History of Physics
NEWSLETTER
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From the March Meeting:
Session Report: "Women and the Manhattan Project"

By Brian Schwartz

Four speakers at FHP sessions at a press conference on "The Atom Files: Extending the Half-Life of Science Stories." From left to right: Ruth Howes, Cynthia Kelly, Susan Marie Frontczak (who spoke at the science communication session), and Michele Gerber.

The Forum on the History of Physics invited session on "Women and the Manhattan Project" featured five speakers, each with a different perspective on the role of women in the Manhattan Project. The session was co-sponsored by the APS Committee on the Status of Women in Physics.

Denise Kiernan, author of *The Girls of Atomic City: The Untold Story of the Women Who Helped Win World War II*, presented the true story of young women during World War II who worked in the then-secret city of Oak Ridge, Tennessee. Kiernan's presentation drew from her interviews with ten women who, in their youth, labored in a range of occupations at Oak Ridge, from janitor to machine operator to secretary to engineer. The Oak Ridge facility was dedicated to making uranium fuel for the atomic bomb dropped on Hiroshima.

Continues on page 2

In This Issue

Continued from page 1

Michele Gerber

Denise Kiernan

History of Physics
NEWSLETTER

The Forum on History of Physics of the American Physical Society publishes this Newsletter biannually at *http://www.aps.org/units/fhp/newsletters/index.cfm*. Each 3-year volume consists of six issues.

The articles in this issue represent the views of their authors and are not necessarily those of the Forum or APS.

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Michele Gerber, author of *On the Home Front*, a comprehensive history of the Hanford Nuclear Site in Washington State, discussed the lives of these women at Hanford during the Manhattan Project. The Hanford site produced most of the plutonium used for the Alamogordo atomic bomb test and the bomb dropped on Nagasaki.

Ruth Howes, a physicist and author, gave a talk entitled, "After the War: Stories of The Women Who Did Scientific and Technical Work on the Manhattan Project." Doors that had been open to women scientists and technicians abruptly closed, Howes explained, as the economy returned to a peacetime footing. Howes presented the stories of the women scientists and technicians of the Manhattan Project and their remarkable determination to continue their careers.

Cindy Kelly is the founder and Director on the Atomic Heritage Foundation, a non-profit organization in Washington, DC, dedicated to the preservation and interpretation of the Manhattan Project and the Atomic Age and its legacy. Her presentation, "Preserving the Manhattan Project," focused on the progress made over the last 20 years to preserve the Manhattan Project properties that for decades have been threatened with demolition and indifference.

The final speaker was Olivia Fermi, granddaughter of Enrico Fermi. Her presentation was entitled, "Then and Now: Women Respond to the Manhattan Project -- An Illustrated Talk." She discussed two women inextricably involved with and affected by the Manhattan Project: her grandmother Laura Fermi, and Marian Naranjo, an inhabitant of the Santa Clara Pueblo near Los Alamos and an environmental and social justice activist. ■

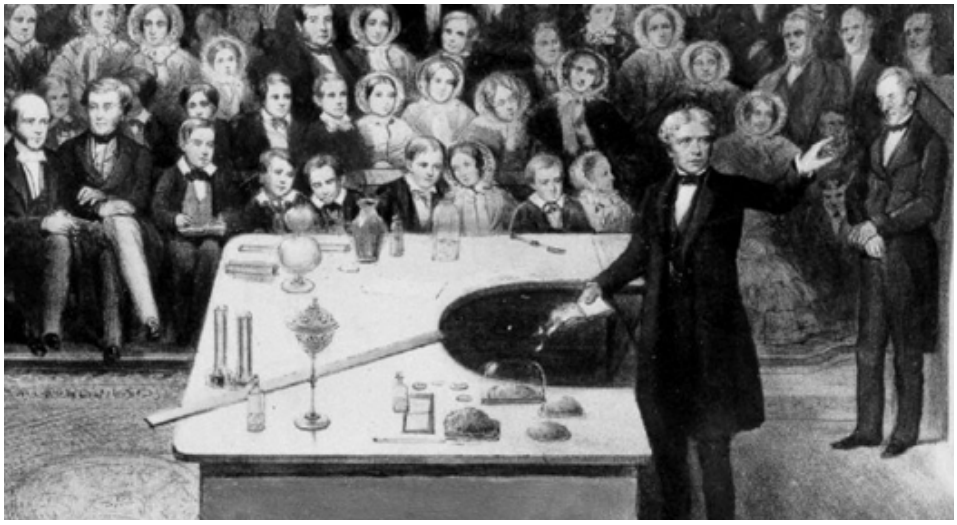
Session Report: "History of the Communication of Science to the Public"

By Brian Schwartz

The Forum on the History of Physics invited session on "The History of the Communication of Science to the Public" at the Denver American Physical Society meeting in March 2014 featured five speakers who are not only experienced in the subject but currently play a significant role in the communication of science to the public.

Frank Burnet is Emeritus Professor of Science Communication, University of the West of England, and spoke on "The Establishment of Science Communication for the Public at the Royal Institution." The Royal Institution (RI) was founded in 1799 with one of its missions being "…for teaching … courses of philosophical lectures and experiments, the application of science to the common purposes of life." There was an emphasis at the Royal Institution on bringing science to the general public, rather than to the specialist. The initiative to create the RI was led by Joseph Banks, the then President of the Royal Society of London, and Benjamin Thompson, an American who fled to England after picking the losing side in the War of Independence and who then became among many other things the Bavarian Army Minister and a Count of the Holy Roman Empire (Count Rumford). Much of the Royal Institution's early activity was directed towards promoting innovation in the field of agriculture, and the majority of its founding ``proprietors'' were wealthy landowners. Two of the greatest scientists of their time, Humphry Davy and Michael Faraday, played a key role in the Royal Institution's outreach to the public programs.

Karen Rader, a historian of science at Virginia Commonwealth University, unfortunately became ill the day before her talk and was unable to be present. She did, however, email her PowerPoint slides and written manuscript, entitled "The Exhibits Revolution in Science and Natural History Museums, 1900- 1990;" the chair of the session, Brian Schwartz read and displayed her presentation. By the end of the twentieth century, Rader said, American natural history and science museums had become institutions defined largely by their displays. Her talk made use of life science and physics exhibits to illustrate how and why this transformation occurred. Efforts to modernize displays shaped and were themselves shaped by changing institutional roles and identities for museums in twentieth-century science education and in American culture. Many of her observations were drawn from her co-authored book with Victoria E. M. Cain, *Life on Display: Revolutionizing U.S. Museums of Natural History and Science in the Twentieth Century.* American efforts to transform museums as institutions of science education and communication pre-date Frank Oppenheimer by at least a half a century, and were modeled on transformations already underway in the late nineteenth century in European museums. A visitor to a place like the Smithsonian would have experienced walking through heavy vertically-oriented museum cases filled with



Michael Faraday delivering a Christmas Lecture at the Royal Institution in 1856.

Brian Schwartz reading Karen Rader's talk.

Continues on page 4

Continued from page 3

The actor Susan Marie Frontczak in period dress posing as Madame Marie Curie.

Susan Marie Frontczak speaking about her performances as Marie Curie.

New York Times reporter Dennis Overbye (top center-right) speaking from his office in New York City to the session via Skype. To ask questions, questioners had to come to a laptop on the stage. [Image 450]

hundreds of taxonomically arranged specimens. By the 1920s, the same visitor would have large dioramas presenting artistically-rendered nature scenes, frozen in time for careful, but distanced, visitor observation. By the mid-1960s, a visit would present "active" displays, like the Boston's Museum of Science "Transparent Woman." By the end of the 20th century, scientists were extraordinarily invested in the success of museums' displays and saw displays as an integral element of their own public outreach work and research agendas.

Susan Marie Frontczak is a writer, actor and storyteller who spoke on "The Role of Living History in the Communication of Science to the Public." Frontczak as an actor performes the role of famous and accomplished women before diverse audiences. Her show, "Manya - The Living History of Marie Curie" is a two-hour, full-length adult program. Frontczak aims to reveal the human behind the scientist, while placing Marie Curie's life and accomplishments in a memorable historical context. This one-woman drama exposes the struggles and triumphs of Madame Marie Curie (née Maria Skłodowska)—an academically impassioned, vehemently private, fervently Polish scientist, mother, and teacher. The drama takes place in 1915 at the outset of the Great War. Her program spans childhood memories, romance, scientific discoveries, and honors; the disruptions incurred by fame, the pain of the loss of her husband, and re-emergence. Susan also developed a one-hour program, "A Visit with Madame Curie," for adults or for school groups grades 4 through 12, and a 40 minute presentation, "Madame Curie from Childhood through Scientific Discovery," for younger children. Her performances are followed by a Q&A session, with Frontsczak remaining in the character of Marie Curie throughout.

Audience giving rapt attention to Overbye's Skyped presentation.

Dennis Overbye, a science reporter for *The New York Times*, spoke on "The Historical Role of *the New York Times* in the Communication of Science to the Public." Overbye, unfortunately, was not able to be present in person, but due to the extraordinary effort of the APS IT staff was able to present his talk and PowerPoint slides by 2-way video. More than any United States paper, *The New York Times* has and continues to play a major role in science reporting. It remains the only US newspaper with a significant science reporting staff and a weekly section, "Science Tuesday" (published since 1978) devoted to science and medicine. The *Times* produces something like 40,000 words on science a week— half in the Science *Times* on

Continues on page 9

Session Report: "Twentieth-Century Chinese Physicists and Physics"

By Danian Hu

Yuelin Zhu (seated) about to give his presentation, aided by session chair Danian Hu.

Sponsored by FHP and FIP, an invited session on "Twentieth-Century Chinese Physicists and Physics" was held at APS March meeting in Denver, CO on March 6, 2014. The session was organized and chaired by Dr. Danian Hu of The City College of New York. The session featured five invited speakers, three of whom came from Beijing, China. One of the three, Prof. Xiaodong Yin, was the recipient of a 2014 Beller Lecturership. During the session, Dr. Amy Flatten, the Director of International Affairs of APS, presented the Beller Lectureship certificate to Prof. Yin.

The first speaker in the session was Dr. Yuelin Zhu from Gutman Library, Harvard University. Zhu presented a paper titled "Chien-Shiung Wu: An Icon of Physicist and Woman Scientist in China," which introduced relevant historical perspectives and show how Wu became an icon. Zhu analyzed especially the 1956 experiment of Cobalt-60 that Wu conceived and initiated. This one, and two other experiments carried out by others, eventually proved the presence of parity violation in weak interactions. Wu's story, according to Zhu, may also help us understand the cultural characteristics of Chinese-born American physicists.

Dr. Xiaodong Yin from Capital Normal University in Beijing was the second speaker. Her presentation, "Chinese Physicists Educated in the Great Britain during the First Half of the 20th Century," examined the experiences of more than thirty Chinese students who went to study physics in Great Britain during the first decades of the last century. Comparing these British trained Chinese physicists with their counterparts educated in Japan and America, Yin argued that Chinese physicists educated in Britain had a high degree of specialization as a whole and formed a unique style, making unique contributions to Chinese physics development.

Prof. Tian Yu Cao of Boston University spoke next on "Mao and physics research in China in the 1950s-1960s: the H-bomb project and the Straton model." Cao analyzed Mao's deep and long-lasting impact on physics research in terms of (1) his establishment of an institutional infrastructure for modern physics research, (2) his science policy in which physics research was all organized in a mission-oriented way, and (3) his metaphysical presumption of infinite divisibility of matter, the guiding spirit of China's only research project in fundamental particle physics, the so-called Straton model that was conceived and pursued in China from the mid-1960s to the early 1980s.

The fourth speaker was Prof. Bing Liu of Tsinghua University in Beijing. Liu's presentation focused on "some problems in the competition of high-temperature superconductivity research during the late 1980s." He investigated especially the competition among American, Japanese, and Chinese scientists during that period, and broached such issues such as different national styles in research strategy and methodology, peer review, the "Matthew Effect," and trade secrets. All these issues, according to Liu, are not only historically significant but also sociologically and philosophically meaningful.

Finally, Dr. Jinyan Liu from The Institute for the History of Natural Sciences, Chinese Academy of Sciences (CAS), presented a brief history of the Chinese Institute of Theoretical Physics

Continues on page 6

A Staged Reading of the Play: "W=S:Transistor Shock"

By Brian Schwartz

Brian Schwartz introducing the play and players.

Players of the Boulder Ensemble Theatre Company immediately following the performance.

In yet another unusual FHP-sponsored event, organized by Brian Schwartz, the Boulder Ensemble Theatre Company performed a dramatic staged reading of "W=S:Transistor Shock," a new play by Ivan K. Schuller and Adam J. Smith, at the Sheraton Denver Downtown, near the Denver Convention Center. A quick plot summary: A university is offered funding, but only if they'll name a building for William Shockley. William Shockley was an American physicist and inventor who won the Nobel Prize for his work on the transistor, but was infamous for his support of eugenics. What do they do? After the performance, the director, actors, and playwrights discussed the play with the audience. ■

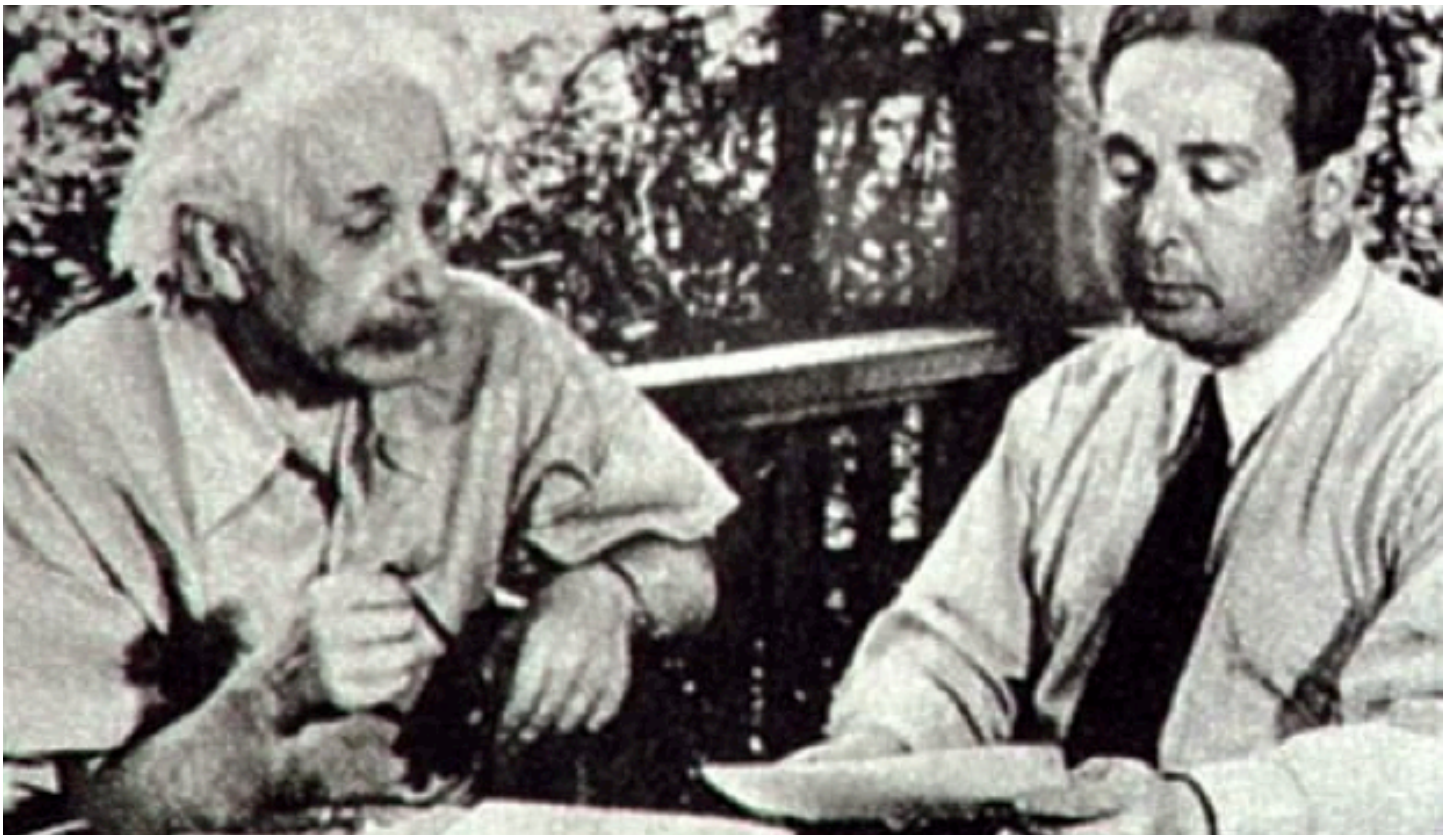
Twentieth-Century Chinese Physicists and Physics

Continued from page 5

(ITP) in the CAS. Founded in June 1978, the ITP has played an important role in the Chinese development of theoretical physics, especially in organizing and undertaking major national projects, expanding international exchanges and cooperation, and nurturing advanced researchers. Liu's presentation discussed the establishment and accomplishments of the ITP as well as its academic leaders in the past 35 years. ■

Prof. Xiaodong Yin receiving the 2014 Beller Lectureship Award from Amy Flatten, the APS Director of International Affairs.

American Physical Society FHP Sessions, April 5-8, 2014 Savannah, Georgia



Einstein and Szilard

April 5, Saturday • 1:30 pm to 3:18 pm Session C17: "Journeys in the History of Physics: Pais Prize Session in Honor of David Cassidy,"
Room 105-106
Session Organizer: David Cassidy
Chair: Catherine Westfall

"Abraham Pais Prize: Physics History, and Biography"
David Cassidy

"Toward A Rethinking Of The Relativity Revolution"
Daniel M. Siegel

"An Insider's History of Some of the Significant Changes in the APS from the 1960s to Today" *Brian Schwartz*

April 6, Sunday • 1:30 pm to 3:18 pm Session K17: "Gaining Inspiration From Galileo, Einstein, and Oppenheimer," *Room 105-106*
Session Organizer and Chair:
Catherine Westfall

"Galileo As An Intellectual Heretic And Why That is Important"
Paolo Palmieri

"Walking in the Footsteps of Einstein: Why History of Physics Aids Physics Education"
Gerd Kortemeyer

"Using the History of Physics to Enrich Your Teaching"
B. Cameron Reed

April 7, Monday • 10:45 am to 12:33 pm, Session R17: "The Many Worlds of Leo Szilard," *Room 105-106*
Co-sponsored by FHP and FPS
Session Organizer and Chair:
Dan Kleppner

"The Many Worlds of Leo Szilard: Physicist, Peacemaker, Provocateur"
William Lanouette

"Leo Szilard In Physics And Information" *Richard Garwin*

"Leo Szilard: Biologist and Peace-Maker" *Matthew S. Meselson*

April 8, Tuesday • 1:30 pm to 3:18 pm Session Y10: "History of G-2: Experiment and Theory," *Room 205*
Co-sponsored by FHP and DPF
Organizer and Chair:
Robert P. Crease

"Study of Electron G-2 from 1947 to Present" *Toichiro Kinoshita*

"The First CERN Muon G-2 Experiment" *Richard Garwin*

"The BNL Muon G-2 Experiment and Beyond" *Yannis Semertzidis* ■

Einstein and the Quantum: The Quest of the Valiant Swabian

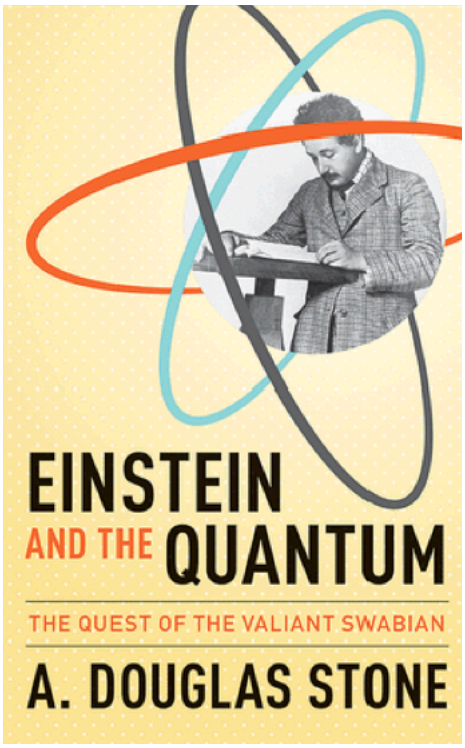
By A. Douglas Stone | *Princeton University Press, 2013, 332 + x pages, $29.95*

Reviewed by Michael Riordan

Despite scores of books about Einstein and his scientific achievements, the well never seems to run dry. Perhaps it is a measure of his greatness. There are so many dimensions to plumb, it seems, that the source may be inexhaustible.

Yale University physicist A. Douglas Stone has opened up yet another vein in Einstein's life and science, one we learned about as undergrads but has so far been paid insufficient attention: his pioneering work in quantum mechanics. Yes, we know he was the first to take Planck's quantum seriously—and earned widespread derision for his boldness until the experiments of Millikan, Compton and others bore out his "wild hypothesis" during and after the Great War. That's why Einstein was awarded the Nobel prize, after all, not relativity. But the focus of biographies and histories has remained upon his singular contributions to the special and general theories. Other physicists like Bohr, Heisenberg, Pauli and Schrödinger supposedly picked up the dropped quantum ball and ran with it.

In Einstein and the Quantum, Stone puts his hero back in the midst of the history of quantum mechanics, building a narrative around his three decades of contributions to the revolutionary theory. In consummate detail and with a flair for the written word, he delves into Einstein's original rationale for espousing the quantum, his use of it to account for the mysterious behavior of specific heats at low temperatures, his explanations of spontaneous and stimulated emissions, and the derivation of



the statistics of integer-spin particles. Readers benefit from Stone's deep understanding of quantum physics as well as his thoroughness in citing primary Einstein documents—rather than regurgitating the opinions of others—to support his conclusions.

One surprise to me, given the famous Bohr-Einstein debates of the late 1920s, was how Einstein struggled for years with wave-particle duality, long before it became a centerpiece of the famous (or, depending on one's viewpoint, infamous) Copenhagen interpretation of quantum mechanics. On reflection, however, it seems a natural task for one—and he was probably the only one for at least a decade—who took the particle nature of light seriously. In the early 1900s, electromagnetic radiations such as X-rays and gamma rays were often found to behave like particles, not waves. How to account for this curiosity within the then-dominant paradigm, Maxwell's theory?

Einstein's early attempts prefigure to some extent Louis de Broglie's later evocation of "pilot waves" to explain the wavelike behavior of matter particles. But he goes much deeper and further than just trying to formulate a suitable explanatory mechanism, invoking philosophical arguments and the gedanken experiments he later became famous for. To me, this is one delight of reading this fine book. Readers get to watch over his shoulder, as it were, as Einstein wrestles with seemingly paradoxical behaviors in face of stern opposition from reluctant classical physicists.

There are only a few books on the history of physics that I can heartily recommend to both scholarly historians and physicists interested in the history of their discipline. Because of Stone's extensive research and writing abilities, Einstein and the Quantum is indeed one of those books.

Michael Riordan, author of *The Hunting of the Quark* and coauthor of *Crystal Fire*, taught the history of physics at Stanford University and UC Santa Cruz. ■

Continued from page 4

Joseph Hanson

Tuesday, the other half spread out during the other days of the week. Overbye presented a historical look back to see if and how the *Times* covered some of the landmark moments in science of the last century. On September 26, 1905, for instance, Einstein published his theory of relativity. Although there were twenty-three stories on the *Times* front page, relativity was not covered. In fact Einstein's name would not appear in the *Times* until 1917, in an article about Einstein's general theory of relativity, connected to its prediction that light rays would be bent going near the Sun and the bending could be seen in a solar eclipse. Similarly unreported on in the *Times* was the famous Solvay meeting of the world's greatest physicists on October 27, 1927, to argue about yet another physics revolution, quantum mechanics, at which Einstein, Bohr, Heisenberg and many other accomplished scientists of the day were present. On April 25, 1953, the date James Watson and Francis Crick published a short paper in *Nature* disclosing the double helix structure of DNA, the *Times* buried the lede, only mentioning at the end that this shape provided a basis for the transmission of genes. Ultimately, the science reporting of the *Times* evolved to a state where reporters consult with a small army of scientist-helpers to make sure they do not miss any more big moments.

Joseph Hanson, affiliated with PBS Digital Studios, discussed "The Future of the New Media in the Communication of Science." Hanson demonstrated how new media—based around social networks, ubiquitous consumer technology, and today's near-universal access to information—has transformed the way that science is communicated to the scientist and non-scientist alike. He demonstrated that free information and programs on the web can earn significant public following, and thus provide funding for the science communicators as well as the organizations producing and distributing such material. An example of a site which has a significant following and even earns money is "Minute Physics," by Henry Reich. Discovery is bringing "I F**king Love Science," a popular Facebook page by creator Elise Andrew with over 10 million likes, to its Science channel in the fourth quarter of 2014. Joe believes we may be in the middle of the greatest shift in information consumption and distribution since the invention of the printing press (or maybe not). He placed today's new media evolution into perspective, and gave clues as to where social media, digital journalism, open access, and online education will lead science communication in years to come. It remains to be seen whether this new media evolution will translate into a shift in how science is viewed by citizens and policymakers. ■

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