

The newsletter of
The Acoustical Society of America

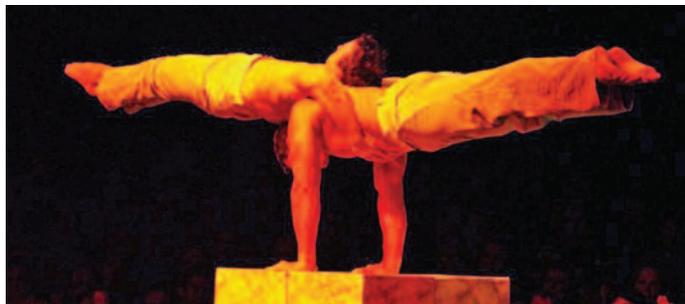
ECHOES

Volume 23, Number 2
Spring 2013

ASA meets with ICA and CAA in Montréal

By Mike Stinson

The ICA 2013 congress will begin in spectacular fashion. The Opening Ceremonies on Sunday afternoon, 2 June 2013, will feature performances by world-renowned Cirque Éloize, a Montréal-based circus troupe. Cirque Éloize makes use of the multidisciplinary talents of its artists, combining circus arts with music, dance and theatre.



Cirque Eloise

Clearly, this is not your usual ASA meeting. Actually ICA 2013 will be an amalgam of three different meetings, the 21st International Congress on Acoustics (ICA), the 165th Meeting of the Acoustical Society of America (ASA), and the 52nd Meeting of the Canadian Acoustical Association (CAA). More than six years ago, the ASA and CAA submitted a joint bid to the International Commission for Acoustics to host the ICA congress in 2013. The bid was successful and planning has been ongoing since that time.

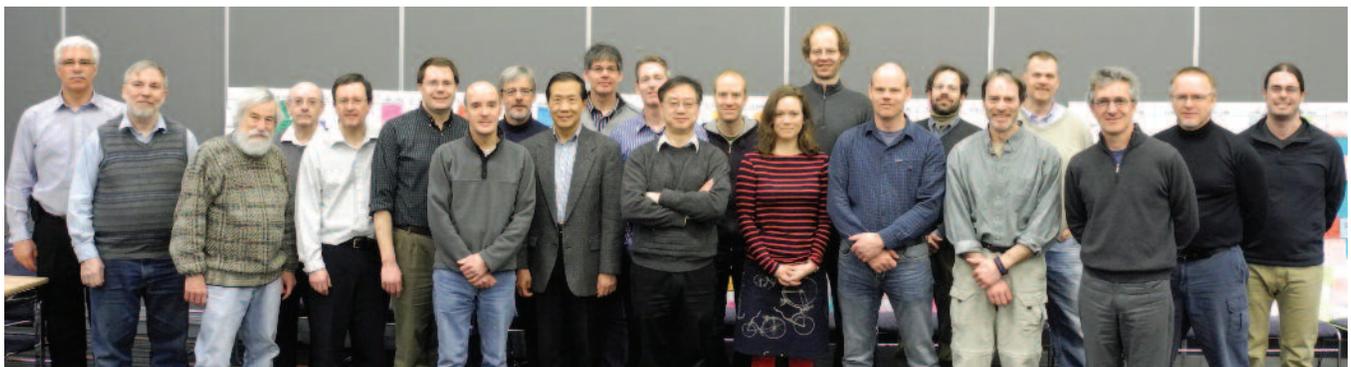
ICA 2013 will be held at the Palais des congrès de Montréal (known simply as the 'Palais'). This spacious and modern conference center is located in the heart of Montréal.

Many local attractions, including Old Montréal, restaurants, and shops are nearby, within easy walking distance. There is convenient access to parking, subway, and hotels.

The technical program will have 1,607 papers in 174 sessions, making it one of the largest meetings in

acoustics ever. Luc Mongeau, Technical Program Chair, and representatives from the CAA and the ASA technical committees met on 15-16 February to organize the program. Fitting so many papers into five days of sessions, while minimizing conflicts and respecting requests by authors and by session organizers, was a great challenge, one met with cooperation and communication by all. The technical program can be viewed now: An itinerary planner for ICA 2013 Montreal is available (asaica2013.abstractcentral.com/planner.jsp).

Technical sessions will run Monday to Friday, morning and afternoon. All oral presentations, whether invited or contributed, will be allocated a 20-minute time slot. The longer time for contributed papers is needed to allow time for attendees



Technical program organizing committee at Montréal. (L to R) Michael Stinson (meeting chair), James Lynch, Roger Richards, Gilles Daigle (meeting vice chair), Christian Giguère (CAA President), Michael Heinz, Gary Scavone, Ron Roy, Junru Wu, Bart Lipkins, Robert Koch, Ning Xiang, Jeff Ketterling, Molly Babel, Jens Meyer, Bruce Martin, Ken Kaliski, Rex Andrew, Ben Munson, Luc Mongeau (Technical Program Chair), Ken Cunefare, Eric Reuter (not pictured Judy Dubno, Kathy Pichora-Fuller) photo by C. Schmid

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We hear that . . .

- A German journalist used a stereo pair of cardioid microphones and a matching windshield prototype to record **ethnic choirs and the sounds of nature in Namibia**. The first result of her 9,000 kilometer trip from the Kalahari to Kaokoveld is now complete: “Chorus and Cuisine“, an unusual mixture of travel guide, recipe book and music CD, has just been published.
- **Elliott Berger** at 3M’s Occupational Health & Environmental Safety Division, was awarded the National Hearing Conservation Association (NHCA) Lifetime Achievement Award in St. Petersburg, FL, in February 2013. This prestigious award represents the highest honor bestowed by the NHCA and is intended to recognize a lifetime of extraordinary accomplishment in the field of hearing loss prevention and in service to NHCA.
- The AAAS popular **Weekend Family Science Days**, held at their annual meeting, engaged children and their parents in dozens of hands-on demonstrations and “Meet the Scientists” presentations. These AAAS stage shows also intrigued families at the largest science festival in the United States, a free public expo held in Washington, DC.
- **Peter Herstein** received the Martell-Bushnell award from the National Defense Industrial Association for outstanding technical contributions to the defense preparedness of the United States in the field of undersea warfare.

meeting. For some highlights, pictorial and otherwise, see “Echoes from Vancouver” in the Summer 2005 issue of *ECHOES*. One highlight for me was the workshop on Design and Construction of String Instruments. Others were the session honoring Wesley Nyborg, who is no longer with us, and the presentation of the Gold Medal in Acoustics to Allan Pierce.

In the Spring 2005 issue of *ECHOES*, which preceded the Vancouver meeting, Gilles Daigle, Stan Dosso, Garry Heard, Murray Hodgson, Tim Kelsall, Douglas O’Shaughnessy, and Kathy Pichora-Fuller wrote the leading article on “Acoustics in Canada.” Of course the Canadian Acoustical Association (CAA) publishes a quarterly journal (*Canadian Acoustics or Acoustique Canadienne*), but I’m afraid most of us don’t read it regularly. I was impressed with the wide variety of research that takes place in our neighbor to the north. I now regret not urging the Canadian team to write a similar article for this issue. All I can say is “Come to Montréal and hear for yourselves what is going on in Canada.” «Venir au Canada et d’apprendre

*Thomas Rossing
Stanford University.»*

Letter from the Editor Looking ahead to Montréal

After reading Mike Stinson’s lead story about the upcoming ICA/ASA/CAA meeting in Montréal, I can hardly wait to jump on the airplane and fly to that charming city. I only regret not having studied French in high school (it was not offered). I know that practically everyone in Montréal speaks English, but it would be so nice to communicate with French-speaking residents in their first language.

This will be our first meeting in Canada since we met in Vancouver in May 2005. That was a most enjoyable

Dateline West Barnstable: ASA Publications

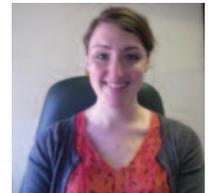
Mary Guillemette



The Acoustical Society’s newest location, its Publications Office in West Barnstable, Massachusetts, recently marked one year since opening early in 2012. Where exactly is West Barnstable? It is in southern New England, about one hour south of Boston, Massachusetts, on Cape Cod Bay.

At the Kansas City meeting, the Executive Council (EC) approved the appointment of a committee to prepare a Request for Proposals (RFP) for publishing services. The committee consisted of Jim Lynch (chair), Keith Wilson, Charles Schmid, Christy Holland, Diane Kewley-Port, Susan Blaeser, Mary Guillemette, and Allan Pierce. The RFP went out on February 15 and proposals are due April 15. Proposals are being received by the Publications office, in preparation for consideration by the EC at its Spring meeting in Montreal.

On December 4 of 2012 Jessica Eldridge, a recent graduate of Bennington College, joined the Publications Office as its Administrative Editorial Assistant. Jessica began learning the ropes of ASA publishing without delay, starting with receiving hundreds of electronic submissions to *Proceedings of Meetings on Acoustics* or *POMA*, in anticipation of the June 2013 joint meeting of the International Congress on Acoustics (ICA) the



Jessica Eldridge

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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

Phone inquiries: 516-576-2360. Contributions, including Letters to the Editor, should be sent to Thomas Rossing, Stanford University, CCRMA Department of Music, Stanford, CA 94305 <rossing@ccrma.stanford.edu>

ASA meets with ICA and CAA in Montréal

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Michael Stinson (meeting chair), Luc Mongeau (technical program chair), Gilles Daigle (meeting vice chair) photo by C. Schmid

to move between sessions because of the large size of the Palais. And it is large! A brisk 3 minutes is needed to walk the length of the Palais. Each day will begin with a Plenary Lecture. We have:

- Stan Dosso (Canada): Studying the sea with sound
- Hugo Fastl (Germany): Basics and applications of psychoacoustics
- Murray Campbell (Scotland): Objective evaluation of musical instrument quality: A grand challenge in musical acoustics
- Tapio Lokki (Finland): Sensory evaluation of concert hall acoustics
- Hideki Tachibana (Japan): Public space acoustics for information and safety

The ASA online *Proceedings of Meetings on Acoustics* (POMA) will host the official Proceedings of ICA 2013. The Proceedings will be opened as volume 19 of POMA a couple weeks before ICA 2013. There will also be a mirror copy of the Proceedings on a USB drive that will be included in the registration kits of attendees.

Expect that there will be no more wasted time in sessions while a presenter unplugs the projection computer and hooks in his laptop, no waiting while a presenter fumbles with a thumb drive. A Presentation Management system will allow presenters to upload their electronic presentations ahead of time. Presenters will be able to upload from their home location to a weblink weeks ahead of time or do the upload at the Palais at the time of the meeting. They will be able to modify their pre-

sentations at anytime after uploading. All presentations for a session will be routed electronically to host computers in the meeting rooms prior to the start of a session.

An extensive Exposition will showcase the latest products, materials, services, and publications in all fields of acoustics. It will be held in a large, centrally-located ballroom. The Exposition will open with a reception on Monday 3, June, at 5:00 p.m. and close Wednesday, 5 June, at 11:00 a.m. Currently, 47 booths have been reserved.

Immediately following the Opening Ceremony on Sunday, attendees are invited to a Welcoming Reception on the top floor of the Palais. (So, make sure you include Sunday, 2 June, in the plans for your visit.) On Tuesday and Thursday, starting at 6:00 p.m., we will host the buffet Social Hours. Wednesday events include the Women in Acoustics Luncheon and a Student Reception. The ever-popular ASA Jam Session will also be on Wednesday. It will be held in the Maisonneuve Room of the Intercontinental Hotel, across the road from the Palais, starting at 8:00 p.m. There will be a Closing Ceremony on Friday 3:00 p.m., immediately followed by a Farewell Reception, co-hosted by the Argentine Association of Acoustics who will be the organizers of the next ICA congress in 2016 in Buenos Aires, Argentina.

On Monday evening, a concert will be held at the historical Église Saint-Jean-Baptiste. This church is in the village Le Plateau-Mont-Royal, noted for its trendy restaurants and cafés. The well-known classical chamber orchestra I Musici will perform under the direction of conductor Jean-Marie Zeitouni. Bus transportation will be provided.



*Above: Dorchester Square, downtown
Below: Palais des congrès*



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ASA/ICA/CAA in Montréal

ASA Publications *continued from page 2*

ASA, and the Canadian Acoustical Association. In January, Jessica became the Manuscript Coordinator for *POMA*. Having successfully processed more than 1,600 ICA *POMA* papers since then, she is very well qualified already.

Publishing activities for the periodicals and the meeting programs are predictably busy in the weeks and months leading up to a meeting. For the 2013 ICA upcoming in June, extraordinary coordination took place between the West Barnstable office *POMA* Coordinator (Jessica Eldridge,) Melville headquarters management (Elaine Moran,) ICA meeting General Chair and ASA Vice President Michael Stinson, Technical Program Chair Luc Mongeau, Vice Chairs Gilles Daigle and Charles Schmid, Peer Express management (Stuart Wortzman,) and *POMA* Editor Kent Gee.

Jessica Eldridge and Mary Guillemette visited the Melville headquarters office in February to meet with Peer Express developers Stuart Wortzman and Brian Goss, the Production Supervisor for the *Journal of the Acoustical Society of America*

(*JASA*) Brian McKenna, Journal Advertising Director Robert Finnegan, Ad Sales Manager Debbie Bott, and Senior Advertising Production Manager Chris DiPasca.

The activity of the ASA's flagship publication, *JASA*, continues to occupy a fair amount of the staff time in Melville and West Barnstable. Recently it has been observed that 60 percent of the authors of articles published in *JASA* are not members of the ASA.

The Publications Office has taken it upon themselves to follow up the acceptance letters sent to these prospective members with a personalized invitation to join the Acoustical Society. As *JASA* authors, their further contributions and participation are likely to be of interest to other members, and they would enjoy the same benefits of membership.

You can reach the ASA's Publications Office staff with comments or questions at (508) 362-1211 or by any of the following emails: jessicaeldridge@verizon.net, mguillemette@verizon.net, allanpierce@verizon.net.

ASA meets... *continued from page 3*

The ICA 2013 Plenary Session and Awards Ceremony will be held Wednesday, 5 June, starting at 3:00 p.m. The ASA will present the Medwin Prize in Acoustical Oceanography, the William and Christine Hartmann Prize in Auditory Neuroscience, the R. Bruce Lindsay Award, the von Békésy Medal, the Helmholtz-Rayleigh Interdisciplinary Silver Medal, and the Gold Medal. Certificates will be presented to ASA Fellows elected at the Kansas City meeting and recipients of the Speech Science Research Grant of the American Speech Language Hearing Foundation will be introduced. The Canadian Acoustical Association will present the Shaw Postdoctoral Prize, graduate student prizes in various fields of acoustics, the Hétu Undergraduate Student Prize, the Canada-Wide Science Fair Award, and the Directors' Awards for the best papers in Canadian Acoustics. The International Commission for Acoustics will present the ICA Early Career Award to Tapio Lokki.

Several events are being held in association with ICA 2013. First, the International Symposium on Room Acoustics (ISRA) will be held in Toronto June 9-11, 2013, immediately following the ICA 2013. The co-chairs of this symposium are John Bradley and John Keefe. Visit the ISRA website at <http://www.ISRA2013.com>. Second, a symposium on the 10th anniversary of the Discovery of Sound in the Sea (DOSITS) project will highlight current advances in underwater acoustics. The symposium will be held on Tuesday evening, 4 June 2013, at the Intercontinental Hotel. The ASA Technical Committees on Acoustical Oceanography and Underwater Acoustics have agreed to hold their Technical Committee meetings together on Thursday evening, 6 June 2013, to give their members the opportunity to attend this DOSITS symposium. And third,

the organizers of the special session "Virtual Concert Hall Acoustics", Wieslaw Woszczyk and SungYoung Kim, are planning a special demonstration and concert Wednesday evening at McGill University.

Looking for a quiet place to chat with colleagues while at ICA 2013? Then head for the Meeting Lounge in room 517b. This large hall will be set up with tables throughout and will be available Monday through Friday noon for you to collect your thoughts or for informal discussions. Some computers will be available here for e-mail access. Wireless? Yes, wireless access will be available, not just in the Meeting Lounge but throughout the Palais.

The city of Montréal has a special charm that is a product of its unique mix of European and North American cultures and its blend of original and contemporary influences. You will find trendy shops, cozy coffee shops, and fine dining. Outstanding museums are close at hand. Things to see in Montréal include:

- Old Montréal -- cobblestone and carriage, boutique hotels and gourmet restaurants
- Old Port -- riverside rendezvous for strolling, biking, riverboat cruising, Science Museum, and more.
- Parc Jean-Drapeau, with the Biosphere and its water-themed museum, La Ronde amusement park, and the Casino.
- Botanical Garden -- a popular oasis in the heart of the city, with an extensive collection of 22,000 plant species and cultivars, 10 exhibition greenhouses, Tree House and some thirty thematic gardens.

Further details about ICA 2013 can be found on both the ASA website (acousticalsociety.org) and the ICA 2013 website (www.ica2013montreal.org).

Scanning the journals

Thomas D. Rossing

- Physicists in China say they have made a **breakthrough in thermoacoustic imaging** that could enable it to be used in hospitals within five years, according to a story posted online Nov 28, 2012 in *Physics World*. The technique, which involves firing microwaves at tissue, had previously been considered too dangerous to use on humans, but the researchers have now employed what they say is a safer, nanosecond microwave source.

Thermoacoustic imaging was invented in the early 1980s. The idea is to expose tissue to a microwave pulse, which travels into the tissue until it is absorbed. Exactly how the pulse is absorbed depends on the type of tissue present. When the pulse is absorbed, it does not heat the tissue significantly because it is very short. The energy instead generates a moving deformation, which is an acoustic wave. The profile of this acoustic wave is detected using an array of transducers, and these data are used to create an image of the tissue through which the microwave pulse has passed.

- **The vibrations of bubbles and balloons** is the subject of a paper in the December issue of *Acoustics Australia*. Bubbles and balloons are two examples of structures that feature a pressure difference across the skin, a thin, tensioned membrane, and a doubly-curved interface surface. While mathematical models have been formulated for bubbles, no such model exists for balloon vibrations. This paper reviews a model of bubble vibrations, and compares predicted natural frequencies and mode shapes to those of a rubber balloon. It is shown that the bubble model consistently underpredicts the balloon's natural frequencies, and it is concluded that the nonlinear elasticity present in the balloon skin accounts for this result.

- **Homing pigeons are able to navigate home by using low-frequency sound waves** to make a mental map of their location, according to a paper in the Jan. 30 issue of the *Journal of Experimental Biology*. However, the normally amazing navigators sometimes get completely lost if the low-frequency waves from their current location don't reach their home loft. A scientist from the U.S. Geological Survey discovered that birds in European pigeon races were going astray on clear-weather days, when the Concord, the supersonic plane, was in the area. That led him to wonder whether the sonic boom from the Concorde plane disrupted pigeon navigation by interfering with the sound waves. A Cornell biology professor observed that if the pigeons were taken to almost any locations, they headed straight home with amazing accuracy, but at one location, called Jersey Hill, the pigeons got completely lost, with each taking off in a random direction. He used a computer program to model the emanation of infrasound waves from 200 sites around Cornell University where about 45,000 pigeons had been released over a 14-year period. He then compared sound wave location data with information on whether the pigeons had made it home and found that on the days when the pigeons got lost, the infrasound waves from Jersey Hill didn't reach their home loft at Cornell

- **Human Time-Frequency Acuity Beats the Fourier Uncertainty Principle** according to a paper published Jan. 23 in *Physical Review Letters* 110, 044301. Ordinarily the infor-

mation available from Fourier analysis is bound by an uncertainty relation called the Gabor limit which says that you cannot know the timing of a sound and its frequency – or pitch – beyond a certain degree of accuracy. Researchers first showed, in the 1970s, that the human auditory system could beat the Gabor limit, implying the brain could perform some kind of nonlinear analysis of the signals that it received from the ear. In the latest study volunteers were given a series of tasks in order to determine precisely how sensitive humans are to the pitch and timing of sounds. One test involved playing two notes widely spaced in time but at the same pitch. In-between the two, they were played a third note, and they were asked to identify whether it was slightly higher or slightly lower than the other two. In another, two notes, widely spaced in pitch, were played almost simultaneously, after which the subjects were asked whether the higher or the lower one had been played first. In one case, subjects beat the Gabor limit for the product of frequency and time uncertainty by a factor of 50, clearly implying their brains were using a nonlinear algorithm.

- It may be possible to **modify the distribution of seismic energy in an earthquake** by boring cylindrical empty inclusions in the soil, according to a paper in *arXiv 1301.7642*. Boring a series of vertical holes essentially creates a metamaterial analogous to metamaterials that affect the propagation of sound or light. A test run was made using a 50-Hz source with boreholes spaced on a 1.7-m.grid.

- Most **echolocating bats exhibit a strong correlation between body size and the frequency of maximum energy** in their echolocation calls. A paper in the 3 January issue of *Nature* suggests that smaller bats emit higher frequencies to achieve directional sonar beams, with different species emitting beams of similar shape and volume. All bats adapted their calls to achieve similar acoustic fields of view.

- Resveratrol, a substance found in red grapes and red wine, may have the potential to **protect against hearing and cognitive decline**, according to a paper in the journal *Otolaryngology-Head and Neck Surgery*. “Resveratrol is a very powerful chemical that seems to protect against the body's inflammatory process as it relates to aging, cognition and hearing loss.”

- An **acoustic analogue of the dynamical Casimir effect** has been demonstrated for the first time according to a paper in *Physical Review Letters* 109 (2012) 220401. Carried out by physicists in France, the experiment involves converting quantum fluctuations into pairs of quantized sound waves – or phonons – in an ultracold atomic gas. Earlier Italian physicists had argued that an acoustic dynamical Casimir effect should be seen in a Bose–Einstein condensate (BEC) when there is a rapid change in the scattering length that governs how its constituent atoms interact. The team created its BEC by cooling about 100,000 helium atoms to about 200 nK. Instead of changing the scattering length, the team found it could achieve the DCE by changing the speed of sound within the BEC. This was done by squeezing the BEC through rapidly increasing the intensity of the laser that traps the atoms. This compression causes virtual phonons to become

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Scanning the journals

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pairs of real phonons that propagate in opposite directions.

- The Baryon Oscillation Spectroscopic Survey (BOSS), the largest component of the third Sloan Digital Sky Survey, has studied **baryon acoustic oscillations**, according to news in the January/February issue of *Cern Courier*. Baryon acoustic oscillations are recurring peaks of matter density that are most evident in net-like strands of galaxies. In the first million years after the Big Bang, the cosmic plasma rang with sound waves excited by the initial inflationary perturbations. The BOSS collaboration is led by scientists at the Lawrence Berkeley National Laboratory.

- The International Monitoring System, under the auspices of the Comprehensive Nuclear-Test Ban Treaty Organization, designed to detect the illegal testing of nuclear weaponry, has been under construction since 1999. The system, composed of a range of sensors, includes detectors for hydroacoustic and seismic signals, will include **60 infrasound measurement arrays** designed to detect low-frequency sound waves produced by an atmospheric nuclear detonation. According to a paper in *Geophysics Letters* **40**, 429-433 (28 January 2013), data from 39 infrasound stations allows identification of coherent noise including ocean microbaroms, volcanic eruptions, the sounds of the surf and thunder and human activity. Unlike previous research, which treated all noise, the authors have devised a method to eliminate irrelevant sensor noise.

- A **numerical mode for computational analysis of acoustic horns** appeared in the November/December issue of

Acta Acustica/Acustica. The model, based on the Method of Fundamental Solutions (MFS), is presented in detail for 2D and antisymmetric problems. The proposed model is tested against established methodologies, such as the BEM and the FEM, and it is shown to provide accurate results. Comparisons with experimental measurements of the horn directivity at different frequencies show a good match.

- In mammalian embryos, the **middle-ear chamber** starts as a pouch that pokes out from the oral cavity, according to a paper in the 29 March issue of *Science*. Cells lining the bottom of the cavity are thick and have cilia that sweep away debris, but cells lining the roof are flat and offer little protection from debris or inflammation. The way in which the mammalian ear develops and our susceptibility to middle ear infections may be related.

- The spring issue of the *Journal of New Music* is a **special issue on Music Performance Monitoring** originating from a workshop of the Institute for Psychoacoustic and Electronic Music (Ghent, Belgium) and IRCAM (Paris, France) in 2010. Monitoring musical performance basically relates to the observation and recording of multiple aspects of musical performance.

- Researchers have found a way to extract **power from the ear**, according to a paper in the November 7 issue of *Nature Biotechnology*. A chip that can exploit the inner ear's electrical potential to convert sound into neural impulses. Electrodes from the chip were inserted into the inner ear of an anesthetized guinea pig. The chip extracted around 1 nanowatt of power for up to five hours.

Message from the President

David L. Bradley



We're 13 years into the 21st Century, but you still hear the words "it's time to get into the modern (read 'real') world!" Communication, in all forms, is dominated by electronics; which in turn, controls how the Society publishes, what it publishes, conducts meetings, carries out business as an organization and how we, as members, interact with each other.

The Acoustical Society of America, while underpinned by science and technology, is the most diverse single society that exists. Where else would you find a MD, a physicist, an engineer, a biologist and a linguist in the same room arguing with each other?

Society population has been stable (in round numbers, 7000 members), but flat, for approximately two decades, with the current average age at 50 years. (With ~20% in the 'under 30' range)

So, what's the message? First, recognition of the Melville staff for what is vital to the Society: stability, continuity and hard work to carry out the activities and requirements of the Society; their ability and willingness to respond to the challenges of a changing environment. Appreciation of the efforts

by officers and Executive Council members (both present and foregoing) to address the issues faced. Second, understanding of the advantages we have and the risks we face: The dynamics of information technology (IT) are frightening: storage, retrieval, availability capability moves much faster than we do; constant attention, review and examination of "what's out there" is required and quick reaction to opportunities. Diversity provides multiple fora to address complex scientific and technological problems; with it comes a reality that, as a Society, we are most likely the one that every member is also an active member of a competing Society for time and resources. Population-wise, stability is good, but growth is better; aging is NOT. Third, are we addressing these issues? Yes: We are soon to be advertising for a Web Design/maintain/upgrade expert that will become a member of the Melville staff; our TPOM process will move into the electronic age; we continue to emphasize the recognition and integration of students, early career people into the Society; interaction and participation with other societies is an ongoing thing, but in its infancy in the context of IT advances, with regard to future collaborations. Fourth, and last; are we done yet? No. The challenges are not "bumps in the road"; they, in one form or another, will stay with us.

Acoustics in the News

- There is currently no cure for tinnitus, according to a story in the December 4 issue of *The New York Times*. Tinnitus affects 10 to 20 percent of people, mostly those over age 65, but also many veterans of the wars in Iraq and Afghanistan. Among possible causes are head and neck injuries, drugs that damage the ear, blood vessel disease, autoimmune disorders, ear conditions, and disorders of the temporomandibular joint. The most common treatment is a hearing aid, although a device that generates masking noise is also common. Recently, the effectiveness of a multidisciplinary psychology-based approach has been demonstrated. It is not so much the noise itself but the patients' negative reaction to it that creates daily life impairment.

- Noise pollution, a growing peril to marine life and especially whales, is being mapped by the U.S. government, according to a story in the December 11 issue of *The New York Times*. The project, by the National Oceanic and Atmospheric Administration, seeks to document human-made noises in the ocean and use the results to create the first large sound maps. The noise of a cargo vessel can rival that of a jet; even louder are air guns used in oil and gas exploration. Marine biologists have linked human noises to reductions in mammalian vocalization, which leads to declines in foraging and breeding.

- Babies pick up language in the womb according to a story in the January 8 issue of *The New York Times*. A baby develops the ability to hear by about 30 weeks gestation, so it can make out its mother's voice for the last 2 months of pregnancy.

- New York's Metropolitan Opera house will get a \$60 million backstage renovation with a major technology upgrade, according to a story in the December 6 issue of *The New York Times*. Directors, who these days require heavier scenery, faster moves, and more sophisticated lighting, find the Metropolitan lagging behind other major opera houses. The Met's high-definition movie theater broadcasts are also driving the need for change.

- Signs for scientific terms have been lacking in sign language. Now, according to a story in the December 4 issue of *The New York Times* new signs for physics and engineering terms have been developed at the University of Edinburgh. The new signs include signs for mass, X-ray, and even light-year. However, some criticism has been raised about developing standardized signs for technical terms. "Signs that develop naturally are more likely to be accepted quickly by the community."

- "Acoustic Assisted Magnetic Recording" is the title of an invited paper presented at the 57th conference on Magnetism and Magnetic Materials in Chicago, January 14-18. If ultrasound is directed at a specific location where data is being stored, it momentarily heats the area causing a tiny portion of the material to bend or stretch. The data can then be stored reliably without adjacent regions being heated. The technology is claimed to store more data in less space (Ed's note: This brings back fond memories of my early years studying

the physics of magnetic data storage).

- Researchers have inserted extracted nanowatts of electrical power by tapping into the chemical gradient in the inner ear of a guinea pig, according to a news brief in the December issue of *IEEE Spectrum*. That's not much power, but it is enough for intermittent operation of a tiny radio transmitter.

- Although the ears of South American katydids are on their forelegs, these ears are remarkably similar to human ears, a story in the November issue of *Science Now* (online) points out. Scientists have known for decades that, like mammals, katydids and related insects have a miniature tympanic membrane; they also have a flat strip of sensor cells in their legs. But how these insects convert airborne sound waves to fluid-borne sound waves was less clear—particularly as researchers had not yet identified a fluid-filled organ that the waves could travel through.

Now, researchers think they have discovered a mechanism in the ears of *Copiphora gorgonensis*, a species of katydid from the forests of Colombia, that rivals the middle ear bones in mammals. The structure is so small—no bigger than a few hundred microns—that it couldn't have been discovered by dissection. Instead, they detected the structure while examining three-dimensional images of the insects' inner ears from high-powered CT scans. This sound-converting mechanism is like that in humans but much simpler and could inspire engineers to make extremely small, sensitive microphones that can hear in ultrasonic frequencies, as well as improve medical devices like hearing aids.

- Grasshoppers that live near highways change their tune to overcome roadside noise, according to a story in the November 20 issue of *The New York Times*. Male bow-winged grasshoppers produce their song, which serves as a mating call, by rubbing their hind legs against a protruding vein on their front wings. The resulting song includes both low-frequency and high-frequency components. However, grasshoppers living in noisy environments raise the frequencies of their low-frequency components in order to minimize masking by road noises of low frequency.

- The National Highway Traffic Safety Administration wants electric and hybrid vehicles to make more noise when traveling at low speeds, according to a story in the January 8 issue of *The New York Times*. The proposed rule would require vehicles to make additional noise at speeds under 18 miles per hour so that pedestrians can hear them coming. Automakers would be able to pick the sounds the vehicles make from a range of choices. The agency estimates that the new noise would prevent 2800 pedestrian and cyclist injuries during the life of each model year of electric and hybrid vans, trucks, and cars.

- A Professional Education in Acoustics program was established in Australia some years ago on request from industry, according to a story in the December issue of *Acoustics Australia*. The request was made due to a lack of regularly available appropriate courses in formal university programs.

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Acoustics in the News

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The program, which has the support of the Association of Australian Acoustical Consultants, is based on a similar program offered by universities and the UK Institute of Acoustics. Each module of the program will be offered separately in distance learning mode so that it can be undertaken throughout Australia or elsewhere in the world and can be commenced at any time. For more information on the program see <http://www.aaac.org.au/au/aaac/education.aspx>.

- An experimental drug can restore hearing in deaf mice by regenerating sound-sensitive cells in the inner ear, according to a paper in *Neuron* 77, 58 (2013). A compound named LY411575 blocks a biochemical pathway called Notch, which normally prevents supporting cells in the cochlea from developing into hair cells. When applied to the ears of mice deafened by loud sounds, the molecule triggered the generation of new hair cells. By three months after this treatment, hearing had been partly restored.

- Hearing loss can lead to dementia, according to a story in the February 12 issue of *The New York Times*. The worse the hearing loss, the higher the risk of reduced cognition. A possible cause is social isolation, a known risk factor for dementia. Another possibility is cognitive load, and a third possibility is some pathological process which causes both hearing loss and dementia. A common pathological cause might help to explain why hearing aids do not appear to reduce the risk of dementia.

- A story in the February 25 issue of *The New York Times* reports that basketball referees are much more likely to have tinnitus and hearing damage than people of the same age in the general population. With whistles creating sound levels of 104 to 116 dB at the referees' ears, the safe daily noise dose

is exceeded in just 5 to 90 seconds. The most commonly used whistle, the Fox 40 Classic, produced 106 decibels, allowing for just 48 seconds before damaging exposure, or 96 whistle blows of half a second each.

- Scallops, through their ability to “cough” out water, are potentially good indicators of water pollution, according to a paper (published online in November) in the *Journal of Experimental Marine Biology and Ecology*. Previous research suggests that scallops may feed less often and grow more slowly in the presence of toxic algae and decreased oxygen concentration. One way that biologists monitor these changes in water quality is to laboriously analyze fine-scale growth patterns in the tiny ridges of scallop shells. But, the scientists suggest, it would be far less labor-intensive to instead use a network of hydrophones to keep track of coughing behaviors that signal changes in scallop metabolism. The team suggests that the technique could also replace a current, disruptive method of tracking scallop behavior: attaching motion sensors directly to their shells.

- Hearing and balance use hair cells in the inner ear to transform mechanical stimuli into electrical signals. Mechanical force from sound waves or head movements is conveyed to hair-cell transduction channels by tip links. According to a report in the December 6 issue of *Nature*, a unique cadherin interaction mechanism, in which the two most amino-terminal cadherin repeats (extracellular cadherin repeats 1 and 2) of each protein interact to form an overlapped, antiparallel heterodimer. Simulations predict that this tip-link bond is mechanically strong enough to resist forces in hair cells.