

Faust in Copenhagen

“If you’re going to write a non-fiction book,” advised physics professor **Gino Segrè** in his **60 Second Lecture** last fall, “you’d better choose a story you’re interested in with characters that you want to know better because you’re probably going to be spending a lot of time with them.” In writing his newest book, *Faust in Copenhagen: A Struggle for the Soul of Physics*, Segrè spent three years communing with the spirits of the most brilliant stars of 20th-century physics — Niels Bohr, Paul Dirac, Werner Heisenberg, Wolfgang Pauli and other luminaries. “I wanted to write it because the characters are in

Gino Segrè



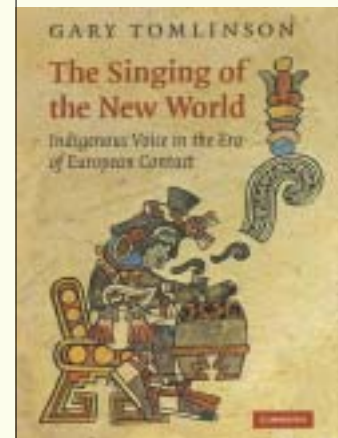
Bridget Renshaw

many ways my intellectual heroes,” he says. Segrè is a high-energy theoretical physicist. His book is an account of the conversations and personalities at the April 1932 physics conference held at Bohr’s Copenhagen Institute. It was the dawn of nuclear power and big science, and world war was about to seize upon the direction of these scientists’ research and lives. The conference ended with a skit, a spoof of Goethe’s *Faust* written by physicist Max Delbrück that poked fun at the elder pantheon of physicists. Segrè’s book is a mix of science and history that gives general readers a close-up glimpse of the culture of theoretical physics and portraits of some of the most remarkable, witty and idiosyncratic people you’ll ever spend time with. *You can view 60 Second Lectures at www.sas.upenn.edu/video.*

Godly Republic

Even before his brief stint as “faith czar” in the White House Office of Faith-Based and Community Initiatives, **John DiIulio, C’80, G’80**, was a believer in the power of religion-government partnerships to help solve the nation’s social problems. He still is, although as a political scientist, his “faith” is data-based. His new book, *Godly Republic: A Centrist Blueprint for America’s Faith-Based Future*, argues for the middle ground between those who seek to cast out religion, like a demon, from public life and those intent on baptizing America as a Christian nation. DiIulio, the Frederic Fox Leadership Professor of Politics, Religion and Civil Society, observes that “most citizens in both parties, and most top leaders, agree that, so long as there is no proselytizing or such, government can and should partner with urban community-serving religious organizations and grassroots groups to serve needy children, youth, and families.” He hopes the book will

help pull the church-state debate back to the political center “on behalf of the poor.” He writes, “I even hold out hope for mutual civic forbearance so deep that it will permit joint left-right, secular-sectarian advocacy and action.” Given the deeply held convictions animating the culture wars, it seems an unlikely hope. But, DiIulio adds, “I believe in miracles.”



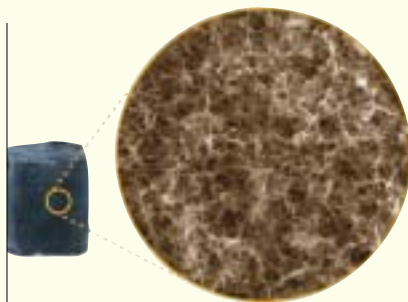
Hearing the Lost Music

Music professor **Gary Tomlinson** loves to “listen” to the forgotten songs of indigenous Americans, songs whose actual sound can no longer be reconstructed or performed. “What we can still hear in certain songs from these societies ... is the nuanced cultural work they were designed to accomplish,” he writes in *The Singing of the New World: Indigenous Voice in the Era of European Conflict*. Tomlinson, the Annenberg Professor in the Humanities, is an expert in the music of the late Renaissance and early Baroque period and also specializes in opera, music and cross-cultural contact, and cultural history and historiography. Using accounts from early European colonizers, archaeological findings and rare indigenous documents, he explores

the power of song in Aztec rituals from just after the European conquest, in Inca ceremony and in cannibal rituals of the Brazilian Tupinamba. “I’m interested in two very general propositions,” he explains: “musical difference in the world — that is, the extraordinary, deep variety that this universal human activity assumes — and, behind and beyond this difference, the overarching similarities that characterize the powers humans discover in music making.” His book closes with an examination of these case studies as “instances of the always fraught role of heightened voice in the meetings of far-flung societies.” Tomlinson’s future research will look at the evolution of music making in *Homo sapiens* and our hominid ancestors.

Carbon Nanotube Aerogels

Scientists from the **Department of Physics and Astronomy** have created aerogels made from carbon nanotubes that can support 8,000 times their weight. Aerogels are rigid gels from which the liquid is extracted and replaced by a gas. A carbon nanotube is a one-atom thick sheet of graphite rolled into a cylinder one nanometer — a billionth of a meter — across. In a collaboration led by **Arjun Yodh**, the James M. Skinner Professor of Science, and **Jay Kikkawa**, an associate professor of physics, researchers created aerogels interlaced with carbon nanotubes. “We started with carbon nanotube gel networks in suspension,” Yodh explains, “removed the suspending fluid and thereby produced a network of carbon nanotubes with controllable purity, connectivity, strength, conductivity and shape.” The scientists freeze-dried the liquid suspension, leaving a web of freestanding nanotube filaments. This new class of material has a high surface-



Polymer-reinforced aerogel pillar with scanning-electron-microscope close-up revealing its open, porous structure

to-volume ratio and is ultra-light and potentially extra strong for its weight. Investigators are able to manipulate its electrical conductivity, flexibility and strength by adding polymers to the starting suspensions and by electrically pulsing the aerogel network. “I think sensors and electrodes might be the most easily attainable applications,” notes Yodh. The new carbon nanotube aerogels might also contribute to the manufacture of stronger, lighter materials, he says.

Monkey Mind

“Monkey society is governed by the same two general rules that governed the behavior of women in so many 19th-century novels,” write **Dorothy Cheney** and **Robert Seyfarth** in their book *Baboon Metaphysics: The Evolution of a Social Mind*. “Stay loyal to your relatives ... but also try to ingratiate yourself with the members of high-ranking families.” Cheney, a professor of biology, and Seyfarth, a psychology professor, show baboons to be skilled social schemers. For 15 years, the husband-and-wife team has lugged loudspeakers, batteries and cameras across the Okavango Delta in Botswana, avoiding lions, devising field experiments and watching a troupe of 80 Chacma baboons. These sharp-fanged, dog-snouted creatures maintain strict matrilineal hierarchies in which, the

researchers discovered, individuals recognize their own place as well as the rank of other group members. Many of Cheney’s and Seyfarth’s imaginative experiments involved playback of baboon calls whose meaning ran counter to the animals’ expectations of what “should” happen, given the reigning system of rank. The scientists then observed registers of surprise, which suggest that the baboons understand who stands where within the troupe. Their findings tell us a great deal about the social intelligence of these primates and even something about how the human mind — and language — could have evolved out of our ancestors’ facility at comprehending the rule-governed structure of their own social groups.



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