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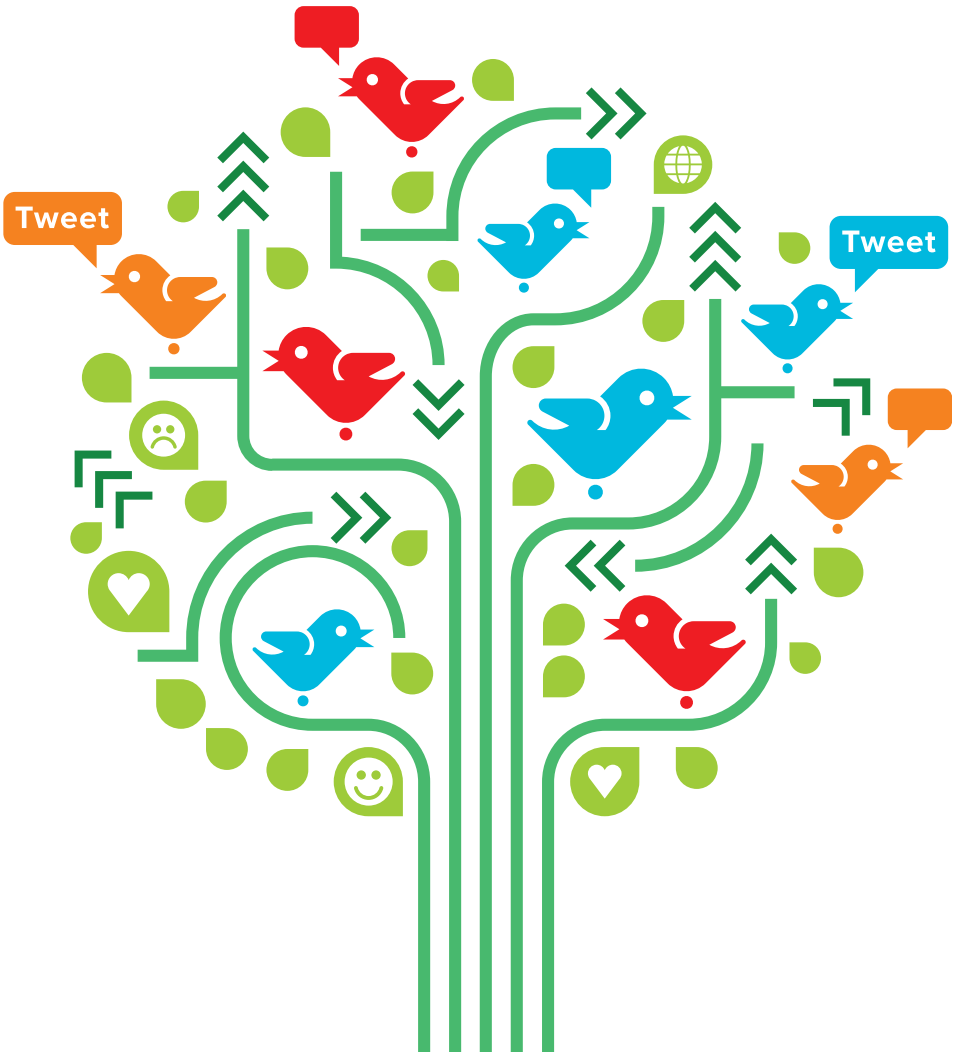

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SOCIAL MEDIA

A network boost

How scientists can use Twitter to expand their social contacts and find jobs.

BY MONYA BAKER

Information scientist Cassidy Sugimoto was initially sceptical that Twitter was anything more than a self-promotional time-sink. But when she noticed that her graduate students were receiving conference and co-authoring invitations through connections made on Twitter, she decided to give the social-media platform a try. An exchange that began last year as short posts, or 'tweets', relating to conference sessions led to a new contact offering to help her negotiate access to an internal data set from a large scientific society. "Because we started the conversation on Twitter, it allowed me to move the conversation into the physical world," says Sugimoto, who studies how ideas are disseminated among scientists at Indiana University in Bloomington. "It's allowed me to open up new communities for discussions and increase the interdisciplinarity of my research."

Relatively few scientists are taking the opportunities Twitter offers. In a 2014 online *Nature* survey on social media habits, just 12% of the more than 3,000 scientists and engineers who responded reported that they used Twitter regularly (see *Nature* **512,** 126–129; 2014). By contrast, the Pew Research Center, a non-partisan think tank based in Washington DC, found that almost one-quarter of all US adults with Internet access are on Twitter. Researchers in computation-intensive disciplines such as astrophysics tend to use the service more, but no estimates suggest that any discipline of scholars is using Twitter at a higher rate than the general public, says Sugimoto.

That leaves much networking potential untapped, say Twitter enthusiasts. The opportunities for microblogging — posting brief, regular updates online — are plentiful and far-reaching, and can help young scientists to build their careers. Following thought leaders and relevant organizations is an effective, easy way for researchers to learn about important papers, events, funding sources, potential colleagues and job opportunities. Scientists who tweet report that they receive invitations to speak at conferences and events, and make lasting professional connections. There are downsides; scholars need to manage their online time and reputations effectively. Still, by strategically selecting whom to follow and what to contribute on Twitter, young researchers can build a powerful virtual network that will yield opportunities, information and advice.

CREATE CONNECTIONS

People who use Twitter may do so as active participants, posting anything that can fit into 140 characters, and also as followers who read these tweets (see 'On Twitter but not tweeting'). More than one million users follow CERN, the particle-physics laboratory near Geneva, Switzerland, for example. Participants often follow 100 or more users, and so constantly receive posts in their Twitter feed from researchers outside their own immediate networks. Users can also search for posts on a particular topic using the hash symbol followed by a keyword, and curate their connections for discussions relevant to their interests and careers. "By following the people you find interesting and may want to work ▶

with, you're among the first to know when they have an open position within their labs or institutions," says Jacob Jolij, a neuroscientist at the University of Groningen in the Netherlands. For instance, if a potential supervisor or peer is moving lab, he or she may announce it on Twitter. Such posts can suggest that labs and institutions may soon be looking for new employees.

When Thea Whitman was a doctoral student in soil science at Cornell University in Ithaca, New York, in 2013, she forwarded, or retweeted, a post from another soil researcher announcing a tenure-track opening at the University of Wisconsin–Madison. She did not think of herself as a candidate: she was considering options for a postdoctoral position. But when she looked again at the posting, she realized that her interests and qualifications matched the job requirements. She sent in an application, landed an interview and got the job. (She starts in January 2016 after finishing a postdoc stint at the University of California, Berkeley.)

One chemist who writes a blog and tweets under the username Chemjobber about work in the US chemical and drug industry estimates that he tweets three to five positions a day. He receives two or three notes a year from readers who tell him that they found the advert for their new job through one of his posts.

Although plenty of job announcements made on Twitter fail to attract suitable candidates, tweeting and retweeting can help to expand recruitment efforts. In December, Matthew MacManes, a genomic biologist at the University of New Hampshire, Durham, tweeted a link for a tenure-track position in his department. Within 2 weeks, retweets brought the posting to more than 10,000 Twitter users, and some 200 viewed a description of the position, he says. "These are candidates that I wouldn't have otherwise reached."

FIND AN EMPLOYER — OR EMPLOYEE

Twitter is not the primary way that young scientists find jobs, however. Gwynn Benner, who coordinates career services for postdocs and graduate students at the University of California, Davis, says that she often sees a mismatch in Twitter usage at career fairs. "The employers will be tweeting, 'I've got a booth,' and the students are just not on Twitter." A steady stream of tweets come from @naturejobs, @ScienceCareers, university career offices, aggregators and employers, but Benner thinks that Twitter could be overwhelming as a primary tool in a job search. Instead, she says, it should be used strategically, to learn what potential employers are up to, and whether they have job openings. "Say there are five companies I want to target," she says. "That's when I get on Twitter."

Twitter can help in early-career researchers' job searches by allowing them to see other users' previous posts and current connections. Arne Bakker at the Stanford University Career Development Center in California provides advice for people with science PhDs and for postdocs, and says that following institutions, companies and individuals on Twitter can offer clues about workplace culture and ongoing projects in a way that static websites do not. That knowledge can be especially helpful during a job interview, he says. It can also paint a picture of what the job might be like, says Whitman. "If your future adviser or colleagues are active on Twitter, it can give you insight into their personality. Do they tend to be negative? Constructive? How do they respond to criticism?"

Cassidy Sugimoto says that Twitter can help to shape scientific networks.

S. CRAIG FINLAY

Employers use Twitter to evaluate potential recruits as well. Evolutionary biologist Iain Couzin is setting up a department to study collective animal behaviour after moving to the Max Planck Institute for Ornithology in Konstanz, Germany. He says that Twitter is becoming a tool to help find excellent young scientists. "I get to know who many of the candidates are as I have also been following them," he says. Danielle Bassett, a bioengineer at the University of Pennsylvania, Philadelphia, says that although she has not used Twitter to recruit lab members directly, she does look at online activity; a history of tweets that demonstrate scientific insight and interdisciplinary interests has increased candidates' chances, she says.

But a Twitter account is not an automatic boost. "Some of my older colleagues think that if you are using social media, you don't have enough to do," says Jessica McCarty, who studies land use at Michigan Tech Research Institute in Ann Arbor. "It is a double-edged sword," warns Jennifer Biddle, an assistant professor at the University of Delaware in Newark who studies environmental microorganisms. "If you are outspoken or mostly post about your personal life, you may create prejudgement."

Or worse: in one particularly controversial case, the University of Illinois at Urbana–Champaign rescinded a job offer for a tenure-track position after a candidate posted inflammatory tweets. Some scientists, including Chemjobber, have opted to not use their real names to avoid potential conflicts with employers.

THE NETWORK WAY

Career consultants and university guidance counsellors interviewed by *Nature* Careers de-emphasized Twitter in favour of encouraging an online presence on LinkedIn (see *Nature* **516,** 441–442; 2014). Nonetheless, Twitter and other forms of social media are changing the playing field. Danielle N. Lee, an outreach advocate and postdoc in psychology at Cornell University, says that her blogposts and tweets about making science more inclusive for women and minorities have yielded prestigious speaking engagements and invitations to write articles for publication.

Sugimoto thinks that social media may be starting to reweave the fabric of traditional academic research. "I'm seeing students creating identities that don't have to be routed through the principal investigator," she says. "I see doctoral students making increasing use of Twitter to brand themselves." Although existing studies on the topic are small and research methods are still being worked out, there is some suggestion that social media can have an equalizing effect by making people without access to conventional networks more visible, she says.

Twitter's value to job seekers is more about making connections than finding a newly advertised job, says Chemjobber. "The reason to get on Twitter for your job search is that it offers you a way to short-circuit traditional networking," he says. "It doesn't matter if you're a full professor or a grad student or an early-career person, you can get noticed."

And the social-media platform helps users to cross disciplines, says Hiroki Ueda, a systems biologist at the RIKEN Center for Developmental Biology in Kobe, Japan. "Sometimes I get interested in PhD students and postdocs especially from different fields — chemistry, physics, information science — just though their tweets."

"It doesn't matter if you're a full professor or a grad student or an early-career person, you can get noticed."

Twitter can enable support networks that would be impossible in the physical world, says Caleph Wilson, an immunologist at the University of Pennsylvania. He participates in a Twitter group that has launched weekly digital conversations using the hashtag #BlackandSTEM. The platform provides a forum where he can share his experiences as an African American working in science, technology, engineering and mathematics (STEM), and younger scientists can learn from them. "Physically, you may be in a situation where you are the only

#SCIENCETRENDING

On Twitter but not tweeting

A common strategy on Twitter is lurking: reading tweets but not posting them. For many users, Twitter becomes their main way to learn about relevant papers, conferences and news. To build that information feed, users need to choose which streams to follow and what hashtags to monitor, such as #lifeafterPhD. Many follow relevant departments in grant agencies; @NIHfunding has 24,000 followers, for example.

Many journals and journal editors tweet their tables of contents and retweet relevant comments. Beginners on Twitter can also find accounts to follow through retweeted posts and by looking through followers of other users. Lists of recommended people to follow abound as well. Programmes such as TweetDeck or Hootsuite can sort Twitter streams by username and hashtag.

And Twitter is boosting the scope of conferences, too, helping people who cannot attend to follow what is going on. At the Annual Geophysical Union meeting in San Francisco, California, last December, attendees numbered about 24,000, yet more than 28,000 people posted almost 57,000 tweets and retweets with the hashtag #agu14 — double the previous year. Specific sessions within conferences often have their own hashtags, catering to researchers' specific interests.

High levels of Twitter activity can be intimidating, so the best approach is to read tweets selectively. Lisa Balbes, a career-development consultant in Kirkwood, Missouri, advises Twitter users not to even try to check every post. She thinks of Twitter as an additional source of information and networking. "I skim the headlines when I have a couple minutes," she says. **M.B.**

person [in an under-represented group] but through social media, you are in a space where you can have the all-important STEM vent session," he says.

Science exchanges on Twitter are generally convivial, but there is no doubt that Twitter can get ugly. In November, the leader of the Rosetta Mission that landed a probe on a comet wore a shirt printed with scantily clad women. A science writer who tweeted that the attire made astronomy less welcoming to women received multiple tweets telling her to kill herself.

NO PERSONAL POSTS

Although horrible tweets and abusive 'trolls' exist, they are not a significant part of most scientists' experience on Twitter, says Chris Gunter, a researcher and science communicator at Marcus Autism Center and Emory University in Atlanta, Georgia. Those who fear Twitter may not realize how much they can control their experience. "You can unfollow or mute people," she says, "and you can take a break for a while." As a precaution, she avoids inflammatory or overly personal posts, such as using family members' names. For conversations that require nuance, users should switch to other types of communication, she says. It is common for interactions that begin on Twitter to move over to e-mail, for example.

Although conventions on social media are still emerging, the basic rules of networking still apply, says Lisa Balbes, a career-development counsellor in Kirkwood, Missouri. "It's a weird, messy landscape right now," she says. "It comes down to building a relationship with other people through whatever tools they are using." Relationships require more than a single click. Twitter users should not assume, for example, that being mutual followers with another user means that the person has taken an interest in helping them.

An online reputation for being thoughtful, enterprising and helpful can be as valuable as a long list of publications, says career consultant Peter Fiske, head of PAX Water Technologies in Richmond, California. Scientific conference organizers and observers often follow a meeting's tweetstream to learn what generated excitement, and to find rising stars. Informed tweets can help to draw their attention, says Gunter. For the past several years, she has chaired committees that select speakers and moderators for the American Society of Human Genetics in Bethesda, Maryland. "The tweets alone can't suggest a good speaker," she says, "but tweeting coherently about the topic is always a good sign".

Twitter's greatest advantage may be its flexibility in terms of the time spent and level of commitment. "You can dip your toes in — you don't have to be a crazy twittermaniac," says Titus Brown, a bioinformatician at the University of California, Davis. "In the past few years, I've seen it grow considerably in professional usefulness. It will continue to evolve," he predicts. "Find a way to use it in a way that makes sense with your personality and time constraints — and it will be useful for you." ■

Monya Baker *writes and edits for* Nature's *Careers section.*

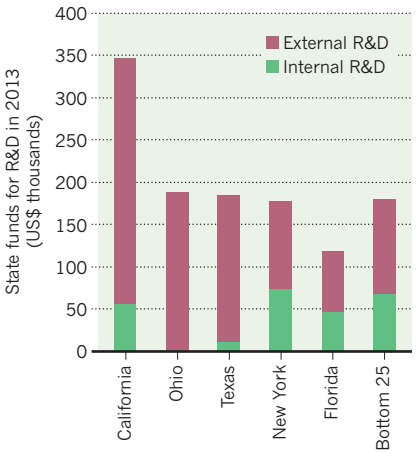
GOVERNMENT FUNDING

State contributions

Individual states funnelled US$1.8 billion into research labs and studies in 2013, with one-quarter of that devoted to basic research, finds a survey by the National Science Foundation in Arlington, Virginia. Although federal funding for research and development (R&D) dwarfs state investments, state expenditures can help to tailor workforces to regional needs, says James Hearn, associate director of the Institute of Higher Education at the University of Georgia in Athens. Five states together accounted for almost three-fifths of the investments (see 'Top R&D spenders'). External R&D — mainly that at academic institutions — tended to receive more than the internal R&D conducted by state agencies.

TOP R&D SPENDERS

California is top, but even Ohio, Texas and New York spent as much as the bottom 25 states combined.



IMMIGRATION

Scientists gain access

Proposed federal legislation would exempt scientists from some US immigration quotas. Similar legislation introduced by the Senate in 2013 failed to make it through the House of Representatives. However, Atessa Chehrazi, an immigration attorney in San Francisco, California, says that foreign researchers would gain many more opportunities to work in the United States if even targeted provisions of the bill pass, such as a proposal to allow graduate students who arrive on non-immigrant visas to seek permanent resident status. Restrictive employment quotas and visas for scientists and other highly trained workers have come under attack in the past decade. More than a dozen higher-education associations are urging Congress to pass the bill.