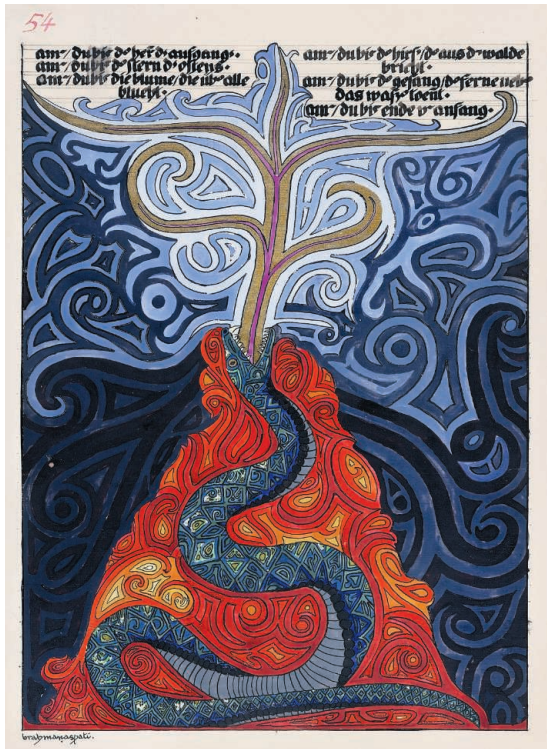
and an idyllic setting that addresses some key biological questions. Losos documents an extraordinary history of research on almost every imaginable attribute of *Anolis* lizards. He frequently stops to take stock before presenting the hypotheses and asking how these could be tested, and he whets our appetites by presenting avenues for future study. What an exciting time it is for evolutionary biology, and anoles provide one of the most compelling systems to further our understanding of the field.

References

1. R. G. Gillespie, D. A. Clague, Eds., *Encyclopedia of Islands* (Univ. California Press, Berkeley, CA, 2009).
2. G. K. Roderick, D. M. Percy, in *Specialization, Speciation, and Radiation*, K. J. Tilman, Ed. (Univ. California Press, Berkeley, CA, 2007).
3. R. G. Gillespie, B. G. Baldwin, in *The Theory of Island Biogeography Revisited*, J. B. Losos, R. Ricklefs, Eds. (Princeton Univ. Press, Princeton, NJ, 2009).

10.1126/science.1182503

BROWSINGS



The Red Book of C. G. Jung. Rubin Museum of Art, New York, through 15 February 2010.

On the lower level of the Rubin Museum of Art in New York, there is a small exhibition, "The Red Book of C. G. Jung: Creation of a New Cosmology." Jung, who was a highly influential figure in the history of psychology and psychoanalysis, spent a period of time during World War I in self-investigation and waking visions. He created phantasmagorical, multicolored, and detailed images that illuminate his description of this exploration in the recently released *Liber Novus* (commonly known as "The Red Book"). The beautiful images, as well as a video describing him by guest curator Sonu Shamdasani, are shown in the exhibit. During the exhibit, the museum has been sponsoring a series of dialogues between notable individuals (including Twitter co-founder Jack Dorsey and philosopher Cornel West) and psychoanalysts; audio podcasts of many of these dialogues will be available at www.wnyc.org. The museum is also showing a film series based on Jungian themes. **–Barbara Jasny**

COMMUNICATING SCIENCE

If Our Messages Are To Be Heard

Peter Kareiva

Scientists know important things. They know about the role of greenhouse gases in global warming. They know how genes are inherited. They know how the body fights off infections. They know that the world's ecosystems are being needlessly degraded. But most scientists do not know how to talk to anyone other than scientists. As a consequence, political leaders and the public at large either ignore or, perhaps more accurately, are bored by whatever it is that scientists are trying to tell them. The general population's attitude toward climate change has become the iconic story of a public that pays no heed to the message of scientists. This inability of scientists to connect with the nonscientists has far-reaching consequences well beyond any single issue such as global warming. Randy Olson and Cornelia Dean have written two very different books with the same goal: to school scientists on how to communicate with and reach the public.

Dean, formerly a science editor for the *New York Times*, knows well how caveats kill the message. And she has seen firsthand the freezing out that instantly accompanies even a hint of patronizing utterances. As a journalist who was in at the founding of the Tuesday "Science Times," Dean saw thoughtful media coverage of science initially grow but then dwindle under the fiscal pressures of failing newspapers. *Am I Making Myself Clear?* is as much about why scientists need to talk to the public as it is about how we should talk science to the public. She argues that scientists need to develop a civic persona that finds some way to communicate science.

Dean's wisdom, especially for engaging in the political arena, is delivered with a mix of authority and charm, as is evident in her advice on how to respond to questions from a congressional committee or staffer: "Say 'I don't know' when appropriate and offer to provide the needed information later. But as the old saying goes, don't let your mouth write checks your ass can't cash. If you promise to provide additional information, memos, or the like, be prepared to produce them, and fast."

Blogs and e-mail campaigns have become hugely influential—for spreading information, creating their own news, and building a community of like-minded activists. However, as Dean cautions, the work required for maintaining an effective blog is enormous, and the return on investment from a scientist's perspective may be too low. The solution may well be science collectives that maintain blogs and can respond instantly to the latest story about a child dying from a flu vaccine or some article that purportedly overturns 30 years of global circulation models. But before we give ourselves over to the Internet, Dean reminds us what we all know—there is too much information out there, so the key is to master the arts of standing out above the confusion and delivering a message that is heard, understood, and remembered. This is hard enough for a captive audience in a classroom and orders of magnitude harder when trying to reach a public audience that has many vibrant options for reading, viewing, and listening. Yet parents with teenagers in their household will have some idea of the power

Don't Be Such a Scientist
Talking Substance in an Age of Style
by Randy Olson
Island Press, Washington, DC, 2009. 215 pp., illus. Paper, $19.95. ISBN 9781597265638.

Am I Making Myself Clear?
A Scientist's Guide to Talking to the Public
by Cornelia Dean
Harvard University Press, Cambridge, MA, 2009. 284 pp. $19.95, £14.95, €18. ISBN 9780674036352.

The reviewer is at The Nature Conservancy, 4722 Latona Avenue NE, Seattle, WA 98105, USA. E-mail: pkareiva@tnc.org

Published by AAAS

of YouTube postings that "go viral" and suddenly become talked about in every high school in the country, having been viewed by millions. The Internet can be a powerful means for communication, and scientists need to better tap into it.

Olson's *Don't Be Such a Scientist* is also about reaching the public in fresh ways, in particular through movies and the entertainment industry. Although his writing style is irreverent and much more raw than Dean's elegant prose, Olson's insights are equally valuable. They come partly from his having lived in the academic world for much of his life. He was a marine biology professor who gave up his tenured university position to go to Hollywood and learn how to make movies. Olson's latest film, *Sizzle: A Global Warming Comedy*, uses goofy humor to inform nontechnical audiences about global warming. Olson's shtick is that science must join the 21st century and reach people where they live—in a world of celebrities, videos, and movies. Olson advocates using entertainment to convey scientific content, and he emphasizes the need to reach people in their hearts and guts (and maybe even their groins). Some readers will find Olson's autobiographical treatise off-putting and a bit narcissistic. But to be turned off by Olson's style only proves his point. Get with it. Film and visual images have enormous capacity to tell stories and change thinking.

CREDIT: COURTESY SHIFTING BASELINES/PRAIRIE STARFISH PRODUCTIONS

The traditional mode of communicating science is not working; surveys that probe the public's mastery of basic scientific issues consistently document that scientists are failing to reach the public (*1*). Stuffy and dry science is a losing proposition. Olson recommends that researchers experiment with new approaches, take risks, develop their own voices, and above all recognize the power of storytelling. Whereas social scientists, linguists, and political scientists might advise us how to better frame the issues, these "ists" are not where Olson turns for inspiration. His book is a plea for indulging one's artistic nature in pursuit of more heartfelt connections to the public. That message will make many scientists squirm, especially those who take refuge in the caricature of science as objective, fact-based, and free from personal values. If scientists were seen as adventurers and explorers instead of as fact-mongers and talking encyclopedias, people might stay awake long enough to learn their science lessons.

Olson is at his best while recounting how unlikeable scientists can be with their relentless critical thinking, negativity, and smarter-than-thou condescension. A particularly telling anecdote concerns a public debate in New York City between two teams arguing whether or not global warming is a crisis. When the moderator asked the "global warming is a crisis" team why it thought the other side was misrepresenting the issues, one scientist responded, "I don't think they ["the global warming is not a crisis" team] are completely doing this on a level playing field that the people here will understand." With that statement, the researcher insulted and instantly alienated his highly educated Manhattan audience. Before-and-after polling revealed that, as a result of watching the debate, the audience (which, admittedly, had been stacked by the organizers) had shifted its position by 16 percentage points against the "global warming is a crisis" view.

It is not hard to figure out why Olson, Dean, and others (*1*) are in 2009 tackling the cultural and communication divide between science and the rest of humanity. Scientists everywhere are bemoaning popular misunderstandings regarding global warming, stem cell research, and childhood vaccination programs, to name just a few topics where science intersects public policy. Fifty years ago, C. P. Snow gave a famous warning about the dangerous divide between science and the humanities, a divide that he thought put human destiny at risk (*2*). Today Snow's warning is even more pertinent, and yet scientists continue to be resoundingly inept at reaching the public. Both Dean and Olson mention that Carl Sagan was spurned by the National Academy of Sciences, purportedly because he was too successful a communicator. The professional reward system in science routinely belittles the "media scientist" or the "advocate scientist." One senses that this is beginning to change, but scientists still have a great deal to learn about effective communication.

"an exceedingly clever vehicle for making science engaging" —*Variety*

Dean and Olson both underemphasize the single biggest reason why scientists are often such ineffective communicators. The failure of scientists as communicators is that they do not know how to listen, especially when it comes to the "uneducated public." Brilliant scientists can be stunningly dumb when it comes to dealing with people. I recall one world-renowned ecologist who nearly caused a brawl in a Pacific Northwest tavern by preaching to the bartender about the extinction crisis and self-righteously scolding the tavern for advertising "fried spotted owl" on the bar menu. Instead of trying to understand the values and thinking behind attacks on the Endangered Species Act, global warming, or the theory of evolution, scientists too often deride what they see as an ignorant public, with potentially devastating consequences (*3*). The foundation of successful communication is listening to and respecting your audience. *Don't Be Such a Scientist* and *Am I Making Myself Clear?* ought to be required reading in all science graduate programs, but they should be supplemented with the wisdom of Nelson Mandela, who knew how to reach a public that initially vilified him (*4*). Scientists could learn from Mandela that to win people's minds you must first get them to listen, and people will listen only if they feel that they are respected.

References

1. C. Mooney, S. Kirshenbaum, *Unscientific America: How Scientific Illiteracy Threatens Our Future* (Basic, New York, 2009); reviewed in (*5*).
2. C. P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge Univ. Press, Cambridge, 1959).
3. A. C. Revkin, *New York Times*, 21 November 2009, p. A1; www.nytimes.com/2009/11/21/science/earth/21climate.html?_r=1.
4. J. Carlin, *Playing the Enemy: Nelson Mandela and the Game That Made a Nation* (Penguin, New York, 2008).
5. J. Coyne, *Science* **325**, 678 (2009).

10.1126/science.1183465

Published by AAAS