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Author/s:

Wang, JTH;Power, CJ;Kahler, CM;Lyras, D;Young, PR;Iredell, J;Robins-Browne, R

Title:

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Date:

2019-01-01

Citation:

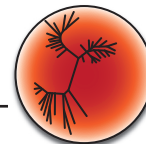
Wang, J. T. H., Power, C. J., Kahler, C. M., Lyras, D., Young, P. R., Iredell, J. & Robins-Browne, R. (2019). Communication ambassadors—an Australian social media initiative to develop communication skills in early career scientists. *Journal of Microbiology and Biology Education*, 19 (1), <https://doi.org/10.1128/jmbe.v19i1.1428>.

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## Communication Ambassadors—an Australian Social Media Initiative to Develop Communication Skills in Early Career Scientists

Jack T. H. Wang<sup>1,7\*</sup>, Cheryl J. Power<sup>2,7</sup>, Charlene M. Kahler<sup>4,7</sup>, Dena Lyras<sup>3,7</sup>, Paul R. Young<sup>1,6,7</sup>, Jonathan Iredell<sup>5,7</sup>, and Roy Robins-Browne<sup>2,7</sup>

<sup>1</sup>School of Chemistry and Molecular Biosciences, The University of Queensland, Brisbane, Queensland 4072, Australia, <sup>2</sup>Department of Microbiology and Immunology, The University of Melbourne at the Peter Doherty Institute for Infection and Immunity, Melbourne, Victoria, 3010, Australia, <sup>3</sup>Department of Microbiology, Monash University, Melbourne, Victoria, 3800, Australia, <sup>4</sup>Marshall Center for Infectious Diseases Research and Training, School of Biomedical Sciences, The University of Western Australia, Perth, Western Australia, 6009, Australia, <sup>5</sup>Centre for Infectious Diseases and Microbiology, The Westmead Millennium Institute for Medical Research, The University of Sydney, Westmead Hospital, Westmead, New South Wales, 2145, Australia, <sup>6</sup>Australian Infectious Diseases Research Centre, The University of Queensland, Brisbane, Queensland 4072, Australia, <sup>7</sup>The Australian Society for Microbiology, Melbourne, Victoria, 3065, Australia

Science communication is a skill set to be developed through ongoing interactions with different stakeholders across a variety of platforms. Opportunities to engage the general public are typically reserved for senior scientists, but the use of social media in science communication allows all scientists to instantaneously disseminate their findings and interact with online users. The Communication Ambassador program is a social media initiative launched by the Australian Society for Microbiology to expand the online presence and science communication portfolios of early-career scientists. Through their participation in the program, a rotating roster of Australian microbiologists have broadened the online reach of the Society's social media channels as well as their own professional networks by attending and live-tweeting microbiology events throughout the year. We present the Communication Ambassador program as a case study of coordinated social media activity in science communication to the general public, and describe the potential for its applications in science education and training.

### INTRODUCTION

Effective communication skills are a vital component of every modern scientist's toolkit. As highlighted by the American Society for Microbiology's curricular guidelines, the "ability to communicate and collaborate with other disciplines" and "effectively communicate fundamental concepts of microbiology" are key competencies for all microbiology students (1). The introduction of student seminar programs and Three-Minute-Thesis competitions (<https://threeminutethesis.uq.edu.au>) in postgraduate training exemplify the increasing emphasis on communication in scientific research (2,3). Written and oral communication skills are highly

valued by employers (4), as their utility in explaining ideas to a wide array of target audiences is transferrable across any work environment.

Given the complexity of scientific concepts, science communicators face an inherent challenge in meeting the core criteria of effective communication—namely clarity, appropriateness of content, depth of knowledge, and style of delivery (5). Engaging peers, cross-disciplinary colleagues, and students in scientific dialogue are very different exercises in navigating shared terminology and areas of interest. The situation is further exacerbated by the diversity in prior scientific knowledge in the general public, but scientists have begun to harness the transformative information-sharing models of social media in science communication (6). Scientists are encouraged to develop a social media platform to broaden their research impact, foster professional networks, and interact with the general public online (7). This can be done in a variety of ways, including long-form posts on blogs and Facebook, which can help improve written communication skills in a medium that is easily accessible to the general public (8). Ongoing 140-character snapshots of science shared via

\*Corresponding author. Mailing address: Room 76-426, School of Chemistry and Molecular Biosciences, The University of Queensland, Brisbane, QLD, 4072, Australia. Phone: +61 7 3365 4611. E-mail: [t.wang1@uq.edu.au](mailto:t.wang1@uq.edu.au).

Received: 6 August 2017, Accepted: 11 September 2017, Published: 30 March 2018.

Twitter can also bolster the profiles of researchers, as studies have found positive correlations between tweets, citation counts, and the number of article downloads over time (9, 10).

To encourage the interaction between microbiologists and the general public in Australia, the Australian Society for Microbiology launched the Communication Ambassador program as a structured platform for early-career scientists to communicate science using the Society's social media channels. Since the program's inception in 2015, our Communication Ambassadors have gained valuable experience in communicating science to diverse audiences while broadening the Society's online profile. This article will outline the design principles underpinning the Communication Ambassador program, its impact on Australian microbiology, and how the model can be translated for use in science education.

## PROCEDURE

### Program overview

The Australian Society for Microbiology is the largest professional body for microbiologists in Australia, with approximately 2,000 members spread across six state branches: New South Wales and the Australian Capital Territory, Victoria, Queensland, South Australia and the Northern Territory, Western Australia, and Tasmania. The recruitment of Communication Ambassadors occurs via the Society's electronic member mailing lists, as well as via social media channels—Facebook (<https://www.facebook.com/AustralianSocietyForMicrobiology/>), Twitter (@AUSSOCMIC), and LinkedIn (<https://www.linkedin.com/groups/6605071>). Applicants go through an expression-of-interest process, submitting a 250-word description of their experiences in science communication, social media presence, and registrations for scientific meetings in the upcoming year. All applications are ranked by the National Executive Committee via the Vice President of Communications, who then notifies successful applicants of their roles, expectations, and the schedule of the program roster.

The Communication Ambassador program uses a rotating curation model, where individual ambassadors take turns controlling the Society's social media channels to communicate directly to the general public for one to two weeks at a time. The Australian Society for Microbiology subsidizes registration costs for ambassadors to attend and “live-tweet” a selection of local meetings in environmental, clinical, and molecular microbiology, thereby promoting scientific discourse across key microbiological themes using our online platforms. The ambassadors need to follow our social media guidelines (<http://theasm.org.au/social-media-guidelines/>) but are otherwise given a fair degree of autonomy. Most ambassadors have chosen to discuss their own scientific journeys, the best career advice they have received, and the importance of forging new collaborations in research. In addition to Twitter and Facebook, the Society hosts the Communica-

tion Ambassador Blog on our website (<http://theasm.org.au/student-ecr-members/asm-communication-ambassador-program/asm-communication-ambassador-blog/>), where interview transcripts between ambassadors and their scientific mentors are frequently posted. At the Australian Society for Microbiology national scientific meetings, ambassadors in attendance are given a “Media” badge and introduced at the opening ceremony; this encourages dialogue between ambassadors and conference delegates and enhances professional networking opportunities for our members throughout the course of the meeting.

### Program outcomes

From 2015 to 2017, 32 Communication Ambassadors from 20 different institutions spread across all six state branches have participated in the program. Over 90% of the ambassadors were doctoral students or early-career researchers at the time of their participation, and training in communication skills was consistently cited as a key motivating factor for their involvement. As the ambassadors are often in the early stages of their scientific career, careful guidance was provided on the type of content that is suitable for ASM's online presence. The Vice President of Communications maintains access to all social media accounts belonging to the society, and stays in contact with ambassadors throughout the first few days of their period of curation. Given the interdisciplinary nature of microbiology, breadth of coverage is favored over depth on any individual topic; the ambassadors are encouraged to focus on showcasing conference talks, highlighting outreach initiatives for members, and linking to peer-reviewed articles relevant to their discipline. Ambassadors have adapted quickly to this style of communication, and they have expanded the impact of the Society's social media channels through weekly Facebook posts and over 5,000 tweets, which have collectively reached more than 500,000 online users. A selection of sample tweets from the communication ambassadors is provided in Table 1. With the recent surge in citizen-science participation via social media (11–13), these online platforms are powerful tools for civic engagement, crowdsourcing, and crowdfunding scientific initiatives (14).

### Applications in education and training

Social media has effectively been used to engage students in science education, although care has to be taken in adhering to privacy regulations across different institutions. The creation of course-specific closed Facebook groups and private Twitter profiles can facilitate peer engagement outside of class, as students actively share videos, animations, and podcasts to better contextualize the subject matter taught in class (15, 16). The rotating curation model used in the design of the Communication Ambassador program can also be applied in education and training, where students take turns through an official class roster to find and disseminate

TABLE 1.  
Sample social media output from ASM Communication Ambassadors via Twitter in 2017.

Category	Sample Tweets	URL
Conference live-tweeting	Good morning! Day 2 opens with Professor Robin Patel's plenary on Prosthetic Joint Infection #2017ASM @MayoClinic	<a href="https://twitter.com/AUSSOCMIC/status/881643676111323136">https://twitter.com/AUSSOCMIC/status/881643676111323136</a>
	Patel: total knee and hip implants have steadily increased, as have arthroplasty infections #2017ASM	<a href="https://twitter.com/AUSSOCMIC/status/881644770006777856">https://twitter.com/AUSSOCMIC/status/881644770006777856</a>
	Patel: Prosthetic joint infection diagnosis - preop blood tests, imaging, & cell count, neutrophil %, culture from synovial fluid #2017ASM	<a href="https://twitter.com/AUSSOCMIC/status/881646455844331520">https://twitter.com/AUSSOCMIC/status/881646455844331520</a>
	Patel: Synovial Fluid Leukocyte differential key diagnostic test for prosthetic joint infections. Novel biomarkers on the rise #2017ASM	<a href="https://twitter.com/AUSSOCMIC/status/881647121983602688">https://twitter.com/AUSSOCMIC/status/881647121983602688</a>
Outreach	ASM Nancy Millis student mentoring breakfast from earlier today. Join us at the mentoring lunch today 12:15 pm in Harbour view !! #2017ASM	<a href="https://twitter.com/AUSSOCMIC/status/881673710180065280">https://twitter.com/AUSSOCMIC/status/881673710180065280</a>
	ASM is sponsoring 2 members to attend @ScienceAU's Science Meets Business in Nov inc rego & travel. Deadline Sept 28 <a href="https://goo.gl/dbDbLL">https://goo.gl/dbDbLL</a>	<a href="https://twitter.com/AUSSOCMIC/status/897971237611331588">https://twitter.com/AUSSOCMIC/status/897971237611331588</a>
	Thanks to all the delegates for joining us at #2017ASM Photos from the final 2 days of the meeting are now up! <a href="https://goo.gl/8LYuCI">https://goo.gl/8LYuCI</a>	<a href="https://twitter.com/AUSSOCMIC/status/883109700450918400">https://twitter.com/AUSSOCMIC/status/883109700450918400</a>
Links to articles	Some Australian states are experiencing bumper #flu cases this year - @MackayIM & @kat_arden discuss some reasons why: <a href="https://goo.gl/ZkiVnk">goo.gl/ZkiVnk</a>	<a href="https://twitter.com/AUSSOCMIC/status/899946080158203904">https://twitter.com/AUSSOCMIC/status/899946080158203904</a>
	Just read this nice review on characterising plasmids in the genomics era: <a href="https://goo.gl/SJ3pGV">https://goo.gl/SJ3pGV</a> Great follow-up #ABPHM17 last week!	<a href="https://twitter.com/AUSSOCMIC/status/866965210980012032">https://twitter.com/AUSSOCMIC/status/866965210980012032</a>

key learning materials on a week-to-week basis. A similar system can be deployed in postgraduate education to develop science communication skills in doctoral students, and many laboratories have set up public Twitter accounts managed by a roster of research group members to inform and engage the public on their project findings.

## CONCLUSION

The Australian Society for Microbiology's Communication Ambassador program aligns with similar outreach initiatives offered through the International Ambassador program organized by the American Society for Microbiology (<https://www.asm.org/index.php/asm-near-you/international-ambassadors>). It is incumbent on scientists to communicate their discoveries to others, and professional scientific societies can play a significant role in disseminating this information using a coordinated and focused approach. Elements of social media initiatives such as the Communication Ambassador program can be readily implemented in both undergraduate and postgraduate training to promote an ongoing dialogue with the general public throughout all levels of scientific inquiry.

## ACKNOWLEDGMENTS

The authors thank the National Council of the Australian Society for Microbiology, all members who served as Communication Ambassadors on behalf of the Society, and

Kara Taglieri for administering the program. The authors declare that there are no conflicts of interest.

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