

The newsletter of
The Acoustical Society of America

ECHOES

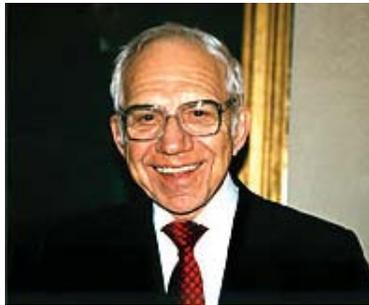
Volume 19, Number 2
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A Life in Acoustics

Leo L. Beranek

I received my Bachelor of Arts degree from Cornell College in Iowa in 1936. That fall, I entered the graduate school of Harvard University in the department of physics and communication engineering with a full scholarship. I received a Master of Science degree in 1937. From the fall of 1937 to the summer of 1939, I was a half-time research assistant to Professor Frederick V. Hunt. With him I helped develop a light-weight phonograph pickup that made possible the use of vinyl disks which resulted in LP recordings of 23 minutes per side compared to 3 minutes per side for previous shellac disks. We also investigated the sound fields in a model of a rectangular room with different acoustical materials on the inner surfaces, also the sound fields in a full scale rectangular room. For my thesis research, I developed a new apparatus for measuring acoustic impedance of sound absorbing materials, and I determined the impedance for a number of commercially available materials. Simultaneous with receiving my Doctor of Science Degree in June 1940, I submitted two papers on this research to the *Journal of the Acoustical Society of America* (JASA) which were published in the July 1940 issue.

In the fall of 1940, I was made director of the Electro-Acoustic Laboratory at Harvard under funds provided by a new Federal agency, the National Defense Research Committee. The initial goal of that laboratory was to develop a new light-weight, highly-sound-absorbing material, for installation in aircraft. I invented a material with very small fibers that was then manufactured by the Owens-Corning Fiberglas Company under the name "Fiberglas AA". Our work soon turned to improving voice communication in high-altitude, unpressurized, military aircraft. We found from extensive tests that the human voice weakens in high-altitude, low-density-air surroundings and that the earphones then in use by the military services also failed at such altitudes. We set about finding and developing earphones that would perform well in low-density air surroundings, we developed amplifiers whose gain increased as the air pressure decreased and with the Psycho-Acoustic Laboratory, under the direction of S. Smith Stevens,



we helped develop new helmets and doughnut cushions around the ears that reduced the aircraft noise at the ears. These developments were immediately incorporated into the equipment used by personnel in military aircraft. The work of the laboratory then turned to improving communication on U. S. Navy warships. At the end of the war I wrote the book *Acoustical Measurements* (1949), which incorporated some of our wartime work.

In the fall of 1947, I was appointed Associate Professor of Communication Engineering and Technical Director of the Acoustics Laboratory at MIT. I taught a course in electroacoustics for which in 1954 I wrote my book *Acoustics*. In the fall of 1948, I co-founded the acoustical consulting firm Bolt Beranek and Newman, Inc. (BBN) with Professor Richard H. Bolt and Robert B. Newman. We worked with architects and companies to design acoustically satisfactory spaces for workers and to recommend the acoustical design of offices, classrooms, auditoriums, concert halls and opera houses. I taught courses on noise reduction at MIT in alternate summers from 1953 to 1964 and from them came the 1960 book, *Noise Reduction* and the 1971 book, *Noise and Vibration Control*.

Three important acoustical projects at BBN under my direction were (1) the construction of the world's largest muffler needed to quiet the extreme noise generated by the testing of supersonic jet engines at a NASA research facility located in the midst of Cleveland, Ohio, communities; (2) reducing the noise inside a Convair, propeller-driven, passenger aircraft; (3) headed a group that included psychologist Karl Kryter and acoustical engineer Laymon Miller, that, under the auspices of the Port of New York Authority, developed noise requirements for jet aircraft that were to operate out of New York airports for the first time in the fall of 1958. The result was that the aircraft manufacturers had to provide mufflers on the jet engines that reduced the noise levels measured in neighborhoods by 15 decibels.

One of the greatest professional influences on my life has

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We hear that . . .

• **Leo Beranek** received the 2008 Eta Kappa Nu Vladimir Karapetoff Award on January 24 from Eta Kappa Nu, national electrical engineering and computer science honorary. The Karapetoff Award is made annually to an electrical engineering practitioner who has distinguished him/herself through an invention, discovery or development that has demonstrated a long-term positive impact on the welfare of society. The citation for the Leo L. Beranek award reads, "For technical attainments in acoustics, broadcasting, and computer networking."

• The ASA ad hoc Innovation Committee received 17 proposals for **Innovative Projects** and selected the following three proposals for funding:

"Promoting Inter-Society Participation in the ASA Through Local Chapter Activities" by Dr. Natalia Sizov [\$2500];

"ASA On-line Study Guide of Acoustics" by Prof. Dr. Malte Kob [\$2000];

"Urban Design with Soundscape in Mind: A Symposium on Urban Planning with Consideration Given to Impacts Caused by Noise" by Mr. Kerrie Standlee and Dr. Brigitte Schulte-Fortkamp [\$5500].

Engineering Acoustics

First: George Lewis, Cornell University

Second: Scott Porter, Pennsylvania State University

Musical Acoustics

First: Summer K. Rankin, Florida Atlantic University

Second: Hiroko Terasawa, Stanford University

Noise

Clinton Francis, University of Colorado

Speech Communication

First: Elizabeth Hunt, MIT

Second: Joseph Toscano, University of Iowa

Structural Acoustics and Vibration

First: Jon La Follett, Washington State University

Second: Micah Shepherd, Brigham Young University

Underwater Acoustics

First: Aubrey Espana, Washington State University

Second: Lin Wan, Georgia Institute of Technology

Best student paper awards (Miami)

Acoustical Oceanography

First: Megan Ballard, Pennsylvania State University

Second: Lin Wan, Georgia Institute of Technology

Animal Bioacoustics

First: Hsiao-Wei Tu, University of Maryland

Architectural Acoustics

First: Robert M. Tanen, University of Hartford

Second: Linda Gedemer, Rensselaer Polytechnic Institute

From the Student Council

Eric Dieckman

Greetings from sunny Miami! The Miami meeting, while on the smaller side, was well attended by students. Approximately fifty students attended the Monday night Student Icebreaker, and nearly eighty students joined fifty senior ASA members at Wednesday night's Student Reception. At the Student Reception the Mentoring Alliance provided a free ticket to the Fellows' Luncheon for one student in each technical committee. These tickets were raffled off and the winning students were hosted at the luncheon by a Fellow in their technical area.

During the Student Council meeting, Jim Sabatier discussed "Project Listen Up," the Technical Committee on Education's campaign to update techniques for teaching and visualizing principles of acoustics. Anyone with an idea for an acoustics demonstration is encouraged to submit a paper demonstrating it at an upcoming ASA meeting.

Another upcoming event at the Portland meeting is the Student Council's fourth Grants and Fellowships Workshop. This workshop, which will be held on Thursday and is open to all students, will emphasize grant and fellowship writing techniques. As always, visit the ASA Student website at www.acosoc.org/student/ for the latest news about the Portland meeting.

We look forward to seeing many students in Portland this May!

Eric Dieckman is a graduate student in architectural acoustics at Rensselaer Polytechnic Institute.



ECHOES



ECHOES

Newsletter of the Acoustical Society of America

Provided as a benefit of membership to ASA members

The Acoustical Society of America was organized in 1929 to increase and diffuse the knowledge of acoustics and to promote its practical applications.

Echoes Editor Thomas Rossing

ASA Editor-in-Chief Allan Pierce

Advisors Elaine Moran, Charles Schmid

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A Life in Acoustics

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been the Acoustical Society of America. The papers I have presented at meetings and published in JASA have built personal and professional relationships that have meant more to me than I can possibly express. I served on the Executive Council from 1944 to 1947, was Vice President from 1949-1950, and was President from 1954 to 1955. While President, I set up a Committee on Promotion and Development, first under the chairmanship of R. Bruce Lindsay, and after the conclusion of my presidency, under my chairmanship. The results were that the number of ASA Technical Committees was increased to ten and the Technical Council evolved, which has been an important means for bringing the needs of the various branches of acoustics to the Executive Council and the Officers of the Society. I also promoted the establishment of the short-lived ASA magazine *Noise Control*. Its demise was followed by the founding of the Institute of Noise Control Engineering, of which I was the first president. From the Acoustical Society I received the R. Bruce Lindsay Award in 1944, the Wallace Clement Sabine Silver Medal in 1961, the Gold Medal Award in 1975, and Honorary Fellowship in 1994.

Starting in 1950, at BBN, I became involved in the acoustical design of halls for music. BBN received the commission to design halls at Lincoln Center in New York in 1955. To better understand what constituted good acoustics I attended concerts in the U.K., Europe and Argentina. I interviewed 19 conductors and 17 music critics and from them evolved a rank-ordering of 47 concert halls and 19 opera houses into 5 categories of acoustical quality. I also collected the acoustical data available from acoustical engineers around the world and architectural drawings and photographs on 55 concert halls and opera houses which I assembled in a book, *Music, Acoustics, and Architecture* which was published in 1962. By 1996, I concluded that enough about the acoustics of halls for music had been published to justify the production of a second book titled *Concert and Opera Halls, How they Sound*, that contained detailed information on 76 concert halls and opera houses. Then, in 2004, I produced a second edition that included information on 100 concert halls and opera houses, titled, *Concert Halls and Opera Houses, Music, Acoustics, and Architecture*.

I had the good fortune starting in 1989 to be invited to be the “Acoustical Design Consultant” on a number of halls in Japan. In particular, I applied my years of study and practice to the acoustical design of the Tokyo Opera City Concert Hall and the Tokyo New National Theatre Opera House. With full cooperation by the architects and the assistance of the Takenaka Research and Development Center who made design models and performed all acoustical measurements, near-perfect results were obtained. I have continued to collect information and to produce papers of which the most recent is “Concert Hall Acoustics—2008” published in the July/August issue of the *Journal of the Audio Engineering Society*.

From 1953 to 1971 I was President and CEO of Bolt



Leo Beranek with Richard Bolt and Robert Newman

Beranek and Newman. Around 1955 I began to think deeply about BBN’s long-range prospects. I hired J. C. R. Licklider, a professor at MIT, who was not only a prominent psycho-acoustician, but had a good foundation in physics, to head up a BBN division called, “Man-Machine and Information Systems.” Together, we assembled one of the nation’s best computer programming groups. BBN hired Frank Heart, who put together the group that invented the ARPANET in 1969, the first packet-switched computer network in the world. Financed by the government, it grew in size and was managed by BBN for two decades. On January 3, 1983, by which time the network was serving 562 computer centers, the government had the network divided into two networks. With the TCP/IP protocol, invented by others, as the joining software, the INTERNET was born, and the government ceased supporting it.

In the period between 1971 and 1989 my efforts were expended outside the acoustics field. In 1971 I became full-time President and CEO of Boston Broadcasters, Inc. which obtained the rights from the Federal Communications Commission to operate Boston’s premier TV station, WCVB. The *New York Times*, in 1981 ran a full-page article about WCVB, headed “Some Say This Is America’s Best TV Station.” We sold WCVB in 1982 and subsequently I served as President of the American Academy of Arts and Sciences; as a member of the Board of Overseers of Harvard University, its senior governing body; and as Chairman of the Board of Trustees of the Boston Symphony Orchestra.

Over a recent period of three years, I put together a memoir on my life, published in 2008 by the MIT Press, and available from the Acoustical Society of America, titled, *Riding The Waves: A Life in Sound Science and Industry*, about which Professor Emily Thompson, a prominent acoustical historian, wrote, “A memoir that engagingly describes a life that exemplifies the best possibilities of twentieth-century America...an account of interest to all students of American history and technology.” At least, it chronicles a life that seems to me like the images in a kaleidoscope—brightly colored, varied, and in constant motion.

ASA visits City of Roses



Cheryl Siderius; Lisa Zurk, general chair; Marjorie Leek, technical program chair

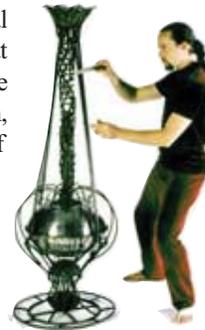
The Acoustical Society of America will hold its 157th meeting in Portland, Oregon, 18-22 May 2009, the first time ASA has met in this city. Portland, the largest city in Oregon, lies near the confluence of the Willamette and Columbia Rivers and has been called America's greenest city. The meetings will be at the Hilton Portland & Executive Tower.

As always, the technical program will include invited and contributed papers on a wide variety of subjects. The Technical Program Organizing Committee, chaired by Marjorie Leek, has organized 1091 papers into 116 sessions. A distinguished lecture on "A Residual-Potential Boundary for Time-Domain Problems in Computational Acoustics" will be presented at 9:00 a.m. on Thursday by Thomas L. Geers from the University of Colorado. A "hot topics" session on Wednesday at 1:00 p.m. will cover the fields of Education in Acoustics, Psychological and Physiological Acoustics and Signal Processing in Acoustics.

Workshops will be held on Preparing *JASA* and *JASA Express Letters* articles and on Federal Regulations for Human Subjects Protection.

The meeting will be blessed with lots of music. On Monday evening at 7:00 p.m., Ela Lamblin will present a tutorial lecture

on "The Art and Science of Unique Musical Instruments" in the Newmark Theater at 1111 SW Broadway, two blocks from the Hilton. He will be assisted by Uwe Hansen, who will explain the acoustics of some of Lamblin's instruments. On Tuesday afternoon at 4:30 p.m., following the technical session on the Acoustics of Wind



Ela Lamblin and his stamenphone



Instruments, members and friends of the Edinburgh Renaissance Band will give a mini-concert in Alexander's Restaurant. On Wednesday afternoon at 2:30 p.m., following a technical session on the Acoustics of Bagpipes, folk musician Kevin Carr will present a lecture and concert on various bagpipes of the world. [A

short clip of Kevin playing Uilleann (Irish) pipes in Campbell Hall at Stanford appears at <http://www.youtube.com/watch?v=O-UMfgvAP0g>.

Friday and Saturday, ASA will sponsor a special workshop on "Cross-Language speech perception and variations in linguistic experience" at the World Trade Centre. Sunday afternoon and Monday morning there will be a short course on "Outdoor Noise Estimation and Mapping."



Kevin Carr

Social functions include buffet socials on Tuesday and Thursday evenings at 6:00 p.m. A Fellows luncheon will be held on Thursday noon with Caitlin O'Connell speaking on elephant



Mt. Hood overlooks Portland



Hilton Portland & Executive Tower

ASA visits City of Roses



Technical Program Organizing Committee. Front row (l to r): Jon LaFollett, Paul Wheeler, Peter Kaczowski, Jeffrey Nystuen, Holger Klinck. Second row: Azzdine Ammi, Tom Matula, David Bradley, Dajun Tang. Third row: Tom Howarth, Melissa Redford, Susan Guion, Kerrie Standlee, Paul Hursky. Fourth row: Frederick Gallun, Cheryl Siderius, Marjorie Leek, Lisa Zurk. (Photo by Charles Schmid)

acoustics, and the Women in Acoustics luncheon will be on Wednesday at 11:30 a.m. A hospitality room for accompanying persons will be open from 8:00 to 10:30 each day. Accompanying person tours will be arranged, depending on sufficient interest. There will be an informal “jam session” on Tuesday, 19 May, from 9:00 p.m. to 12:00 midnight in Bistro 921 (ground floor) at the Hilton. This open live music session is courtesy of ASA members. Anyone interested in participating should contact Tom LePage at tom.lepage@comcast.net.

A Student Icebreaker will be held on Monday, 18 May, from 5:30 p.m. to 6:45 p.m. in Alexander’s Restaurant on the 23rd floor at the Hilton which will provide an opportunity for students to meet informally with fellow students. The Students’ Reception will be held on Wednesday, 20 May, from 6:30 p.m. to 8:00 p.m. in Alexander’s Restaurant. This reception, spon-

sored by the Acoustical Society of America and supported by the National Council of Acoustical Consultants, will provide an opportunity for students to meet informally with fellow students and other members of the Acoustical Society.

With a full program like this, there may not be much time for seeing the city of Portland and the beautiful area around it. But attendees who arrive early or stay after the meeting will certainly enjoy seeing such attractions as the Columbia River Gorge, Multnomah Falls, Mt. Hood, and the Willamette Valley wineries. In Portland itself there is Washington Park with the International Rose Garden and the Japanese Garden, the Oregon Zoo, the Museum of Science & Industry, Powell’s bookstore, the Classic Chinese Garden, and the Portland Art Museum. A walking tour of “Beervana’s” many microbreweries is a pleasant diversion.

Scanning the Journals

Thomas D. Rossing

- **Photoacoustic tomography** is now racing headlong toward clinical implementation, according to an article in the January issue of *Photonics Spectra*. One of the first areas of deployment will likely be mapping of the sentinel lymph node. Biopsy of the sentinel lymph node is currently the standard practice in patients with breast cancer. With this technique, doctors inject an optical dye and radioactive colloids into the tumor and, after the contrast agents are accumulated by the sentinel lymph node, use them to pinpoint it. Using photoacoustic tomography, researchers can perform noninvasive *in vivo* ultrasound imaging of tissue based upon optical absorption contrasts within the tissue.

- *Public Library of Science* (PLOS), the poster child of the **open access publishing movement**, is relying on bulk, cheap publishing of lower quality papers to subsidize its high-quality flagship journals, according to an article in the 3 July issue of *Nature*. Since its launch in 2002, PLOS has been kept afloat financially by some \$17.3 million in philanthropic grants, and apparently has fallen short of its goal of quickly breaking even through its business model of charging authors a fee to publish in its journals. But its financial future is looking brighter thanks to a cash cow in the form of *PLOS One*, an online database launched in 2006. *PLOS One* uses a system of “light” peer review to publish any article considered methodologically sound, published 1230 articles in 2007, which brought in about half of PLOS’s total income. In 2006 author fees in PLOS’s two top journals were hiked from \$1500 to as much as \$2500 and have since increased further.

- **Microseisms** (the continuous, low-amplitude background vibrations in the solid Earth between earthquakes) are generated by ocean waves. Most microseism studies have concentrated on surface (S) waves, but relatively little is known about those that propagate as body (P) waves. According to an article in the March (2007) issue of *Geophysics Research Letters*, recent studies in southern California have shown that they are generated by distant storms in regions of deep ocean, and that they propagate through Earth’s mantle and core. These P waves can provide information about deep Earth structure along paths not usually sampled by global tomographic studies, because the earthquakes used in those analyses occur mostly along plate boundaries rather than in the deep ocean.

- Although vocal communication in a noisy bird colony and vocal learning of a specific song template both require the ability to monitor **auditory feedback** and to distinguish self-generated vocalization from external sounds, neurons that respond to auditory feedback from vocal output have not been found in songbirds. According to a paper in the 8 January issue of *Nature*, however, some neurons are highly feedback sensitive in that they responded to song perturbations but not to unperturbed songs. These findings suggest that a computational function of fore-brain auditory areas may be to detect errors between actual feedback and mirrored feedback.

- In teleosts (fish), proper **balance and hearing** depend on mechanical sensors in the inner ear. These sensors include actin-

based microvilli and microtubule-based cilia that extend from the surface of sensory hair cells and attach to “ear stones” or otoliths. According to a paper in the 8 January issue of *Nature*, cilia motility is required for normal otolith assembly and localization. Cilia-driven flow is found to be a key factor in controlling otolith biomineralization.

- The November/December issue of *Acta Acustica* united with *Acustica* is a special issue on **Virtual Acoustics**. Guest editors are Tapio Lokki and Michael Vorländer. According to the editorial introduction “Virtual acoustics is often applied when sound signals are processed to contain features of a simulated acoustical space and sound is spatially reproduced either with binaural or with multi-channel techniques.” Papers deal with perception of room acoustics, auralization, room acoustics modeling, head-related transfer functions and spatial sound reproduction. Beginning in 2009, Virtual Acoustics will be a regular section/category in the journal, and Tapio Lokki will be the first associate editor.

- **Ants chirp** by scraping a tiny guitar pick-like appendage on their posteriors, like a spoon against a washboard. Now according to a paper in the February 6 issue of *Science*, the sounds allow one kind of ant to distinguish between workers and queens. Some caterpillars can mimic the queen’s noise, granting them food, care and protection. Acoustic analysis at the University of Oxford revealed that worker chirps have lower frequency than the chirps of queens. When workers heard recordings of queen ants on tiny speakers, they gathered and sometimes stood guard around the speaker. They relaxed when they heard the sounds of other worker ants, white noise, or silence.

- The **familiar buzz of flying mosquitoes** is an important mating signal, with the fundamental frequency of the female’s flight tone signaling her presence, according to a report in the 20 February issue of *Science*. In some mosquitoes, both sexes interact acoustically by shifting their flight tones to match, resulting in a courtship duet. Matching is made not at the fundamental frequency of 400 Hz (female) or 600 Hz (male) but at a shared harmonic of 1200 Hz, which exceeds the previously known upper limit of hearing in mosquitoes.

- **Road traffic noise in residential areas** can increase the risk of heart attack, according to a paper in the March issue of *Epidemiology*. People living in environments with high levels of road traffic noise might be more likely to suffer myocardial infarction than people in quieter areas. Once people with impaired hearing or exposure to other sources of noise had been eliminated from the study, it was found that there was a 40% higher risk of myocardial infarction in people exposed to road traffic noise exceeding 50 decibels.

- A tiny new adaptive lens made of two water droplets can **change focus when high frequency sounds cause the droplets to vibrate** back and forth, according to a story in the October issue of *Nature Photonics*. Because it captures 250 pictures per second and requires considerably less energy to operate than competing methods, the miniature image-capturing

Scanning the Journals

technology could lead to smarter and lighter cameras in everything from cell phones and cars to autonomous robots and tiny spy planes. Most current methods for manipulating liquid lenses involve changing the size and shape of the area where the liquid contacts a surface in order to bring an image into focus, which takes both time and valuable energy. In this new technique, the water stays in constant, unchanging contact with the surface, thus requiring less energy to manipulate.

- The January issue of *Acoustical Science and Technology* is a special issue commemorating the **Japan-China Joint Conference on Acoustics** held June 4-6, 2007 at Tohoku University. The issue begins with a paper “Principle and application of ball surface acoustic wave (SAW) sensor, based on the keynote address by Kazushi Yamanaka. Other papers are based on special sessions on bioacoustics research of Chinese freshwater dolphins, and on prosody adaptation methods for Mandarin text-speech system.

- Predatory Australian katydids target amorous male cicadas by **imitating the wing-flick sound** of the female cicada, which is produced in reply to acoustic features within the males’s call, according to a paper in *PloS One* 1, e4185 (2009). Katydids are able to mimic the body-jerking of the female cicadas that accompanies the wing-flick, a behavior that adds a visual element to

their response to male song. The katydid-cicada interaction promises to reveal insights into the evolution of insect communication.

- Although the neural substrates that the fruitfly *Drosophila* uses to sense smell, taste and light are quite similar to ours, two other sensory modalities, **hearing** and gravity sensing are combined into a sensory organ, called Johnston’s organ, according to an article in the 12 March issue of *Nature*. Gravity- and sound-sensitive neurons differ in their response characteristics, and only the latter express the mechanotransducer channel NompC. Responses were recorded by means of a tungsten electrode inserted between the antenna and the head. It was found that vibration-responsive neurons are required for hearing.

- A balloon filled with a gas that has a different sound speed than that of air can be used as an **acoustics lens**, a paper in the March issue of *American Journal of Physics* reminds us. To determine the validity of a gas-filled balloon as a classroom demonstration, the physics is considered analytically, numerically, and experimentally. Although a geometric analogy is a good first-order approximation, scattering theory is required to fully understand the observed phenomena. Thus this demonstration can be adapted to a wide range of students.

Acoustics in the News

- A Silicon Valley company has built a vehicle called the Wave Glider that will allow them to eavesdrop on whales off the coast of Hawaii, according to a story in the February 24 issue of *The New York Times*. The Wave Glider is a sensor-carrying vehicle that moves through the ocean propelled entirely by wave energy. “The glider’s engine is about five feet long and sits 22 feet below the surface, tethered to a floating instrument platform equipped with sensors and the command center.” The design is simple. When the surface buoy rises with a swell, it pulls the glider upward. When the buoy falls, so does the submerged glider, while water pushing on the glider’s wings allows it to move horizontally while it rises and falls. It can move into the wind and reach speeds up to two knots. Batteries provide a 10-day backup energy source. In January, a glider completed a nine-day, 343-mile trip around the big island Hawaii in heavy seas. Potential uses for the Wave Glider include mapping the seafloor, improving tsunami warning systems, patrolling marine reserves, and monitoring coastal pollution.

- Physicists from Korea and China have created an acoustic metamaterial which causes a reverse Doppler effect, according to a story in the February issue of *Physics World*. The researchers achieved this feat by creating an elastic tube that transmits sound with a negative phase velocity. This is an important stepping stone to an acoustic cloak, say the researchers. (See Scanning the Journals in the Spring 2008 issue of *ECHOES*.)

- Subtle shifts in density that occur within individual pieces of

wood might explain why violins made in eighteenth century Cremona sound so special, according to a note in the 3 July issue of *Nature*. A medical researcher and a violin maker measured the densities of five classical violins, including two by Stradivari, and eight modern instruments using computed tomography. The difference in density between spring and summer growth and maple was significantly smaller in the classical instruments than in the modern ones. These variations in density may influence the wood’s acoustic properties by affecting its stiffness.

- “With giddiness and glee, musicians tested the acoustics of the newly renovated Alice Tully Hall,” reads a story in the January 29 issue of *The New York Times*. A major milestone in the upgrade of Lincoln Center, the hall reopened after a \$159 million renovation. Musicians and acousticians and officials proclaimed the hall more present, alive and reverberant than the old Tully, which had been faulted for its “dry” sound. Measures have been taken to deal with amplified sound and movies include floor-to-ceiling doors on the stage that have black sound absorbing material on one side and absorbing banners that can be lowered. Acoustical consultants for the renovation were JaffeHolden.

- NASA has completed a delicate set of flight tests to measure how modifications to an F-15 jet can affect the way shock waves form, according to a story in the 17 February issue of *New Scientist*. The measurements will be used to calibrate a

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Acoustics in the News

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computer model of shock wave propagation which will be a crucial aid for engineers designing a new generation of quieter supersonic aircraft. Five years ago, NASA, the US Defense Advanced Research Projects Agency, and several aerospace companies studied how a spiked nose cone affected shock waves generated at the nose. Now NASA finished a similar set of measurements of the boom generated at the rear of the aircraft. Boom shaping doesn't come for free, however. The aerodynamic modifications may reduce fuel efficiency by 10 to 15 percent.

- Bats rarely succeed in nabbing a tiger moth, according to a story in the January 31 issue of *Science News*, because the moths emit a loud noise that jams the bat's sonar. When threatened, these moths emit a steady, broadband sound, a classic in the evolutionary arms race according to researchers at Wake Forest University.

- A tiny new lens made of two water droplets can change focus when high frequency sounds cause the droplets to vibrate back and forth, according to a story in the September issue of *Photonics*. Because it captures 250 pictures per second and requires considerably less energy to operate than competing methods, the miniature image-capturing technology could lead to smarter and lighter cameras in everything from cell phones and cars to autonomous robots and tiny spy planes.

- A peer-reviewed journal deleted a previously-published paper from its Web site after the makers of a voice-analysis

system complained that the article contained inaccuracies and defamed them, according to a story in the 13 February issue of *Science*. The authors of the review article in the December 2007 issue of *The International Journal of Speech, Language and the Law*, in turn, complain that the company is attempting to stifle free inquiry. The paper argued that there is no scientific basis for techniques that aim to determine emotional stress by analyzing the sound of a person's voice.

- Federal fisheries regulators announced rules to protect marine mammals during Naval sonar training along the Atlantic coast and in the Gulf of Mexico, according to a story in the January 24 issue of the *Washington Post* online. The rules authorize the Navy to conduct the training while requiring it to take steps to avoid endangering mammals such as whales. Similar regulations were issued previously covering the West Coast and Hawaii by the National Oceanic and Atmospheric Administration. The rules will be in effect for five years, but the Navy will have to provide annual reports and seek a new letter of authorization for its training each year.

- Parasitic caterpillars belt out a convincing cover version of a tune irresistible to red ants, according to a story in the 14 February issue of *New Scientist*. This discovery may explain why duped ants treat the larvae "as if they were the holiest of holiest, the the pinnacle of power, the queen ant." Worker ants listening to recordings of their own songs tapped the speakers with their antennae with interest."



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