



Annual Review 2017

Research in progress



Part of Springer Nature

In 1999 BioMed Central made high quality research open to anyone who wanted to access and could use it. By making open access sustainable, we changed the world of academic publishing.

We didn't shout about it, we preferred to concentrate on how we could make it work better, to better serve research. To create and test new, innovative ways to help authors. Our pilot projects became open research standards.

The same pioneering spirit that inspired us then continues to inspire us now. We pride ourselves on continually improving our author services and the quality of our publishing.

Always questioning.

Always listening.

Never settling, always progressing.

For us innovation is an attitude not an activity.

It's how we remain as forward thinking as the communities we serve. And it's how we continue to make small gains that can help research have a huge impact. It's our commitment to keep discovering and to help others do the same.

Now as BMC and as part of Springer Nature, we extend this commitment to communities and disciplines beyond biology and medicine, and around the world.

Research in progress.

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THIS IS YOUR
CONFERENCE!



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Introduction

Rachel Burley, Publishing Director

The past 12 months have been an exciting time for BioMed Central. We've kick-started initiatives to push the publishing industry forward, listened, learned, taken action on feedback from our communities, and refreshed our identity to reflect that we have always been, and continue to be, a progressive presence in the publishing world.

We have moved from BioMed Central, the open access publisher, to simply BMC, and renewed our commitment to research in progress and innovation. We benefit from being part of Springer Nature, our parent company which advances discovery by publishing robust and insightful research, supporting the development of new areas of knowledge, making ideas and information accessible around the world, and leading the way in open access.

In 2017 we have enabled researchers to publish 70,000 open access articles, contributing to over five million article downloads. Our proactive approach to promoting open access research has further increased the visibility and reach of our authors' research.

This year we have launched trials of new peer review systems to see if there are ways to make the process more robust, and science more reproducible. Based on the discussions at the 2016 SpotOn conference, BMC and Digital Science issued a report¹ that examines how peer review can be improved for future generations.

This 'Research in Progress' report aims to showcase what BMC represents. By celebrating our successes of the past year and informing you of our future plans, we want to show you that BMC shares the same spirit and ambition as the researchers we partner with, and that we are committed to being as forward thinking, fast paced and progressive as the communities we serve.

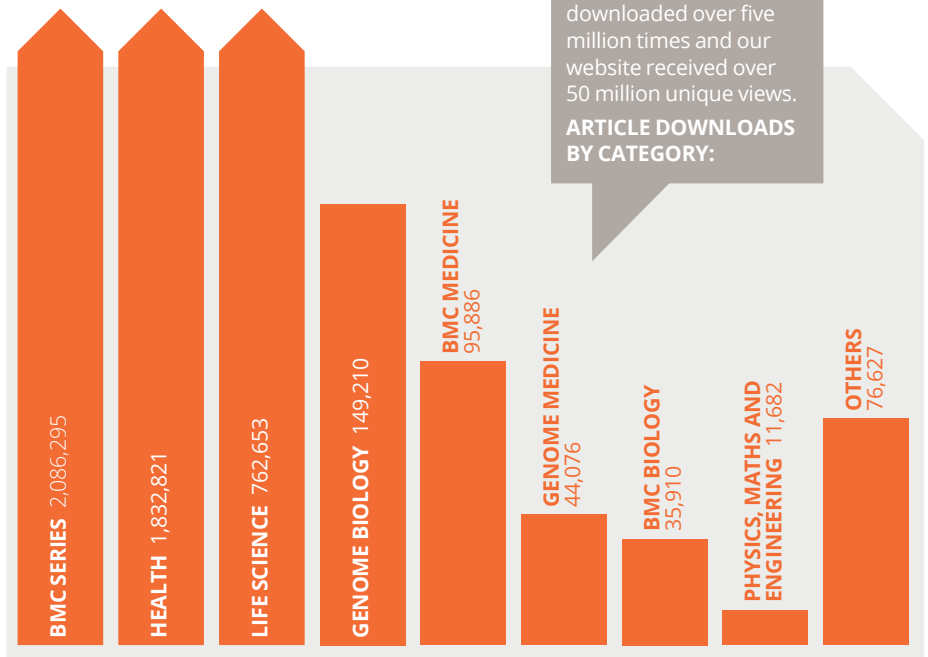


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BMC in numbers

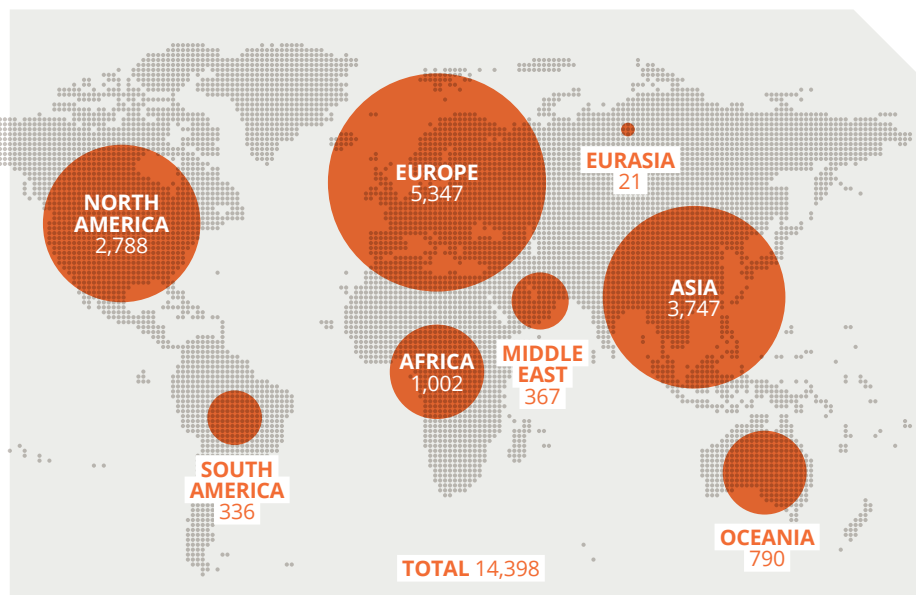
About our journals

BMC publish a diverse range of journals covering biological sciences, business and commerce, Earth and environmental sciences, health sciences, humanities and physical sciences. For the period July 2016 to July 2017, BMC published nearly 70,000 open access articles in 375 journals. That's 70,000 articles that are freely accessible to anyone in the world, whether they are a researcher, a clinician, or just an interested member of the public.



In 2017, articles published in BMC journals were downloaded over five million times and our website received over 50 million unique views.

ARTICLE DOWNLOADS BY CATEGORY:



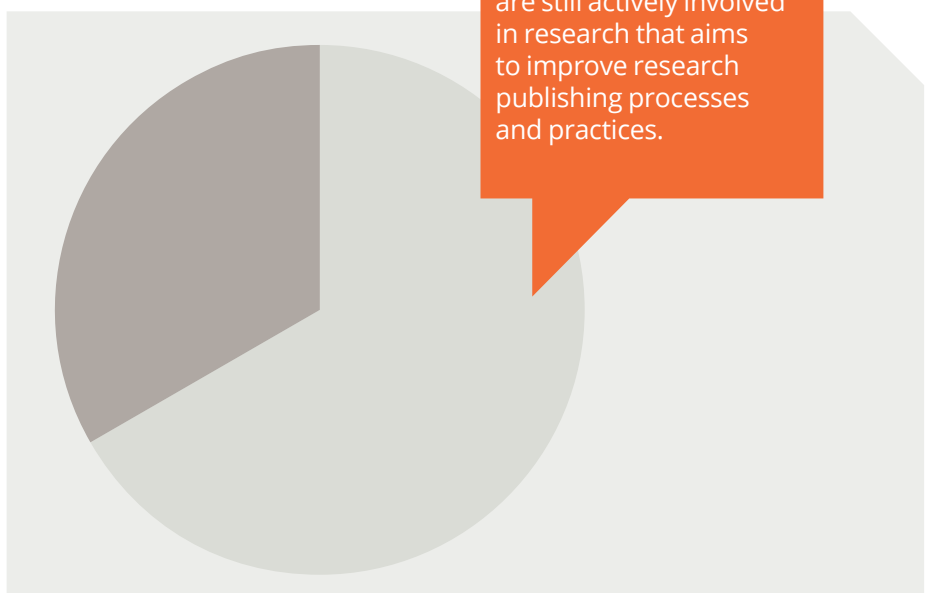
About our authors

For the period July 2016 to July 2017, BMC published the work of over 86,000 distinct authors from around the world.

This graph shows where corresponding authors published in *Genome Biology*, *Genome Medicine*, *BMC Medicine*, *BMC Biology* and the BMC Series are based:

About us

BMC employs 170 publishing staff at offices in London, Berlin, Beijing, Shanghai, Seoul, Tokyo, Hong Kong, Heidelberg and New York. We employ a diverse range of people with varied backgrounds but we are proud to attract staff that have worked in research themselves and understand the needs of the research community.



What you told us this year

Listening to your feedback

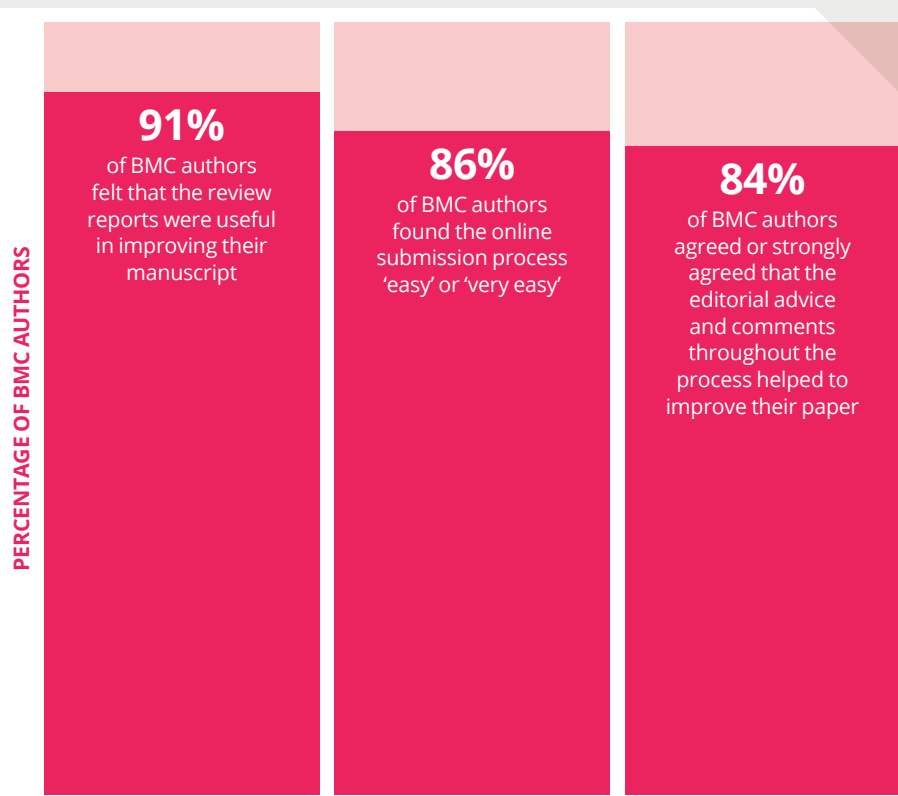
At BMC we are always looking for innovative ways to improve the publishing process for our authors. After articles are published, we invite the authors to rate their experience through our Author Satisfaction Survey. Over the last 12 months* 84% of BMC authors rated their overall publication experience at their BMC journal as 'excellent' or 'good'. Some highlights of what we have learned from our authors so far this year are detailed in the chart (right).**

Overall, our authors were most positive with the production of their research, with 94% of authors rating the presentation of their article online 'excellent' or 'good', whereas speed of publication process received the least positive result, with 64% of authors rating it 'very quick' or 'quite quick'.

Based on these results, we continue to take steps to improve our publication speed while maintaining our high standard in areas we excel in.

*Based on surveys sent out from July 2016 – July 2017 (n=4,041)

**Based on surveys sent out in 2017 (n=1,859)



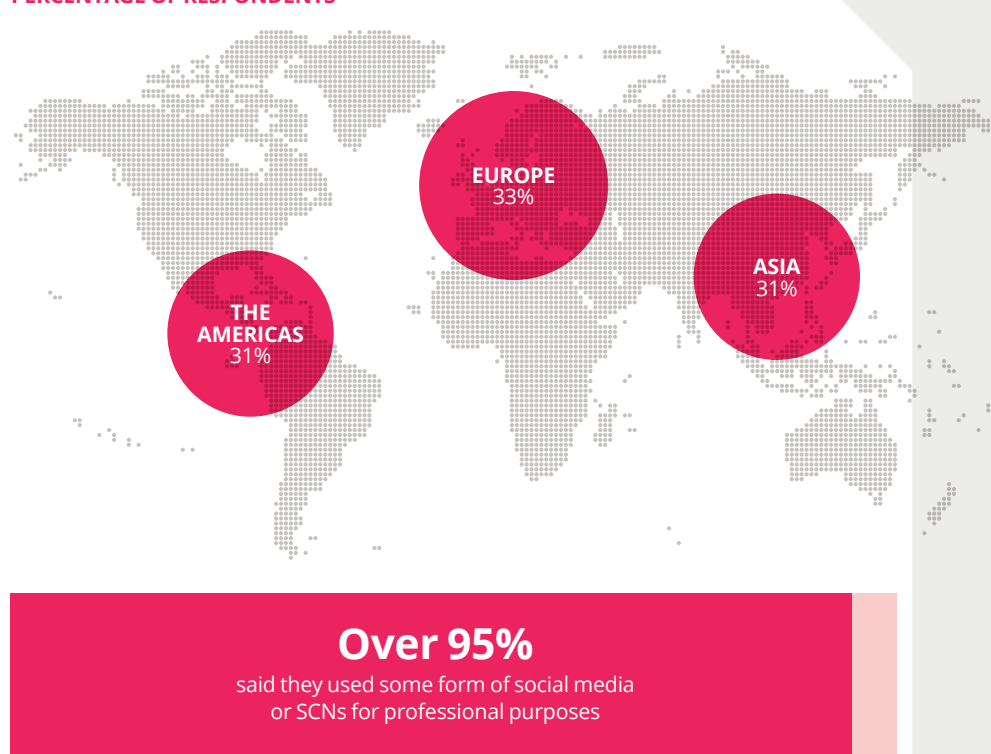
How researchers engage through social media

In February 2017, we conducted a global survey to better understand how social media and Scholarly Collaboration Networks (SCNs) such as Academia.edu or ResearchGate are used within academia to support research activity. Over 3,000 researchers from all over the world completed the survey, with the largest groups of respondents from Europe, the Americas and Asia (see graph).

Social media or SCNs were used by respondents as sources to discover new research content, network and collaborate with other researchers, promote their own work and share relevant research content. People who used Twitter and Facebook shared a significantly higher proportion of scientific content than any other platform.

We are using the findings from the survey to support our approach to social media, discussions on the value SCNs provide for researchers, and how we can best shape our services to meet the needs of the academic community.

PERCENTAGE OF RESPONDENTS



Preferred communication channels by researchers

In 2017, we ran an online survey to increase our understanding of what communication channels researchers use both personally and professionally, and in particular to understand what we could be doing to tailor our communications to use the right channel mix to reach researchers.

From this, we learned that we need to improve our communication with our researchers and work to ensure we only share relevant and useful information in a personalised way, and this is what we will continue to work to do. We also learnt that although many are using social media and different websites to keep up to date with news and information from publishers, email remains the preferred way the majority of people want to hear from us, so this is where we are concentrating our efforts to improve our communications.

Other findings included:

- Email, websites and search engines are used most commonly for professional purposes
- There are regional differences in professional communication channel usage
- Email and journal/publisher websites are used most commonly by researchers to keep up to date with latest information from journal/journal publishers. Offline channels are also commonly used
- Authors place significantly higher importance on receiving relevant articles from publishers than any other materials

Data from this survey is available on Figshare.²

Characteristics of researchers: decision psychology to submit to a journal

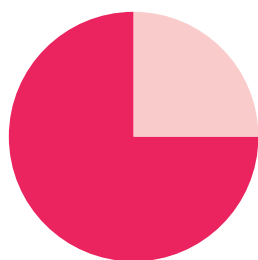
Unsung Heroes of Science³ – an online interactive quiz taken up by c. 4,000 participants – was run to create a statistical cognitive model for the global research community of how researchers choose the journals they publish in. The model relates contextual cognitive, personality types to the themes that influence their thinking and places them into thematic groups. Unsung Heroes was built based on previous author research carried out by BMC that determined that the two primary drivers for a scientist's choice of journal were reputation and relevance.

We learned that researchers determine a journal's reputation by considering the reputations of the scientists who they know have published in the journal. Ultimately, they assess this reputation by unconsciously considering how well the researchers are matched to their notions – often formed at an early age – of what 'being a good scientist' means. We found that researchers can be categorised into four main personality types: Creative, Collaborative, Ethical and Technical. We also learnt that:

- The vast majority of our audience possess traits that fall into three themes: Creative, Ethical and Collaborative
- Personality variations relate to achievement focus, altruism and anxiety
- There are statistically significant variations in theme proportions based on parameters such as seniority, geography, subject area and publication rate
- The most significant variation in personality is attributed to geography

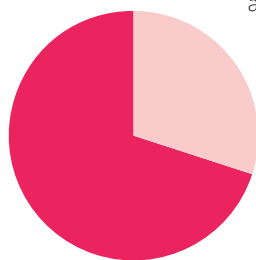
With the findings from this research, we aim to get an insight into the psychology of our authors so we can better improve our journals, services, and communications to meet their needs.

PERCENTAGE OF RESPONDENTS



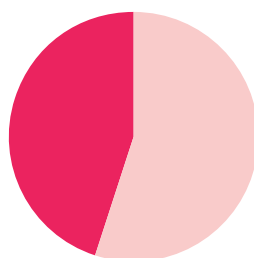
75%

of respondents attend conferences at least once a year



Over 70%

of respondents feel positively about journals and/or journal publishers sharing relevant articles and relevant scientific news, which are the main content types we share



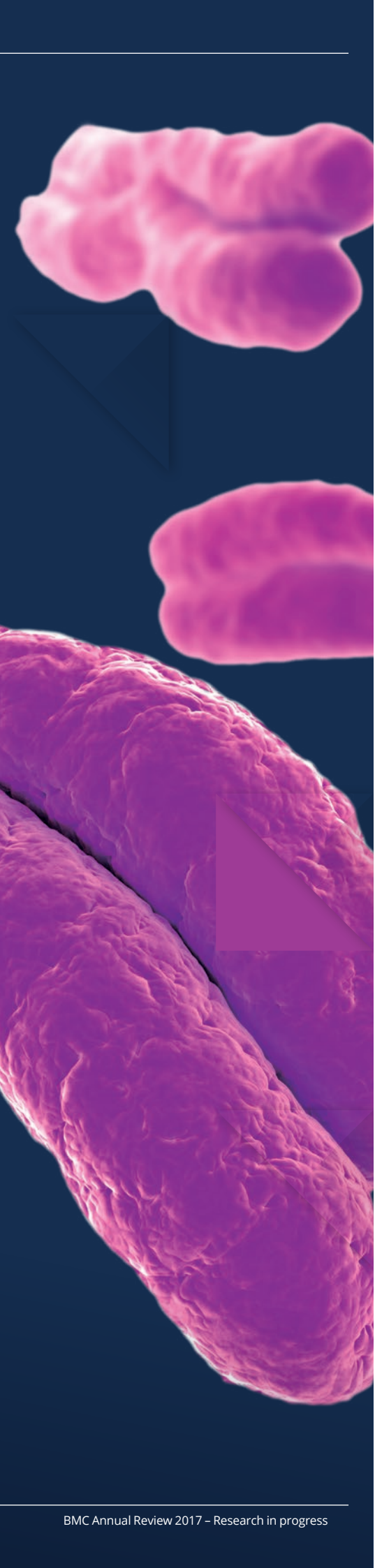
Only 45%

of respondents rated publishers as 'very good' or 'good' in terms of sharing information. There is room for improvement across all areas, but particularly in personalising communications and offering relevant promotions and services



Research in progress

In 1999 BMC made high quality research open to anyone who wanted to access and could use it. By making open access sustainable, we changed the world of academic publishing.



We didn't shout about it. Instead, we chose to concentrate on how to serve our communities better. To create and test innovative ways to help researchers, to better communicate their research results.

Last year, we reflected on our purpose and values. With input from authors and editors, we concluded that BMC is committed to be as forward thinking, fast paced and progressive as the communities we serve. While all of us at BMC demonstrate these values every day in everything we do, we recognise the need to tell our communities how BMC will continue to help them achieve their goals.

It was time to give BMC a fresh visual identity that is as innovative and progressive as our mission.

We are now ready to talk about the initiatives we are undertaking to further open access, to help our authors publish and promote their research with ease and integrity, and to advance discovery. We are also delighted to extend this commitment beyond biology and medicine.

If you haven't already, you will start to notice changes to our website and materials, including new logo, colours, images and tone of voice. We are rolling out the new identity phase by phase, giving time to consult with and gather feedback from our editors and users. This helps us ensure the best approach is taken every step of the way, staying true to our spirit of always listening and always progressing.

Accepting Registered Reports

One example of how we progress research publishing is Registered Reports.⁴ In 2017, BMC announced that several journals would begin accepting submissions in the Registered Reports format. This innovative approach to publishing allows authors to submit their rationale and methods for peer review before any experiments are conducted. Articles that pass that stage of peer review will be accepted in principle meaning that, as long as the study is completed in accordance with the pre-registered methodology, the article will be published following a second round of peer review.

Registered Reports shift the emphasis from research results, to the scientific questions being asked and the strength of the study design. The goal is to make it easier for high-quality research to be published regardless of the outcome, allowing researchers to take a proactive approach towards improving transparency and reproducibility. Authors will also benefit from having their experimental designs peer reviewed, providing the opportunity to respond to expert feedback prior to conducting experiments.

In April, *BMC Biology*⁵ became the first dedicated biology journal to accept Registered Reports, followed in August by *BMC Medicine*⁶ and *BMC Ecology*.⁷

Chris Chambers, Chair of the Center for Open Science Registered Reports Committee, said: *"...this is a great step forward for reproducibility and transparency in the life sciences. The Registered Reports initiative minimises bias by embracing the simple philosophy that the results of a scientific study should be irrelevant to whether or not the study gets published."*

Experimenting with new ways to do peer review

BMC was one of the first publishers to truly open up peer review, and this year we have led on new initiatives to further improve the process. In the past year, *BMC Psychology*⁸ launched the first ever randomized controlled trial to find out if a 'results free' peer review process can help reduce publication bias. 'Results free' means that reviewers of research manuscripts submitted for publication will not be able to see the results or discussion sections until the end of the review process. It is thought that this could ensure the research is judged on the strength of a study's methods, and the question it is addressing, rather than the results or outcome of the study.

The trial started with an initial pilot phase where the first 10 articles where authors opted in, went through the 'results free' process to show that the procedure is feasible and efficient. Following the pilot, a randomized controlled trial will start where authors who opt in will have their manuscript randomly assigned to the 'results free' or normal peer review process.

In June, *BMC Psychology* published the first article⁹ that had gone through the trial. Dr Zorana Supan, author of the study from the University of Cambridge, said: *"Our experience of the review process was positive. It seemed like a more scientific approach to peer review with the paper judged on the question asked and the methods used to address the question."*

Dr Katherine Button from the University of Bath, and advocate for improving the transparency of research, said at the time: *"The current system favours publication bias because significant results are seen as more important to the scientific record by publishers, academics and the systems in place to measure their performance. This new trial should at least begin to address one area where publication bias arises."*

SpotOn: Conference and report

In November 2016, BMC and Digital Science hosted SpotOn London, a one-day conference that brought together individuals across various communities including research, publishing, funding, communications, technology and policy to discuss the question: 'What might peer review look like in 2030?' The conference program was designed with the help of the research community to explore all angles of peer review and encourage collaboration on feasible and innovative ways to improve it.

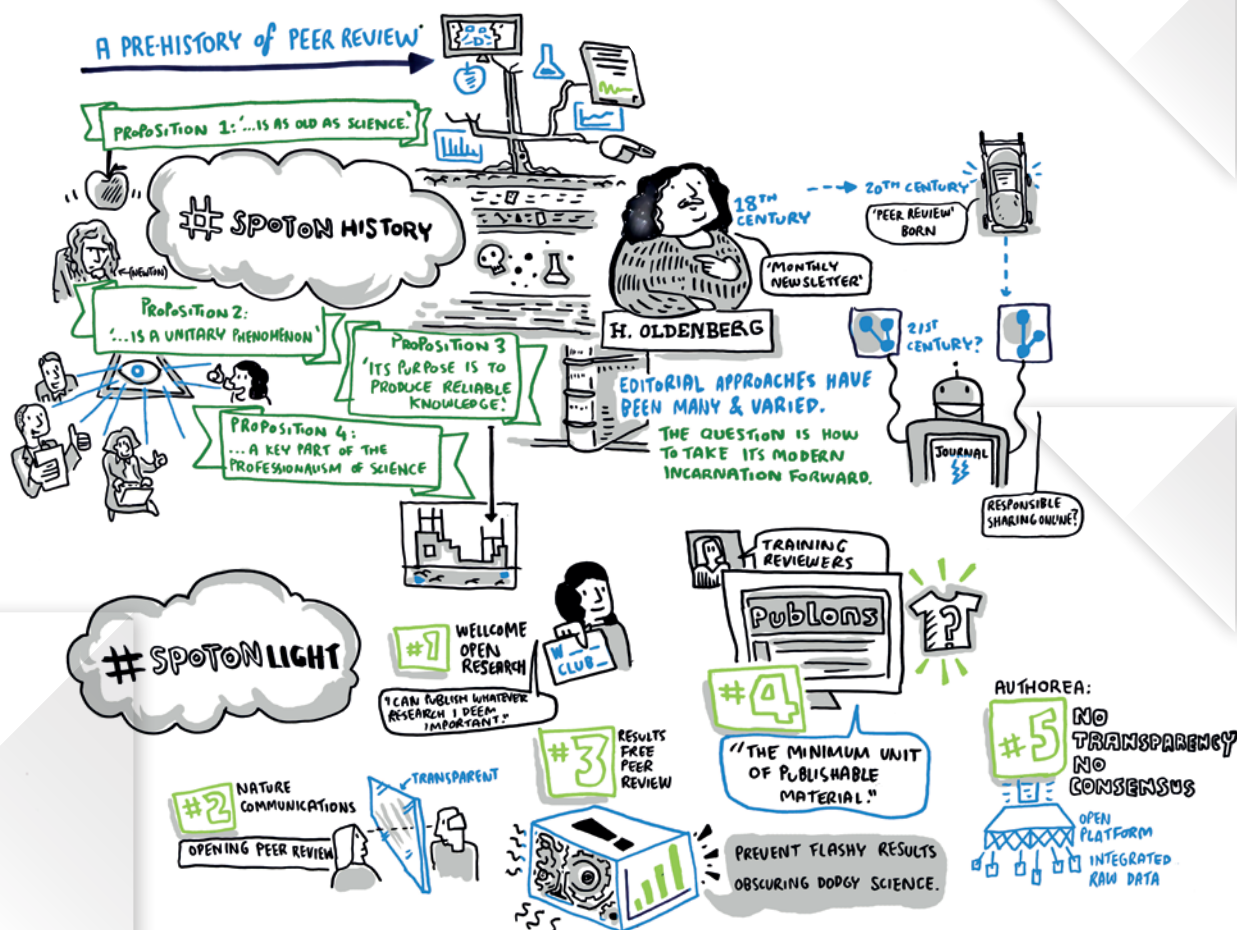
Based on the discussions at the conference, BMC and Digital Science issued a report¹⁰ examining how peer review can be improved for future generations. The report offers key recommendations to the academic community that include finding and inventing new ways of identifying, verifying and inviting peer reviewers, investing in reviewer training programs, and recognizing reviewers. The report concludes that in order to affect real, industry-wide improvements, publishers, researchers, funders and institutions need to be willing to experiment with different models of peer review, particularly those that increase transparency, encourage more diversity in the reviewer pool, utilize Artificial Intelligence (AI) and support training and mentoring.

SpotOn17 will be held at the Crick Institute on Saturday, 18 November 2017, hosted by BMC, Nature Research and Digital Science. Focusing on the tools and skills that make a great researcher, attendees will be invited to explore questions such as: What skills should be taught to academics, and who should be teaching them? What is the best way to make sure that we are developing 'open' skills, and how do we facilitate more effective collaboration?



By the end of 2017, the way we describe our journals will become less reliant on the Impact Factor and we will show more alternative metrics, and data, which scientists can use to make their own informed choices about where to publish.

Image © Ludic Creatives
Illustration commissioned for SpotOn Conference 2016



#SPOTON[2016]

WELCOME! ...

THIS IS YOUR CONFERENCE!

HOW CAN WE IMPROVE PEER REVIEW?

MORE ETHICAL?

MORE ROBUST?

COMPLETELY TRANSFORMED BY TECH?!

DEEP LEARNING NEURAL NETS

101101101

110011010101101

#SPOTON POETRY

SCIENTISTS

POETS

BEAUTY

TRUTH

INTER-DISCIPLINARITY!

A CAT IS AS BIG AS A CAT

TAUTOLOGY!

"POETS CAN USE THE LANGUAGE OF SCIENCE TO EXPRESS BEAUTY."

"IF DAVID BOWIE WERE A SCIENTIST..."

IF WE PEER REVIEW POETRY, ARE WE REVIEWING VALIDITY, PHILOSOPHY, SOUNDNESS OR LITERARY QUALITY?

WHAT MIGHT PEER REVIEW LOOK LIKE IN 2030?

RETRACTION WATCH:

#SPOTON RW

"PUBLISH OR PERISH"

DRIVES BAD PRACTICE & ENABLES PREDATORY JOURNALS.

"MORE & MORE LAWYERS ARE GETTING INVOLVED"

ISSUES SURROUND IMAGE MANIPULATION

MOST RETRACTORS ARE MEN

SO MEN ARE EITHER REALLY GOOD AT FINDING OR AT CATCHING FRAUD! (OR BOTH)

COUNTER-MEASURES?! (A.I. IMAGE RECOGNITION?)

"RETRACTION ISN'T THE BEST MECHANISM TO CLEANSE THE LITERATURE."

AUTHOR: FORMAL TRAINING NEEDED?

REVIEWER: (JUNIOR POST-DOC?)

AUTHORS SHOULD SET EXPECTATIONS?

INCENTIVES? EG: PAY?? KUPUS

#SPOTON TRAINING

AS "TRAINING STANDARDS": DEEP END

REVIEWER

(THE USUAL PROCESS)

BECAUSE PUBLISHERS ARE ASKING RESEARCHERS TO REVIEW FOR FREE, SHOULD THEY PROVIDE TRAINING?

EDITORS SHOULD GIVE BETTER FEEDBACK TO REVIEWERS!!

WHAT ABOUT A FACILITY FOR ASSESSING QUALITY AS WELL AS QUALITY?

2 FUNCTIONS:

• VET • IMPROVE

"DOING SCIENCE"

#SPOTON ETHICS

REVIEWING BY

IMPACT?

SOUNDNESS?

RESEARCH INTEGRITY

MOVING FROM TRUST-MODEL TO VERIFICATION-MODEL

OPEN

- I.D. - REPORTS - PARTICIPATION

OPEN-NESS LEADS TO ...

ACCOUNTABILITY?

WRITING IT UP

RESEARCH INTEGRITY

SHARING KNOWLEDGE

TAKE HEED FROM THE MEDICAL MODEL

PATIENT CENTRICITY

WON'T ALL OUR DATA BE 'OUT THERE' ANYWAY?

READY FOR MINING BY 'DATA PARASITES'?

IN THIS ERA OF CONSUMER REVIEWS & FEEDBACK, SHOULDN'T IT BE EASY TO GET PEOPLE TO DO PEER REVIEW?!

SO WHAT WILL IT LOOK LIKE BY...

2030

DON'T THE OPEN-NESS OF PEER REVIEW WITH PRE-PRINT LET PSEUDO-SCIENCE IN THROUGH THE BACK DOOR?

SCIENCE CASTLE

OPEN

THE ROLE OF PUBLISHERS IN THE PRE-PRINT ERA.

DISAPPEARING?

AND THE ROLE OF JOURNALISTS

STILL RELEVANT AS MEDIATOR THAT ADDS VALUE?

CLIMATE CHANGE

TRAINING

#SPOTON PP

E.G. ARXIV

IS IT DANGEROUS FOR THE PUBLIC TO SEE SCIENTISTS ARGUING IN PUBLIC?

+ CONNECTED + EXPOSED

RESEARCH

#6

SAM ILLINGWORTH

POETRY ABSTRACTS

DE-JARGON!

EFFECTIVELY COMMUNICATE TO NON-EXPERTS!

HOW TO MAKE IT USEFUL TO EXPERTS? (AS WELL)

Staying social

Discovery and discussion

Social media gives authors, readers and others the opportunity to discuss and discover research. The BMC Facebook page¹¹ has over **55,000 likes**, and is an especially effective platform for disseminating videos of research. On Twitter,¹² BMC has over **47,000 followers** and many of these are influential users in research, policy or open access. Several BMC journals also have a dedicated Twitter presence, helping them engage with specific audiences. These networks are growing globally, and BMC channels are growing by about 20% each year.

Engaging the scientific community

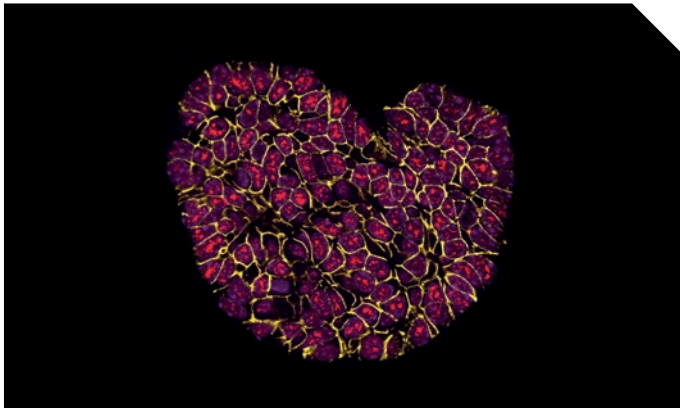
In the past year BMC has launched a new BMC photo competition and worked with *BMC Ecology*¹³ and *Breast Cancer Research*¹⁴ to help promote two image competitions aimed at the scientific community. Submitted photos were judged by other researchers in the field and the winning images were shared through the BMC blog network, social media channels and outreach to the science media.

BMC Ecology Image Competition

In August, BMC Ecology¹⁵ announced the winners of its fifth annual image competition, which include some stunning photos that range from close-ups capturing the animated life of insects to aerial views of vast landscapes.

The overall winning image by Ana Carolina Lima, University of Aveiro, Portugal is a photo of giant South American turtles (*Podocnemis expansa*).

The selection of winners and highly commended images truly reflect the variety of research in progress in the field and they captured the imagination of the international media, appearing in *The Guardian*,¹⁶ *The Sun*¹⁷ and *Daily Mail*¹⁸ in the UK, *IFL Science*¹⁹ in Canada, and *Smithsonian.com*²⁰ in the US.



Highlights

from BMC journals in 2017

BMC Research in progress photo competition

Earlier this year we proudly announced that BioMed Central is becoming BMC.²¹ Firmly believing that our research communities share our enthusiasm for innovation, science and progress we launched our first ever “Research in progress” photography competition. We were looking for inspiring images reflecting curiosity, integrity and innovation across four categories: people at work, close-ups of equipment, plants, animals and microscopy.

Winning image

“I Heart Research” – Sarah Boyle, Centre for Cancer Biology, Adelaide, South Australia.

This photo shows a fluorescently labeled mouse mammary tumor produced by scientists studying the progression of breast cancer. The red color labels the active form of a protein, as cancer develops the levels of this protein may increase.

Runner up

“The Power of Life” – Yuan Xiao Wei, China Agricultural University.

This photo shows cucumber seeds growing in a petri dish. This experiment tests how well seeds germinate and how fast they are likely to grow and establish crops, which are important factors in cucumber breeding.

The winning image, runner up, highly commended and special selection images have been released²² under a Creative Commons Attribution 4.0 License.



Images, clockwise:

Image © Sarah Boyle, Centre for Cancer Biology, Adelaide, South Australia
I Heart Research

Image © Yuan Xiao Wei, China Agricultural University.
The Power of Life

Image © Ana Carolina Lima, University of Aveiro
Podocnemis expansa

Giving our authors a voice

The BMC blogs network has always been a platform aimed at giving authors the space to tell great stories about their research. Online since 2007, the network has grown by leaps and bounds, and this past year has seen some of the biggest successes in its lifetime with visits to the blog now exceeding 100,000 every month. Between July 2016 and July 2017, over 650 blogs were published.

Here be ruby seadragons! New species seen in the wild for the first time

In January 2017, research published in *Marine Biodiversity Records*²³ described the first live record of the ruby seadragon, *Phyllopteryx dewysea*, a species never before observed in the wild.

News of the research was widely reported internationally by almost 800 media outlets, from *New Scientist*,²⁴ to the *New York Times*.²⁵

It was tweeted by novelists J.K. Rowling and Margaret Atwood.

At least 42 percent more people will need palliative care in England and Wales by 2040

In May, a study published in *BMC Medicine*²⁶ found that the number of people requiring palliative care over the next 25 years is likely to increase substantially, requiring a shift in healthcare priorities in England and Wales.

Simon Etkind, King's College London, co-author of the study said: “Thanks for your help with the press release and dissemination, we're delighted to have had so much coverage.”

Co-author Irene Higginson added: “Great it did so well, and thanks for all your help.”

These are but two examples of how the work of our communications team can help authors achieve greater visibility for their research – a service that is appreciated by our authors.



Image © Zoe Della Vedova

A ruby seadragon *Phyllopteryx dewysea* that washed up on the Point Culver cliffs in Western Australia.

Our commitment to improving how research is valued and measured

We want our authors' research to be as widely read, cited, and talked about as possible and we have a real interest in how academia measures the impact of research. The Impact Factor (IF) is the traditional and most widely used method for gauging the quality of journals. However, as a measurement of the overall citation of all articles published in a journal, the Impact Factor cannot tell you how likely it is that your article will be downloaded by your peers, shared on social, or read by policymakers.

In April, BMC signed the San Francisco Declaration on Research Assessment (DORA).²⁷ By doing so we commit to DORA which recognises “...a pressing need to improve the ways in which the output of scientific research is evaluated by funding agencies, academic institutions, and other parties.” Signing DORA means that we pledge to greatly reduce emphasis on the journal Impact Factor as a promotional tool by presenting the metric in the context of a variety of journal-based metrics.

Looking to the future.

As we look to the future, BMC's first priority is to continue to put authors at the heart of everything we do by providing a first-class publishing service across all of our journals.

Where we identify a gap in the research literature, we will launch new products to serve the community's needs.

We want to experiment with tools, technologies and services that progress research communications, and the systems and processes that support it.

We will continue to advocate for open research, and drive initiatives that support transparency and reproducibility, including open peer review and open data.

We're looking forward to continuing our journey in 2018, and would like to thank each and every one of our authors, peer reviewers, editors and partners who have made our progress in 2017 possible.

BMC. Research in progress.

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