debate about the definition of

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the second. A ten-year event horizon is a staple of scientific journalism, and most promised breakthroughs fail to materialize on deadline. The latest development in atomic timekeeping, by contrast, has arrived bang on time. Well, almost. ■