Microbiology Goes Digital

Microbiologists and science writers are making more and more use of electronic media to share their thoughts about this science

Melanie D. G. Kaplan

When Vincent Racaniello records “This Week in Virology” (TWiV) every Friday, his main aim is virologists. But he also is recording for professors, graduate students, lay people battling their own viruses, those individuals who dismiss viruses as conspiracies, and also for a beekeeper. “There’s a beekeeper in California who listens all the time, while he’s inseminating queen bees,” says Racaniello, a professor at Columbia University Medical Center in New York, N.Y. “There is a debate over whether colony collapses are caused by viruses. So if we get a related question, we’ll say, ‘Rich, what do you think?’ and he’ll answer later because he’s listening.”

Welcome to Microbiology 2.0—a world where information is disseminated, exchanged, and debated in a manner that is faster, easier to digest, and, in many cases, cheaper than anyone ever imagined. This interactive world of audio and video podcasts, blogs, and social networking is making microbiology more accessible, benefiting elementary school students, science writers, working microbiologists, and, well, beekeepers. Perhaps less obvious, electronic communication is good for the science of microbiology.

“Getting candid feedback from other scientists is always a good way to improve your research,” says Merry Buckley, a microbiology writer and social media editor of mBio, the new ASM open-access, online journal. “Anything that will improve one researcher’s work is ultimately good for science.”

When Your Facebook Status is “Tweeting about Protists”

ASM Communications Director Barbara Hyde says interactive media is invaluable for microbiologists—today and tomorrow. While she acknowledges that most of those who sing the praises of new media are young, older members of ASM are also embracing this trend. “We have members who do not care what a Twitter stream is and will never join Facebook,” she says. “And that’s fine. We’re not stigmatizing anyone. But to be relevant to the microbiologist in the future, we feel we need to embrace this technology as much as possible.”

Chris Condayan, ASM manager of public outreach, says that using new media is critical for scientists who want to have their research publicized. Moreover, it also fits within another important part of the scientific fabric, acting as an additional set of checks and balances as individuals offer new findings and ideas. “For the first time ever, you have an

Summary

• Information about developments in microbiology is being disseminated, exchanged, and debated in ways that are faster, easier to digest, and, in many cases, cheaper than anyone ever imagined.

• ASM is embracing newer electronic communication media on many fronts, including mBio, the new online and open-access journal, podcasts from Microbe and MicrobeWorld, frequent postings on Twitter and Facebook, and talk show videocasts from the General Meeting.

• Microbiologists are also part of this movement, including Moselio Schaechter and his blog “Small Things Considered,” and Jonathan Eisen and his blog, “The Tree of Life”; Eisen also posts regularly on Twitter and Facebook.

• These newer forms of communication also foster instant feedback and broad discussions about developments in microbiology, providing a powerful new means to hone ideas.

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Intel for the Micro World

Esos pequeños bichitos
www.madrimasd.org/blogs/microbiologia
Spanish microbiology forum

Discover Blogs
Loom
blogs.discovermagazine.com/loom
New York Times science writer Carl Zimmer’s
blog on scientific research

MBiosphere
mbioblog.asm.org
The latest news, through summaries and inter-
views, from the new online, open access journal,
mbio from ASM.

Microbe Podcasts
http://www.microbemagazine.org
Look online in the Current Topics section for a link
to the podcast associated with each issue of Mi-
crobe, the ASM monthly magazine.

MicrobeWorld
microbeworld.org
The ASM interactive multimedia education out-
reach site, where registered users can post links,
blogs, images or videos; also home to audio and
video podcasts and the MicrobeWorld iPhone app.

MicrobiologyBytes
microbiologybytes.com/blog
The latest news about microbiology, from Alan
Cann in England.

Mystery Rays from Outer Space
iayork.com/MysteryRays
Immunology and virology blog by Ian York,
former assistant professor in the Michigan State
University Department of Microbiology and Mo-
lecular Genetics, now in the influenza division at
the Centers for Disease Control and Prevention.

Discover Blogs
Not Exactly Rocket Science
blogs.discovermagazine.com/notrocketscience
British science writer Ed Yong writes about science

Persiflagers Infectious Disease Puscasts
moremark.squarespace.com/puscast-pacid-pod-
cast
A bimonthly review of the infectious disease liter-
ature by Mark Crislip.

Research Blogging
researchblogging.org
A collection of blogs that cover peer-reviewed sci-
ence, in more than a dozen categories.

Skeptic Wonder
skepticwonder.fieldofscience.com
A graduate student and aspiring protistologist
writes under the pseudonym Psi Wavefunction
about “protists, memes, and other random mus-
ings.”
Small Things Considered
schaechter.asmblog.org
The ASM microbe blog, written by Elio Schaechter and Merry Youle.

This Week in Parasitism (TWiP)
microbeworld.org/twip
Podcasts about eukaryotic parasites hosted by Columbia University professors Vincent Racaniello and Dick Despommier.

This Week in Virology (TWiV)
twiv.tv
Vincent Racaniello, Alan Dove, and Rich Condit cover a wide range of microbiological topics, including lab procedures, prokaryotes, endogenous retroviruses, and prions.

The Tree of Life
phylogenomics.blogspot.com
The blog by Jonathan A. Eisen, an evolutionary biologist, open access advocate, and microbiology professor at the University of California, Davis

Twisted Bacteria
twistedbacteria.blogspot.com
A blog by César Sánchez that began with a focus on actinomycetes but subsequently expanded to cover microbiology more broadly along with science communication.

Virology Blog
virology.ws
Vincent Racaniello, professor of Microbiology at Columbia University Medical Center and host of “This Week in Virology” and “This Week in Parasitism,” writes about viruses and viral diseases.
instant letter to the editor,” he says. “This gives you a sense for how the research is being taken and how well or badly the article is written. If there’s a mistake, people find errors, and it’s immediate. But that’s great, because it’s self-correcting.”

With Hyde, Condayan oversees MicrobeWorld Radio and MicrobeWorld.com—two programs that typify what ASM is doing along the forefront of the new electronic media. In 2005, they converted the ASM series of conventional 90-second radio spots into podcasts, making ASM the first scientific society to offer regular podcasts and also saving more than $300,000 per year in outsourced radio production costs.

ASM soon launched a regular series of podcasts called “Meet the Scientist,” now hosted by New York Times columnist Carl Zimmer; developed a Spanish-language version of the MicrobeWorld podcasts; and brought TWiV and Racaniello’s sister podcast, “This Week in Parasitism” (TWiP), into the MicrobeWorld fold. Throughout 2009, all the ASM English-language podcasts were featured in the Apple iTunes online store. For his work on these programs, as well as the award-winning MicrobeWorld videos, Condayan recently received the ASM Secretary’s Award.

Building a digital presence for ASM entailed more than expanding an attractive site for researchers, clinical microbiologists, students, educators, and the general public to visit. It also meant creating a space onto which registered users could submit content. This challenge took about a year to figure out, with Condayan, Hyde, and their colleagues researching online models that have nothing to do with science, including Twitter, YouTube, Digg, and Delicious.

There was some skepticism early on about allowing users to post articles on ASM sites without a vetting process and also allowing others to leave comments to those unvetted articles, according to Condayan. “We thought, ‘What are we opening ourselves up to here?’” he says. “But look at Amazon’s reviews and ratings of products. That’s one of the models we considered, because all of us, as consumers, appreciate it.” In a similar fashion, the “Most Popular” tab at the top of the MicrobeWorld home page is designed to reflect the posts that have the most clicks and comments. “You, as a viewer of MicrobeWorld, are an editor,” he says. “By interacting with the content, you help place it. It’s the voice of the crowd.”

Content posted to MicrobeWorld is also tweeted automatically, and the “cream of the crop” is posted on Facebook, Condayan says. It proves tricky to establish a science-focused social network on Facebook when so many users on this social network are posting messages about what movies they want to see or what they ate for breakfast. The ASM solution is to use Facebook as a content hub, rather than a free-for-all social network.

**ASM Is Using New Media in Many Different Ways**

ASM Communications took advantage of new media in another way during the 2010 ASM General Meeting, held in San Diego last May. Instead of holding conventional press conferences, microbiologists with newsworthy findings were invited to participate in “ASM Live,” a series of interviews in television talk-show format that were streamed live to the public over the Internet. These sessions enabled ASM members, journalists, and other science writers and bloggers who could not travel to San Diego to cover the meeting from afar. One important upshot, according to Hyde, there was more traditional press coverage from the 2010 meeting than there had been in the previous decade.

As social media editor for the new ASM journal, Buckley maintains the mBio Facebook fan page and writes a blog, “mBiosphere,” that explains contents of some mBio reports to nonscientists and other lay readers. Her blog also features input from editors about the implications of the science. This approach is proving successful at getting the word out about breaking developments in microbiology, she says.

“I see it primarily as a service to authors,” says Buckley, who also tweets information about recent research reports and provides links to them from her blog. Those actions help to alert researchers and the general public very quickly to the appearance of new research findings. “Usually when you send a paper out into the world, you don’t hear anything about it until other people start citing it in their own papers. With social media, authors can get fresh insight into their work.”

The major users who keep pace with research developments via social media are under 34 years of age, according to Buckley. But she urges editors of research journals and authors of papers being published in those journals, who generally are older, to learn more about the technology and
how to use it. “These are important ways that science is going to be conveyed in the future,” she says. “To ignore it or fail to participate will be missing chances to interact with the next generation.”

Even *Microbe*, formerly *ASM News*, which began publishing soon after the Society was formed, now offers monthly audio interviews with scientists whose research is described in the Current Topics section. These 15-minute interviews by *Microbe* Current Topics and Features Editor Jeff Fox are posted on the *Microbe* website, and provide listeners with an in-depth and personalized account of that research in the scientists’ own words.

**Small Things Blogged**

Like microbiology itself, the basis of new media is experimental. Its developers and users are repeatedly puzzled and amazed over why some approaches prove wildly successful and others fail. One popular dogma—that you need to be on the younger end of the age spectrum to participate fully—fails to account for the Moselio Schaechter phenomenon. An adjunct professor emeritus at San Diego State University, he eschews Twitter and Facebook, perhaps his partial concession to age trends. However, he breaks from those trends altogether as the creator and continuing coauthor of one of the most popular blogs in microbiology, “Small Things Considered.”

“I was as virginal as can be,” says Schaechter, slyly referring to his electronic media disposition when he started the blog in 2006. His first posting to the blog, “It Don’t Mean a Thing If It Ain’t Got That Swing,” was a brief tract about the circadian rhythm of cyanobacteria. “It was not a headline I would have ever used before,” he says, noting that he grew more comfortable with being creative and personal in his writing for the blog. Shortly after the blog launched, a scientist and early fan of the blog, Merry Youle, contacted Schaechter from her home on Hilo, also called the Big Island of Hawaii. Youle is now the design chief and technology guru of one of the most popular blogs in microbiology, “Small Things Considered.”

An avid supporter of “open” science, Eisen says, “Blogs are changing the way we communicate,” Schaechter says. “Instead of big heavy scientific narratives, it humanizes the science and makes it possible for people to open up their heads.”

**Small Things Twittered—and Blogged**

Using new media “will make science less of a closed, conservative, old boys’ network,” says Jonathan Eisen, another scientist who blogs and Twitters. An evolutionary biologist with a focus on microbial genomics, Eisen has a faculty post at the University of California, Davis, and is also affiliated with the nearby Joint Genome Institute, a Department of Energy facility.

Eisen calls his blog, “The Tree of Life,” while his Twitter feed could be called exuberant. “I always try to make sure it makes sense to someone who is not an active scientist,” he says. A central goal, he says, is to communicate in a way that makes developments in genomics, microbiology, and other specialty areas that strike his fancy accessible to everyone. “With [Twitter], I’m learning all sorts of tricks for saying the exact same thing in one 10th of the length. Scientists are not always good at being concise.”

An avid supporter of “open” science, Eisen says that he feels obliged to spread scientific information. He does this not only through publishing reports describing his research but also by actively tweeting information from scientific meetings that he attends. “I have many [followers] on Twitter,” he says. “[Some] say if they know I’m going to a meeting they know they don’t have to go because I
just post my notes. The meeting people probably hate that, but sharing the notes allows graduate students and poorly funded faculty to participate as though they were at the conference.” Meetings that ban tweeting—such as those held at the Cold Spring Harbor Laboratory on Long Island in New York—are meetings that Eisen refuses to attend. Likewise, he tends to avoid writing about non-open-access papers on his blog.

Eisen cut his own travel to meetings in this new media era to spend more time with his young children, but also because he now substitutes his blog and Twitter for some of the face-to-face interactions he no longer considers necessary. Instead, new media provide an important vehicle through which he connects with stakeholders—whether they are reporters, program officers, or funders, he says.

These blog and Twitter efforts are now a recognized part of his professional portfolio. For example, the Sloan Foundation recently funded him to develop several new media platforms, including podcasts, websites, and blogs, around its “Microbiology of the Indoor Environment” program. Eisen welcomes additional blogging opportunities. He calls it his favorite type of work these days. “The challenge is doing my other work,” he says. “I love teaching and research, but there’s something about blogging and tweeting that’s a hybrid between the two.”

The Micro Community

The new media foster niche communities. In microbiology, where each finding raises new questions, having ready access to a diverse and knowledgeable group of experts is a valuable asset. For instance, Eisen uses “crowd sourcing” on Twitter to pose questions about his research interests. Recently, he sought input about evolutionary trees based on DNA sequence data from a series of metagenomic projects. “I know many evolutionary biologists have worked on this type of data previously, and I wanted to write a blog on it,” he says. On Twitter, he queried, “Anyone out there know if anyone has solved this problem?” He was soon peppered with references to papers and links to relevant materials. Some researchers replied to his query, writing, “Yeah, we’re working the same problem.”

“You now have a set of people you trust or who work in similar areas, and they can provide very useful feedback, whether it’s informatics or finding sources,” Eisen says. “It’s very powerful.”

Sometimes after users post questions on MicrobeWorld, someone following the site answers them before anyone at ASM headquarters has a chance, Condayan says. “It makes them feel like they’re part of a community,” he says. “Until social networking came along, you could only do that at meetings, and all the information and news was top-down. Now it’s more horizontal, and your participation determines your status in a community. If you’re contributing, people know who you are.” Website managers cannot possibly control all the messages. “If you’re smart, you become a facilitator, and that allows you to keep the pulse of your members,” he says. “If you don’t, you could be hit by something from left field.”

Speaking of left field, Racaniello says he is surprised to find angry people among those following his TWiV and TWiP podcasts. “In my career, I haven’t had to deal with that,” he says. “Online you always run into people who are angry with you, or don’t believe in viruses, or don’t trust scientists, or they’re ill and want answers.” He says topics such as chronic fatigue syndrome and autism seem to rouse the most anger among his listeners. Yet this not-so-pleasant feedback is good for him to hear, he says. “It’s uncomfortable, but it’s good to get out of your lab, away from your research and see it. I think part of it is that people don’t understand the science. And that’s why we do this.”

Zimmer, who writes “Loom,” his Discover Magazine blog, in addition to hosting “Meet the Scientist” for ASM, sometimes receives immature or mean-spirited comments from readers. However, most comments are insightful, he says. Moreover, instead of spending six months with a story—researching, writing, and producing it—and maybe getting a handful of letters, he now posts quickly and sometimes receives responses within minutes. “In my line of work, you’re writing and trying to reach people with your writing,” he says. “So you have to go to the places where people are reading to be a part of the discussions that are going on in these places. Right now, Facebook and Twitter are the places to be.”

So what’s next? Mobile is one answer. Recently, ASM partnered with Wizzard Software to create an iPhone application to stream MicrobeWorld audio and video content over Wi-Fi and the AT&T 3G network. “Mobile has to figure into our considerations now,” says Hyde. “In a way, we don’t have a choice, because this is the way the world is going.”