32 Open Research: Much Ado About Nothing?

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Recent developments have seen intensified calls for a more open research culture in science. Changing the status quo in a field notorious for its elitist and secretive nature may appear daunting at first but promises long-term benefits for all.

Open research is principled on a transparent approach to scientific investigations, honest public engagement, and free access to scholarly publications, datasets and research tools such as software and protocols. Fuelled by the rising popularity of the Internet, the open access movement was birthed in the 1990s as a response to growing dissatisfaction with traditional subscription-based publishing models [1]. Elimination of paywalls means that all scientists, irrespective of location or affiliation, can have equal access to high quality journal articles. Since the publication of the first commercial open access journal, *BioMed Central*, in 1998, the field has witnessed significant growth with over 11,000 journals currently indexed in the Directory of Open Access Journals. Publishing open access offers authors the advantages of a transparent peer review process, increased citations and visibility, higher public engagement, and autonomy over rights retention and reuse [2]. It also supports the view that research funded with taxpayers' monies should be publicly accessible.

Sharing research protocols, data and software can foster interdisciplinary collaborations and improve scientific productivity. Connecting researchers from diverse backgrounds and expertise can provide faster routes for tackling complex scientific challenges. A prime example is the Human Genome Project which comprised twenty universities and research centres from six countries. Having sequence data publicly available facilitated timely completion, 2 years ahead of schedule. Making the Protein Data Bank [3], which houses over 130,000 biomolecular structures of protein and nucleic acids, open access enables scientists build on existing discoveries, which frees up resources for more impactful advancements. This can potentially translate to quicker scientific discoveries and treatments for incurable diseases such as cancer, HIV/AIDS and Alzheimer's disease.

At a time when issues surrounding research integrity and reproducibility are on the front burner, developing a transparent scientific culture and open approach to data sharing can uphold accountability and rigour. The role of social media in ushering this new era of open access cannot be understated. The Haruko Obokata STAP stem cell scandal in 2014 [4,5] immediately comes to mind—suspicions of

scientific misconduct were initially discovered through discussions on two science blogs, Knoepfler Lab and PubPeer. Knowing that you have no monopoly of scientific truth and your datasets are open to public scrutiny will inspire a greater attention to detail and tame tendencies to overestimate research findings.

Increased public engagement is another incentive for a more inclusive research environment as it makes science more relevant to society. This is what citizen science hopes to achieve—by involving laypeople in scientific investigations, we can dispel negative stereotypes and increase public trust in science. It also encourages application of scientific thinking in everyday life and can inspire more people to pursue science careers. For 118 years, the Audubon Christmas Bird Count in the Americas has involved citizen scientists in collecting population data which have been used in conservation research and policy making [6] The project's remarkable longevity and success is a pointer to how widening public participation in research can extend the borders of scientific inquiry and drive reform. Recruiting the public for research activities has also proven to be labour-, time- and cost-effective, as seen with the FoldIt [7] and EyeWire [8,9] projects.

The past 20 years have witnessed tremendous changes in the global research landscape with respect to conduct of scientific inquiries, data sharing, engagement and publication. The gains notwithstanding, establishing an extensive and sustainable open research culture also requires addressing concerns over participant privacy, predatory publishing and protecting intellectual property. But if recent scientific advances are anything to go by, open research is here to stay.

References

1. Power, H. Predatory Publishing: How to Safely Navigate the Waters of Open Access. *Can. J. Nurs. Res.* **2018**, *50*, 3–8. [CrossRef] [PubMed]
2. McKiernan, E.C.; Bourne, P.E.; Brown, C.T.; Buck, S.; Kenall, A.; Lin, J.; McDougall, D.; Nosek, B.A.; Ram, K.; Soderberg, C.K.; et al. How Open Science Helps Researchers Succeed. *eLife* **2016**, *5*, e16800. [CrossRef] [PubMed]
3. Young, J.Y.; Westbrook, J.D.; Feng, Z.; Peisach, E.; Persikova, I.; Sala, R.; Sen, S.; Berrisford, J.M.; Swaminathan, G.J.; Oldfield, T.J. Worldwide Protein Data Bank biocuration supporting open access to high-quality 3D structural biology data. *Database*. 1 January 2018. Available online: https://doi.org/10.1093/database/bay002 (accessed on 10 October 2018).
4. Cyranoski, D. Stem-Cell Scientist Found Guilty of Misconduct. *Nature*. 1 April 2014. Available online: https://www.nature.com/news/stem-cell-scientist-found-guilty-of-misconduct-1.14974 (accessed on 10 October 2018).

5. Rasko, J.; Power, C. What Pushes Scientists to Lie? The Disturbing But Familiar Story of Haruko Obota. *The Guardian*. 18 February 2015. Available online: https://www.theguardian.com/science/2015/feb/18/haruko-obokata-stap-cells-controversy-scientists-lie (accessed on 10 October 2018).
6. Audubon. Available online: https://www.audubon.org/about/history-audubon-and-waterbird-conservation (accessed on 10 October 2018).
7. FoldIt. Available online: https://fold.it/portal/info/about (accessed on 10 October 2018).
8. Eyewire. Available online: https://eyewire.org/explore (accessed on 10 October 2018).
9. EyeWire. A Game to Crowdsource Brain Mapping, 2016. CitizenScience. Available online: https://www.citizenscience.gov/eyewire-brain-mapping/# (accessed on 10 October 2018).