experiments *in vitro* and on mice, the researchers discovered that when the hemozoin nanocrystals are excited by a picosecond 672-nm laser pulse, they absorb enough energy to vaporize a small volume of the surrounding fluid. The vapor nanobubbles' expansion and collapse generate a detectable acoustic pulse. Both the laser pulse and the acoustic signal can pass through the skin, so the diagnosis can be performed without drawing blood. The researchers have shown that the technique does no damage to uninfected blood cells or other tissues, and they are presently conducting their first study on human patients. (E. Y. Lukianova-Hleb et al., *Proc. Natl. Acad. Sci. USA* **111**, 900, 2014.) —JLM

Understanding *qi-wa*, the curling of scrolled artwork. In the Chinese and other traditions, paintings are executed on long paper or silk scrolls. On display, those artworks may be plagued by *qi-wa*, a curling up of the side edges that can tear fibers and dislodge pigment. Many analyses to date of *qi-wa* have focused on such factors as environmental humidity or the glue used to affix a painting to its mounting. But a group of Taiwanese physicists and conservationists led by Tzay-Ming Hong of National Tsing Hua University have shown that *qi-wa* can be explained by a physical mechanism put into play when the art is rolled up for storage. Rolling compresses the inner, painted face of the scroll in the long direction and stretches the outer face. When the scroll is removed from storage, the strain relaxes. As a result of the Poisson effect, the art face gets compressed in the transverse direction, the back face is stretched, and the scroll curls along its sides. Ultimately, the amount of curling is determined by the scroll's seeking to minimize its total stretching energy and thus is a function of various stretching moduli of the mounted artwork. Hong and company's analysis is applicable to thin sheets generally and suggests specific strategies for minimizing *qi-wa*. For example, the researchers recommend aligning the fibers of the mounting paper parallel to the long direction of the artwork, a procedure carried out in traditional Japanese practice but contrary to Chinese custom. (M.-H. Chou et al., *Phys. Rev. Lett.* **112**, 034302, 2014.) —SKB

SHEN NANPI

Binaural hearing for the hearing-impaired. Listening to someone in a noisy restaurant is easier with two ears (binaural) than with just one, for three reasons. When speech and noise come from spatially separate sources, differences in both their volume and arrival time at the two ears help the listener to separate them. (For more on interaural differences, see the article by Bill Hartmann, PHYSICS TODAY, November 1999, page 24.) But even when speech and noise are coincident in space, the third reason, an effect called binaural summation, centrally integrates the signals from both ears, and the signal—the speech—is enhanced over the surrounding noise. Many profoundly deaf people have regained some hearing through using cochlear implants either in both ears (bilateral) or in just one with a hearing aid in the other (bimodal). But which of the three speech-recognition advantages accrue most with which device configuration has been indeterminate. Now Kostas Kokkinakis and Natalie Pak at the University of Kansas report that both bilateral and bimodal users reaped significant speech-recognition benefit—roughly 7 dB in the signal-to-noise ratio compared with a suitable control—from the sound-level effect and very little, if any, benefit from arrival-time differences. The surprise came with summation: On average, the duo saw a 7-dB improvement in bimodal users, while bilateral users gained a meager 2 dB. The researchers say the low-frequency cues delivered to one ear by the hearing aid complement the higher frequencies delivered to the other ear by the cochlear implant. (K. Kokkinakis, N. Pak, *J. Acoust. Soc. Am.* **135**, EL47, 2014.) —SGB

String formation in complex fluids. Many everyday materials, such as shampoo, ink, and coffee, are complicated mixtures of fluids and suspended particles with complex and often surprising internal interactions (see the articles by Alice Gast and William Russel, PHYSICS TODAY, December 1998, page 24, and by Amy Shen and Perry Cheung, September 2010, page 30, and the Quick Study by Peter Yunker, Doug Durian, and Arjun Yodh, August 2013, page 60). For example, under shear flow (like the flow field you generate when you stir your coffee), the particles can attract each other and align in chains, as seen in this microscope image of 40-µm-diameter polystyrene beads in a solution of polyisobutylene and heptane. First reported nearly four decades ago, the chain behavior has been extensively explored, but a conclusive explanation for it has been elusive. Experiments by Jan Vermant and colleagues at the University of Leuven, Belgium, and ETH Zürich offer new insights into the underlying causes. The team prepared various fluids with polystyrene beads and sheared them between counterrotating top and bottom plates or between counterrotating, concentric cylinders and imaged the particles' motion. The researchers found that although anisotropic normal-stress differences and confinement can each promote string formation, neither is essential. But shear thinning—the decreasing of viscosity at higher shear rates—is. Shear flow naturally causes suspended particles to spin. In "normal," Newtonian fluids, particles that get sufficiently close will tumble together and eventually separate. In shear-thinning fluids, however, the viscosity decreases in the thin gaps between adjacent particles, enabling the particles to spin separately yet stay in line. (S. Van Loon et al., *J. Rheol.* **58**, 237, 2014.) —RJF ■