▶ papers and news articles of particular interest show up on both sites, so he is confident that he rarely misses anything crucial.

Still others choose more deliberately what to read. As a PhD student, chemist Peter Robinson got a sense of recent developments by checking a handful of journals he could access online through institutional subscriptions. Each day he scanned just-accepted abstracts and read a few papers from start to finish. He spent up to 3 hours reading each morning and continued to read through the day in 20–30-minute chunks. Today, as co-founder and chief scientific officer of the start-up Enable Biosciences in Menlo Park, California, he still spends 1–2 hours reading daily — but has added technology and business news to the mix. About two-thirds of his reading is scientific papers, but the rest comes from blogs, social media and industry news aggregators such as FierceBiotech (www.fiercebiotech.com) and GenomeWeb (www.genomeweb.com).

IT'S ALL ABOUT WHO YOU KNOW
Adam Thomas, a lead data-science officer at the US National Institute of Mental Health in Bethesda, Maryland, relies on his virtual and in-person network for updates. He has set up a few automatic searches on Scopus, an Elsevier-owned database of academic journal abstracts and citations. But he relies most heavily on Twitter, Facebook, e-mail distribution lists, lab meetings and visiting speakers to learn about interesting work from colleagues.

Blogs are another way to get fast updates, as well as to interact with other researchers. "With so much new information, we really need curators of content," Jacob says — "not just aggregators, but people who select and comment on why something is particularly novel or important, bridge disciplines to explain broader relevance, put new content in context of where the field has been and ought to go." She likes Dynamic Ecology (dynamicecology.wordpress.com), a group blog written by researchers in her field. Readers comment with thoughts or follow-up questions for the community — and these exchanges help to put information in context, she says.

"With so much new information, we really need curators of content."

But there's a lot to be said, too, for old-school face time (the real, physical kind, not the Apple messaging function). Through conferences, journal clubs and seminar series, colleagues catch up and share news of interesting publications or talks. "Word of mouth is really important," says Chung, who starts a postdoc in September at the University of California, Irvine. It's a way to learn nuanced information that no paper, news story or blog can impart. "Academia and research can be isolating," Jacob says. "Weekly events can help bring people out

of their offices, create a sense of community and teach the culture and norms of the field."

CURATE THYSELF
Some researchers create their own curation systems. About six years ago, microbiologist Elisabeth Bik of Stanford University in California set up PubMed alerts to stay current on papers in the fast-growing field of microbiomes, and she shared interesting studies with co-workers. But then the field exploded: PubMed alerts clogged her inbox, and she shared more and more papers. Soon she was compiling her finds into weekly, then daily e-mails.

Co-workers suggested that other labs might benefit from her round-up, so she created Bik's Picks (microbiomedigest.com), a blog that gets 300–500 views daily. Besides links to microbiome publications, it aggregates news stories on microbes and other topics, such as science careers and publishing. She started tweeting some of her blog content (@MicrobiomDigest) 3 years ago, and has more than 6,000 followers.

But Bik admits that the blog is a time-sink. "About two years ago, I could easily scan all the literature published each day in about an hour. Today it takes me two to three hours," she says. Each day, she scans 30–50 papers through PubMed alerts, dozens of tables of content and publisher alerts, and up to 30 Google and Google Scholar alerts, each consisting of 5–20 papers and articles. She sometimes finds papers on Twitter and occasionally discovers preprints on sites such as bioRxiv, PeerJ and F1000.

Bik spends a few hours every workday morning selecting papers for the blog and tweeting the most interesting ones, then another hour at home on most evenings going through alerts that came in during the day. She receives no financial compensation for her efforts, but her principal investigator lets her spend work hours on the blog because it saves time for the other lab members.

Preprints have yet to gain a foothold in biomedicine, but other fields have a decades-long history of disseminating research before it goes for peer review. Since 1991, arXiv.org has served as a centralized online repository of freely accessible preprints in mathematics, physics, computer science and related disciplines. Moderators review manuscripts before posting them on the site, and most authors eventually submit them for publication in peer-reviewed journals.

In 2007, when astrophysicist James Guillochon started working on his PhD at the University of California, Santa Cruz, his department would meet three times a week for arXiv discussions. But the chats didn't probe very deeply into the new research, says Guillochon, now a postdoc at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts. He decided in 2009 to create Vox Charta (ucsc.voxcharta.org), a version of arXiv for astronomy and astrophysics paper discussions. Through his site, colleagues can prepare for discussions — or decide whether to go at all — by using a voting system to flag the most interesting papers. Because Vox Charta papers come from a centralized source and most of the website is automated, Guillochon says that he spends little time managing the site beyond basic maintenance.

Last September, a pair of physicists created a similar site, Benty Fields (www.benty-fields.com), to cover the whole arXiv. The site lets researchers organize arXiv publications into reading lists and vote to put them onto the next discussion agenda. Benty Fields is set up like a social network: users can upload their CV and list of publications into a profile, and colleagues can follow each other.

In today's digital world, it is impossible to stay abreast by reading a few journals, so researchers must identify sources that can provide the crucial data they need for their work and career. "Reflecting on when, where, why and how we consume new information, and whether those behaviours help or hinder our personal and professional goals, moves us closer to becoming more effective scientists," Jacob says. ■

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