

CAREERS

TURNING POINT Virologist follows her dream to become an astronaut p.541

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PUBLISHING

Open to possibilities

Opting for open access means considering costs, journal prestige and career implications.

BY STEPHEN PINCOCK

Not so long ago, Mike Taylor gave no thought to open access when submitting research papers for publication. “I just sent them to the well-respected journals,” says Taylor, a palaeontologist at the University of Bristol, UK. “It’s only gradually, really, that it became apparent to me how stupid that was.”

As he started to think more carefully about where he published his work, his contemplation turned into fully fledged advocacy. Taylor would like to see free, unrestricted access to all scholarly papers online. In an article on the website of UK newspaper *The Guardian* this

January, he argued that hiding publications behind a paywall is “immoral” (see go.nature.com/v9fmtm). But within hours of appearing, the article was accumulating comments that laid out caveats that he had not considered.

The point that raised the most ire was Taylor’s argument that scientists no longer need to publish in prestigious journals to boost their careers, which commenters vigorously refuted. Taylor was forced to rethink his position on

that: journal prestige remains important, he realized. “I got quite a lot of criticism from people I respect a lot,” he says.

Early-career scientists face a pressing question: how should they publish to advance their careers at a time when the scholarly world is being shaken up? New options in publishing have highlighted sticky debates related to the impacts of costs on individual researchers and the ethics of business models that can keep cash-poor scientists from accessing data. But many researchers contend that impact factors and other metrics of journal prestige remain crucial — for now.

Over the past 20 years, open-access ▶



THE FUTURE OF PUBLISHING

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► publishing has become a major part of the scholarly landscape. It is now common in astronomy, maths and physics, where most researchers submit their work to the open-access repository arXiv.org before it is published, and is on the rise in the life sciences and other fields. Over the past decade, open-access publishing has increased its share of articles by about 1% a year (see page 425). Around 17% of the 1.66 million articles indexed by abstract and citation database Scopus in 2011 were freely available from journal publishers¹.

Worldwide, more than 200 institutions and 80 research funders require their researchers' work to be open access, according to the Roar-map registry (roarmap.eprints.org). For example, from 1 April, researchers supported by any of the seven UK research councils will be asked to publish their work in a journal that either provides immediate and unrestricted access to the final published version of the paper, or consents to the manuscript being deposited in an open-access repository within a certain time — six months for science papers. The US National Institutes of Health requires that scientists submit final peer-reviewed journal manuscripts arising from agency-funded work to the digital archive PubMed Central, and that those papers are made available to the public within one year of publication.

THE POWER OF PRESTIGE

Not everyone shares Taylor's moral outrage over the need for open access. Many senior researchers have simple advice, especially for early-career scientists: go to the best journal you can publish in. Rob Brooks, an evolutionary scientist at the University of New South Wales in Sydney, Australia, supports open access in principle, but says that career building still relies on established models of prestige. "Journal quality remains the benchmark for that piece of work and that's what people will be assessed by," he says. "Impact factors still pretty much rule. A lot of people — grant committees, administrators and even referees — can't assess quality. All they can do is count or pseudo-quantify. They count the number of papers you've got and count the impact factors of the papers and make a little metric, rather than just reading the papers."

Early-career scientists should be wary about turning away from high-impact journals to publish in open-access outlets with lesser reputations, says Chris Chambers, a neuroscientist at Cardiff University, UK, and an academic editor at *PLoS ONE*, who was among those who critiqued Taylor's post. "On the one hand, this is a noble act that is impossible not to applaud," he says. "On the other hand, there is a risk that such researchers deal themselves out of the game, being overtaken in the race to senior positions by more careerist colleagues." But going for high-impact journals need not rule out open-access, says Peter Suber, director of the open-access project at Harvard University in Cambridge, Massachusetts. He suggests

looking through the Directory of Open Access Journals (www.doaj.org) for those with editors and published authors who are familiar and respected in the field. Suber also points out that publishing in a subscription journal does not mean that an article cannot be made freely available online later; most allow pre- or post-print archiving in open-access repositories such as those listed at www.andoar.org.

The open-access journal *eLife* published its first articles only last October, but can already boast a measure of prestige. Although it is too early to gauge its impact factor, the journal seems likely to benefit from the reputation of its founders, research funders the Wellcome Trust in London, the Howard Hughes Medical Institute in Chevy Chase, Maryland, and the Max Planck Society in Munich, Germany. "*eLife* is ... an obvious example of a brand-new journal with no branding, no standing in the world," says Peter Binfield, publisher of the separate open-access journal *PeerJ*, based in San Francisco, California, "and yet it's clear that this is a good place to publish, because it's got some big-name backers."



"If you come to the Wellcome for a grant, funding decisions are based on the intrinsic merit of the work, and not the title of the journal."

Robert Kiley

published." Kiley points to the policies of the UK programme for assessing research quality, the Research Excellence Framework, which stated in July 2012 that no grant-review sub-panel "will make any use of journal impact factors, rankings, lists or the perceived standing of publishers in assessing the quality of research outputs" (see go.nature.com/xgsses).

In principle, open-access publishing can connect researchers to a wider readership. Some studies suggest that articles in open-access journals or repositories are accessed more often and reach a broader audience than those in subscription-only journals. Whether this translates into higher citation rates is up for debate. In 2010, a meta-analysis found 27 studies showing that open-access articles had more citations than papers behind paywalls — up to 600% more, depending on the field — and

four that found no open-access advantage².

Some journals, including *PLoS ONE* and *PeerJ*, tally metrics such as the number of people who have clicked on each paper, and the paper's visibility on social-media websites such as Twitter and Facebook. Ross Mounce, a palaeontology PhD student at the University of Bath, UK, thinks that such alternative metrics are already beginning to free researchers from conventional measures of prestige. "I think if you have faith in your own work, then you can publish it wherever," he says, countering comments on Taylor's article. "And as long as people can access it and read about it and know about it, and can discover your work, then that's all you need."

WEIGHING THE COST

Many researchers contemplating open access are concerned about having to pay publication costs. As of August 2011, about one-quarter of open-access journals said that they charged article-processing fees; in 2010, those fees ranged between US\$8 and \$3,900, with the average around \$900 (ref. 3).

According to Carl Bergstrom, an evolutionary biologist at the University of Washington in Seattle, there tends to be a positive correlation between an open-access journal's fees and its score in a system he co-developed that rates journals according to the number of citations they receive, with citations from highly ranked journals weighted more heavily. However, not all expensive journals have high ratings; an interactive tool shows that there is a great deal of variation (www.eigenfactor.org/openaccess).

In any case, Suber notes that only a little over 10% of article-processing fees are paid out of pocket by authors⁴. "Most of the time, those fees are paid on behalf of the author by the author's employer or the author's funding agency," he says. Scientists should check with their funding agencies directly, but open-access publisher BioMed Central keeps an incomplete list of those that will pay (see go.nature.com/pqjxoi). And some publishers reduce or waive fees for researchers who cannot afford to pay.

PeerJ, which published its first papers last month, has taken a completely new approach to cost. Rather than charging a fee per paper, it offers lifetime membership, ranging from \$99 for one publication per year to \$299 for unlimited publications (see *Nature* 486, 166; 2012). All memberships include the right to post articles on a non-peer-reviewed preprint server. For a paper to be published, all authors must be members (or at least 12 authors must be, for papers with more). "We've deliberately tried to strip out all the extraneous costs from the system to make it as efficient and cheap as possible from a researcher's point of view," says Binfield. "Then we've layered on this different business model, which is a payment per person per membership rather than payment per publication."

Bo-Christer Björk, an information systems scientist at Hanken School of Economics in

Helsinki, says that the number of subscription journals offering open access for a fee has doubled in recent years, and currently stands at more than 4,300. However, just 1–2% of eligible authors take up that open-access option⁵. Björk argues that the high costs are a deterrent — about \$3,000 is typical. “There are, however, a few publishers and individual journals with a much higher uptake,” he says. For example, *Nature Communications*, which was launched in 2010 by Nature Publishing Group (NPG), is a multidisciplinary journal that takes this hybrid approach. When it started, about half of authors chose the open-access option. But those numbers have fluctuated, says James Butcher, associate director of open publishing at NPG, and in the past six months about 30% have chosen open access. Butcher has not collected data to explain the trend, but speculates that it might be attributable to the journal’s relatively high fees of around \$5,000, to changing author demographics or to a general drop in interest after early excitement about the open-access option.

Chambers suggests that paying a fee to publish in a hybrid journal is a good way to achieve both accessibility and prestige. “The key factor is whether the researcher has the funds available to do so, and whether the funding agency requires papers to be open access,” he says. But where funds have not been set aside for article-processing charges, and young scientists would need to spend research money, Chambers advises against consenting to high publishing fees.

“As a young investigator you have to do what’s economically viable,” says Stephen Macknik, a neuroscientist at the Barrow Neurological Institute in Phoenix, Arizona. Paying an article-processing charge for a reputable open-access journal may be a good middle ground for young researchers, he says.

But scientists shouldn’t sacrifice funding that was meant for research. “To maximize their competitiveness it is vital that young researchers maintain a productive profile of high-quality research, and this means using research funds to do as much high-quality research as possible,” says Chambers. “It falls to the more senior scientists to change the system.” ■

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TURNING POINT

Kate Rubins

After 15 years in infectious-disease biology, Kate Rubins jumped at the chance to fulfil her childhood dream of becoming an astronaut.

Did you always want to become an astronaut?

As a kid, I really did, but various people pointed out that it was not the most realistic career choice. When I was 16, my dad took me to a DNA conference at the Exploratorium science museum in San Francisco, California, and I was captivated by this way of looking at biology and by the discussions of bits of nucleic acid that could make us sick.

How did you come to focus on research related to public health?

As an undergraduate majoring in biology at the University of California, San Diego, I worked on infectious diseases at the nearby Salk Institute for Biological Studies. I decided to do graduate studies in virology at Stanford University in California because it had a hospital, which made working on clinical applications easier. I was looking at immune responses related to smallpox and Ebola, so I flew to Maryland every few weeks to work in a biosafety-level-4 lab, which handles the most dangerous microbes. Then I shipped the data back to Stanford.

You built a lab quickly after your PhD. How?

I decided to skip the postdoc. The Whitehead Institute for Biomedical Research in Cambridge, Massachusetts, had a fellows programme that was akin to a junior faculty position with few teaching responsibilities. That seemed to be a good fit. My interests had shifted to the genomics of infectious disease, and I started laying the groundwork to study monkeypox infections in the Democratic Republic of the Congo. With a lot of hubris, I started my own lab. It was amazing — the Whitehead gave fellows a lot of leeway. In three years, I had secured enough money from the US National Institutes of Health and the departments of defence and homeland security to increase the lab to 14 people.

Why did you apply to become an astronaut?

It was one of those childhood dreams that I couldn’t let go of. I thought that NASA didn’t take biologists and so nothing would come of it, but I knew I would regret it if I did not apply.

How did it feel to have to dismantle your lab after NASA accepted you?

Joining NASA was very exciting, but it was the hardest decision I have had to make in my life. I had been working towards one goal for



NASA

more than 15 years. I had been very specific about what I wanted to do with my career, and this was completely different. I was concerned about my lab members— wonderful people whom I couldn’t leave high and dry. I wanted to make sure that they were able to continue their research. In the six weeks that I was given to shut down my lab before heading to the Johnson Space Center in Houston, Texas, for training, I found good labs for everyone to join.

Three years later, do you still feel that joining NASA was the right decision?

Yes, I am really happy. I have learned a whole bunch of new skills, including how to speak Russian, conduct a space walk and fly a supersonic jet. The whole time at NASA has been a huge turning point for me.

Are you able to do research?

Yes, but it is different from having my own lab. I don’t get to say, “I want to do this”; they select the best peer-reviewed research. I bring an operational perspective to the experiments that match up with my expertise. My time in biosafety labs taught me to work in a high-pressure environment, which provided skills that I am using at NASA. I am working on experiments from immunology to bone loss in microgravity.

Will you go into space?

Fingers crossed. I am in the newest class of astronauts. The International Space Station will be operational until 2020, and perhaps 2028, so there is a chance. NASA is also building a space-launch system to go beyond low-Earth orbit. Whether either of those overlaps with my time frame is unknown, but it would be fantastic. I will go wherever NASA sends me. ■

INTERVIEW BY VIRGINIA GEWIN