

The newsletter of  
The Acoustical Society of America

# ECHOES

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## Wallace Waterfall

by Elaine Moran

Wallace Waterfall, founding member of the Acoustical Society of America, served the Society continuously from its beginning in 1929 to his death in 1974 as Secretary (1929-69), Managing Editor of the *Journal* (1929-33) and Treasurer (1967-74). His influence was profound and long lasting.

Wallace Waterfall was born in Columbia City, Indiana on 27 May 1900 and grew up on a farm. He received a bachelor's degree in engineering physics from the University of Illinois in 1923, the first one granted by that university, and married Fern Riley in the same year. After spending two years working in his father's architectural office, Wallace joined the Celotex Corporation, an acoustical materials manufacturing firm, in 1925 as an acoustical engineer. He held the positions of research engineer, manager of the acoustical department, and finally director of research when he left Celotex in 1949. While at Celotex he also received the graduate degree of Professional Engineer in 1931 from the University of Illinois.

Wallace Waterfall, Floyd Watson, and Vern O. Knudsen, held a meeting at a beach club in Santa Monica, California, in July 1928 where they discussed the formation of an acoustical society. After that meeting, Wallace sent letters to a group of about 15 men soliciting their opinions and suggestions on the plan to organize a society devoted to the interests of the subject of architectural acoustics. He credits Harvey Fletcher and Dayton Miller with pointing out the desirability of a society of wider scope.

The letter was very favorably received and three months later, on 27 December 1928, a meeting was held at Bell Telephone Laboratories in New York City to discuss forming a society. Forty people attended and the Acoustical Society of America was formally organized at that meeting. The minutes of that meeting, which are published in Volume

1, Number 1 of the *Journal*, report that Wallace Waterfall was elected the "temporary" Secretary.

The first meeting of the Acoustical Society of America was held 10-11 May 1929. After that meeting, Wallace was handed the manuscripts of all the presentations and was instructed by the Executive Council to "Go publish them." With a sizeable contribution from The Celotex Company, the *Journal* was started and the first issue was published in October 1929. Wallace served as Managing Editor for the next four years.

Wallace Waterfall had a major influence on the fields of acoustics and physics through his involvement the formation and operation of scientific organizations and through his work during and after World War II.

The need for an organization with the purpose of standardizing the testing of acoustical materials became evident when acoustical materials manufacturers would employ different laboratories to test their materials, resulting in varying results. In 1934 Wallace helped to

organize the Acoustical Materials Association (AMA) and served as its Executive Secretary and Treasurer for many years. The AMA arranged for standardized testing of materials and published the results in the annual "Bulletin of the Acoustical Materials Association." Wallace Waterfall also provided assistance to the American Society of Testing and Materials (ASTM) in forming a committee on acoustical materials. In his honor, the ASTM Committee E-33 on Environmental Acoustics established the Wallace Waterfall award for outstanding contributions to standardization in acoustics.

Waterfall joined the scientific staff of Columbia University's Division of War Research in 1943. There in cooperation of the Office of Scientific Research and Development, he directed studies of problems and equipment involved in underwater acoustics and other techniques of subsurface war-

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# We hear that...

- The Association for Computing Machinery (ACM) has launched a new fully refereed journal **ACM Transactions on Applied Perception**, which aims to broaden the synergy between computer science and psychology/perception. The scope of this journal includes applications and algorithms in any area of research that incorporates elements of perception and computer science. Please visit [www.acm.org/tap](http://www.acm.org/tap) for more information.
- ASA member **Mark A. Clements** was elected a Member-At-Large of the IEEE Signal Processing Society Board of Governors. He will serve from 1 January 2003 until 31 December 2005.
- A three day **short course** on "Speech Spectrogram Reading: An Acoustic Study of the English Language" will be conducted by Victor Zue and James Glass at MIT, July 9-11. This course will feature a concentrated study of the acoustic characteristics of speech sounds in American English, with particular emphasis on the word and sentence level. Information on the course is available at <http://web.mit.edu/professional/summer/courses/engineering/6.67s.html>
- ASA Member **Bishnu Atal** will receive the Benjamin Franklin Medal in Electrical Engineering on April 24th at the Institute in the Benjamin Franklin National Memorial for his important work on voice coding.

## Greetings from the Editor in Scotland

I am assembling this issue of *ECHOES* in Edinburgh, Scotland, where I am a Visiting Professor at the University of Edinburgh until the end of June. Fortunately, the Internet makes it possible to do so.

Looking ahead to the 75th anniversary celebration, we continue featuring biographies of ASA founders. In this issue, Elaine Moran has written about Wallace Waterfall, who served ASA as Secretary for 40 years as well as managing editor of *JASA* and Treasurer.

I have invited my colleague Murray Campbell, a talented musician as well as a physicist, to write about the serpent, an unusual ancient instrument which Murray demonstrated at an ASA meeting a short time ago.

Unfortunately, we received no Letters to the Editor or lay-language articles about acoustics from our readers. We always welcome these. Not only does it improve *ECHOES* to have many contributors, but it makes the Editor's job much easier.

I will miss the Nashville meeting, my first absence for a long time, but Scotland is a long way away. I hope that all of you will enjoy your visit to Music City, and that some of you will send messages to me in Edinburgh <[rossing@physics.niu.edu](mailto:rossing@physics.niu.edu)>.

## The Foundation Prepares for ASA's 75th

By Bob Frisina

Next year, at the upcoming New York City meeting, ASA celebrates its 75th birthday. In anticipation, the Acoustical Society Foundation and College of Fellows have launched a 75th Birthday Campaign. Initial contributions have been overwhelming, with more than \$250,000 of donations received by the Foundation since last May. Recent major contributions have come from Thomas Rossing to establish a new prize in Education Acoustics; by Evelyn Young to establish a prize honoring her late husband Robert Young; and by George Wilson, a member of the Foundation Board. Tom Rossing deserves special gratitude in that he not only has made one of the largest donations yet to the Foundation, but he still gives his own time unselfishly to the Society in diverse ways of service, including Editor of *Echoes*. Robert Young's acoustics career was remarkable in that he continued to be a regular attendee at ASA meetings up until last year. This was a noteworthy accomplishment for Bob, an ASA Past-President, as he was an ASA Charter Member at its founding in 1929. The Foundation has now increased ASA's endowment by over \$600,000, and it would be great if we could exceed the \$750,000 level and move closer to \$1 million, to say "Happy 75th Birthday" to ASA in an enduring way. Thank you.



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  
Assistants . . . . . Elaine Moran, Charles Schmid

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# ASA Returns to Music City

As the Acoustical Society prepares to return to Nashville for its Spring meeting, April 28-May 2, many members will remember the fine local hospitality from the last meeting in the Music City in 1985. The number of papers has grown from 421 to 620, but Nashville remains an historical city and the capital of country music as well as the state of Tennessee.

The technical program for the 145th meeting includes 46 special sessions, ranging from Geoacoustical Inversion to Singing Voice Acoustics. A "hot topics" session on Wednesday afternoon will feature current topics in Underwater Acoustics, Biomedical Ultrasound/Bioresponse to Vibration, and Acoustics Education.

The history of bioresponse to vibration will be presented in a special lecture by Janet Weisenberger on Tuesday morning.

In keeping with the Music City theme, technical tours to the Gibson Guitar plant (Tuesday) and the Country Music Hall of Fame (Friday) are scheduled. A social Wednesday evening in the Ryman Auditorium (home of the Grand Ole Opry from 1943 to 1974) will include a live show.

A tutorial on "Hearing in Three Dimensions" will be presented by Barbara Shinn-Cunningham on Monday, April 28 at 7 p.m. The Acoustical Oceanography mini-tutorial series continues, with two lectures on "Probabilistic Geoacoustic



*Wesley Grantham (l), Nashville meeting Chair and Ralph Ohde (r), Nashville meeting Technical Program Chair.*

Inversion" (Monday afternoon) and "Acoustic Swimbladder Resonance Spectroscopy" (Wednesday morning). A short course on Community Noise will be held Sunday (1:00 p.m. to 6:00) and Monday (8:30 a.m. to 12:30 p.m.). Instructors are Eric Stusnick and Kenneth Plotkin.

The Physical Acoustics technical committee has organized two special sessions (Tuesday morning and afternoon) on "Sono(con)-fusion: Evaluating the Chances and Claims of Bubble Fusion." Most of the world's experts on this hot subject (see the Spring 2002 issue of *ECHOES*) will be present, and the discussions may very well last into the evening (or even all night, as they did at the famous "Woodstock of Physics" session at an APS meeting a few years ago

on the hot subject of room temperature superconductivity). It is a session not to be missed!

"You know the minute you hit the airport in Nashville that you're in Music City USA," wrote one reporter in the News-Tribune. "The walls are dotted with wood-block posters of the musicians whose voices still echo across the ages: Hank Williams, Patsy Cline, Roy Acuff." The Grand Ole Opry, now on the outskirts of Nashville, boasts the largest hotel complex in the US. The Tennessee state capital and the Andrew Jackson museum and library downtown are certainly worth a visit.



*Members of the Nashville meeting Technical Program Organizing Committee.*

# Serpent in the Garden

by Murray Campbell

Early in 1990 the English musician and instrument maker Christopher Monk issued an invitation to “all known or suspected serpent players.” It is generally accepted that the curious antique bass wind instrument, known as the serpent because of its sinuously curved shape, was invented in or around 1590 by a canon in the French town of Auxerre.



Having been largely responsible for the twentieth-century revival of the serpent, Christopher decided to mark the 400th anniversary of its birth with a celebration concert in London. In response to the invitation, 29 serpent players from all over the world assembled for a week-long workshop at Christopher’s Surrey farmhouse.

At the end of the week, on 13 July 1990, the celebration concert was held in St John’s, Smith Square, London. By that stage the number of serpent-playing participants had swelled to 58, making it the largest ever assembly of serpents.

The serpent is a fascinating instrument from the point of view of wind instrument acoustics. Even its musical classification raises a question: is it a member of the woodwind family, or does it belong more properly with the brasses? The basic form of the instrument is a conical tube around 2.5 m long, expanding in diameter from around 1 cm at the input end to around 10 cm at the output end. The side wall is pierced by six side holes, in two widely spaced groups of three; in some instruments additional side holes are provided, covered by pads and operated by keys.

The serpent was normally made of wood, although metal instruments were not unknown, and the side holes (opened or closed by the player’s fingers) are a typical feature of woodwind instruments. On the other hand, the method by which the sound is generated in the mouthpiece of the instrument is typical of the brass family: the lips of the player are pressed against the rim of the mouthpiece cup, and their vibration modulates the air flow into the instrument. This feature places it firmly in the acoustical class of “lip-reed” instruments, along with the trumpet, the trombone and the French horn. Lip-reed instruments generate sound through a non-linear coupling between the mechanical resonances of the player’s lips and the acoustical resonances of the air column in the instrument tube.

The serpent is remarkable in this respect, in that the wide-bored conical tube has a set of air column resonances whose frequencies are fairly close to a harmonic series — if the frequency of the lowest resonance is  $f$ , the frequency of the  $n$ th resonance is close to  $nf$ . The second resonance is therefore almost exactly an

octave above the first (a frequency ratio of 2). This contrasts strongly with the trombone, which has a considerable fraction of cylindrical tubing and ends with a rapidly flaring section: as a consequence, the interval between the first two resonances is typically around six semitones more than an octave (a frequency ratio of 2.8). For that

reason, the lowest played notes on the trombone (the “pedal” notes) do not make use of the lowest tube resonance; the sound is powerful, but lacking in body and warmth. The bottom note of the serpent is quite different, with a rounded mellowness which can be traced to the fact that the fundamental frequency is strongly boosted by the well-tuned first resonance.

The situation changes dramatically when side holes are opened by the fingers. The basic acoustical principle of side holes on wind instruments is that opening a hole is equivalent to cutting off the tube just below the opened hole. A sound wave travelling down the tube from the mouthpiece encounters a sudden drop in acoustic impedance when it reaches the hole; if the hole is large enough the tube is “fully vented,” and almost all the sound energy is reflected back up the tube. This is however a low-frequency approximation to the actual behavior of a side hole: above a certain cut-off frequency the venting becomes inefficient, and most of the sound energy continues past the open hole to the lower end of the tube.

On the serpent, the holes cannot be bigger than the human fingertips which have to cover them, which means in practice that the hole diameter is not more than 10% of the main bore diameter. The cut-off frequency can be as low as 100 Hz, which is in the middle of the playing range of the instrument.

A further acoustic complication is introduced by the irregular separation of the side holes. Although the successive opening of holes is intended to produce a regular ascent through the musical scale, the length of the instrument makes it impractical to place the holes in the acoustically desirable positions. Typically the lowest three holes are spaced around 4 cm apart; there is then an unpierced section of tubing around 35 cm long, followed by a second set of three holes with a spacing of around 4 cm.

This looks like acoustical mayhem! Yet, somehow, it works: a skilled serpent player can play a well-tuned musical scale over a compass of nearly three octaves.

The crucial factor which has been ignored in the discussion so far is the role played by the lips of the player. In the

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# Serpent in the Garden

*(Serpent, continued from page 4)*

non-linear equations which determine the playing frequency of the serpent for a given fingering pattern, the parameters describing the mechanical resonances of the lips exert an influence at least as great as those describing the acoustic resonances of the air column.

As a consequence, the serpent player can “lip” most notes over a range of several semitones around the pitch corresponding to the nearest air column resonance. It is much easier in practice to lip a note below the air column resonance than above it. Exactly what the player does when lipping a note is still not entirely clear: this is one of the hot topics in current brass instrument research.

In the foreground of the photograph taken in Christopher Monk’s garden during the 1990 serpent workshop, two instruments much larger than the remaining 27 take pride of place.

The smaller of the two is the only antique contrabass serpent in existence. Now in the Edinburgh University Collection of Historic Musical Instruments, it was constructed in 1840 by Joseph and Richard Wood, two Yorkshire handloom weavers.

It is twice the bore length of the normal serpent, and plays one octave lower, with a magnificent fundamental tone at 33

Hz. The larger instrument is a contrabass serpent made by Christopher Monk in 1990 for the late Philip Palmer, now in the possession of the Boston Symphony Orchestra bass trombonist Doug Yeo. It is of special acoustical interest because Christopher chose not to reproduce the original contrabass serpent (lovingly known as the “anaconda”), but rather to scale up a particularly satisfactory French serpent in his possession.

The internal bore dimensions of the Baudouin serpent used as the model were obtained by John Bowsher and Phil Drinker at the University of Surrey using acoustic pulse reflectometry. Subsequently a third contrabass serpent was constructed using essentially the same bore measurements. It is good to know that acoustics has played an important role in tripling the world population of such a rare species as the contrabass serpent.

*Murray Campbell is Professor of Musical Acoustics in the School of Physics at the University of Edinburgh. His research interests include the physics of musical wind instruments and the application of laser-based techniques to the study of non-linear acoustic fields. He was a participant in the 1990 Serpent Celebration, and retains an active involvement in serpent playing.*

## From the Student Council

*David T. Bradley*

The most recent manifestation of the Student Council’s efforts was seen in the most successful Student Reception to date. In addition to an increase in publicity efforts, the Council enacted a different approach to the reception format, resulting in a relatively high turnout, and positive reaction from those in attendance. The overall success, however, was not measured by numbers, but rather by the flourish of networking that occurred between and among students and members. We hope to continue this trend at future meetings, and strongly encourage all members to attend these receptions.

The Council has also been working on a Student Website, which will act as an information resource and communication hub for student members. In addition to the website, the Council is implementing a more proactive

mechanism for disseminating information to the student constituency, known as the Student E-zine.

This correspondence will be sent to all student members and will contain information on such topics as: room sharing and alternative student accommodations, the Lunch with a Member program and Student Receptions, and social activities planned by the Student Council. The Council is also creating a Student Mentoring Award, which will recognize the efforts of outstanding mentors who have contributed to the lives of students in acoustics. This award is in the development process, and more information will be available in the near future.

*David Bradley, a graduate student at the University of Nebraska Omaha, chairs the ASA Student Council.*

## Student Best Paper Awards at Cancun

Acoustical Oceanography  
First place:  
Robert Heitsenrether  
Second place:  
Kelly Benoit-Bird  
  
Animal Bioacoustics  
First place: Jose L. Pena  
Second place:  
David T. Blake  
  
Biomedical Ultrasound/  
Bioresponse to Vibration  
First place: Parag Chitnis  
Second place: Javier Van Cauwelaert

Musical Acoustics  
First place: Gregoire Derveaux  
Second place: Tamara Smyth  
  
Noise  
(outstanding young presenters)  
Thais Morata, Beatriz Pinto  
Physical Acoustics  
First place: Nico F. Declercq  
Second place:  
Andreas Hakansson  
  
Signal Processing  
(best paper by a young presenter)  
Mark Skowronski

Speech Communication  
First place: Paola Escudero  
Second place: Paul Dybala  
  
Structural Acoustics  
and Vibration  
First place: Tatiana Semenova  
Second place:  
Cecile Goffaux  
  
Underwater Acoustics and  
Engineering Acoustics  
First place: Eric M. Giddens  
Second place:  
Gareth Block

# Wallace Waterfall

(Continued from page 1)

fare. From 1945 to 1948 he served as Director of the Summary Reports Group, the unit that published the summary results of the research and development work carried on throughout the war by the National Defense Research Committee.<sup>1</sup> During this period Wallace Waterfall hired Betty (Hofstadter) Goodfriend who worked with Wallace in the Summary Reports Group and eventually at the American Institute of Physics (AIP) and the ASA. Betty succeeded Wallace Waterfall as Secretary of the Acoustical Society of America (1969–1987).

In 1931, four societies involved in physics joined together to form the American Institute of Physics (AIP). Wallace Waterfall was elected Secretary of AIP in 1945 and in 1949 he left the Celotex Company to become the full-time Secretary of the Institute. He served as AIP's Executive Secretary, Treasurer and Deputy Director in addition to his role as Secretary through 1974. The AIP began its existence as an organization to provide editorial and printing services to the four founding societies. It grew rapidly and began publishing its own journals during Wallace's term as Secretary. Today the AIP is a leader in publishing the world's physics literature and conducts a wide-array of programs serving the physics community.

Wallace Waterfall's dedication to the ASA remains unparalleled. During his tenure as Secretary, the Society's membership increased from 500 to 5000. Meetings grew in size in both number of papers and registrants. During an oral history interview Wallace mentioned one significant development in the Society's structure which occurred in 1960. He recounted the growing sentiment that the members wanted an expanded role in conducting the activities of the ASA. In response, the current Technical Committee structure and later the Technical Council were formed. Wallace felt that it gave the ASA a "House of Representatives" with a large committee representation which could influence the direction in which the Society went—not only in administrative affairs but the conduct of meetings and the Journal. Wallace commented that "I feel that this kind of a grassroots representation has been very healthy. It certainly saved the Society from being broken up into actual sections... And it prevented the establishment of divisions."<sup>2</sup>

Wallace was involved in all operations of the Acoustical Society. He attended and participated in all meetings of the Executive Council and Technical Council, preparing clear and concise minutes. He handled details of publishing and distributing the Journal, organizing meetings, membership, standards—virtually all ongoing and new endeavors. Early in the Society's existence, he worked to gain publicity for ASA by corresponding with the science editor at The Associated Press and encouraging the Editor of the "Octagon" published by the American Institute of Architects to include information about the Society.

Wallace Waterfall was held in very high esteem by the officers and members of the Acoustical Society. At the 25th Anniversary meeting in 1954, he was honored with the presentation of the first Gold Medal of the Acoustical Society of America. The accompanying certificate read in part, "His vision conceived the Acoustical Society. His energy promoted its formation. His enthusiasm has inspired our cooperation. His effi-

ciency has diligently maintained our orderly procedures. His worldly wisdom has counseled our successive Presidents. His smile has increased our joy of living."

In April 1969, all the past Presidents of the Society presented a Silver Tuning Fork to Wallace Waterfall in recognition of the help he provided to the presidents of the Society during its first 40 years. The tuning fork was accompanied by a certificate which read "On behalf of the members of the Acoustical Society of America, past and present, who have benefitted so greatly from your service, we past presidents present you, Mr. Secretary, this fork in recognition of these 40 years."

Wallace Waterfall's personal interests included a love of the outdoors which he developed from spending summers in Colorado and the northern Indiana lakes area as a youth and in frequently camping with his family. His father got him interested in photography and his uncle in fishing. He was a devotee of maps and also enjoyed playing bridge.

Wallace Waterfall was a modest man who loved the Society and had great respect for its members. His speeches, notes, and other writings often give credit to others for the Society's progress and achievements. In accepting the Gold Medal award in 1954, he responded "The compensation...is the privilege of working with the many fine people in the worthy cause which I consider the Acoustical Society to be...Fortunately the Secretary gets a lot of help, and he owes whatever success he may have had to the faithful cooperation of many people...Honoring me as you have tonight is greatly appreciated, and I feel that you have very considerably overdone it. Nevertheless I am extremely grateful."

His vision for the Acoustical Society of America is summarized in his notes for a 1966 speech to the ASA Narragansett regional chapter in which he wrote "We also try to seek out groups who are working in some area of acoustics and try to show them the Society will be of value to them. Over the years there has been a lot of discussion about what should be the scope of the Acoustical Society. I choose to take the position that acoustics and the scope of our Society should include whatever those who call themselves acoustical scientists are doing, which they regard as acoustics."

The Acoustical Society of America continues to foster this open and welcoming attitude today—nearly 75 years after Wallace Waterfall envisioned a Society of acoustical engineers.

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<sup>1</sup> "Wallace Waterfall 1900-1974" by Richard H. Bolt, *J. Acoust. Soc. Am.* 56, 1932-33, 1974.

<sup>2</sup> "Interview with Wallace Waterfall," Oral History Interview, Niels Bohr Library, American Institute of Physics, Center for the History of Physics, 14 April 1964.

*Elaine Moran was hired by Betty Goodfriend and joined the ASA staff in 1970. She handled some secretarial duties for Wallace Waterfall and remembers his kindness in making her feel welcome in the ASA office.*

# Scanning the Journals

Thomas D. Rossing

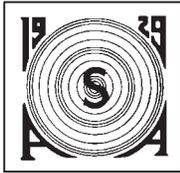
- The concept of **synchrony** seems to apply equally well to wobbly bridges and to new speech recognition systems, according to a news feature in the 20 February issue of *Nature*. An array of junctions will come to oscillate in synchrony as connections between the junctions nudge the devices into phase. Computer simulations of neuron networks are well suited to certain tasks, such as pattern and face recognition. A simulated network of 650 biologically realistic neurons can recognize sounds by detecting synchronous firing much quicker than identifying a word by time-frequency analysis by channels.
- **Songbirds** have long captivated humans. In recent decades, the fascination with songbirds has hatched a remarkably productive niche in neuroscience, according to an article in the 31 January issue of *Science*. By studying how male birds learn and produce their song, researchers have gleaned insights into the neural mechanisms of learning and motor control. Birdsong researchers were the first to discover that new neurons can be born in the adult brain. Birdsong researchers held their first international conference in December at Hunter College in Manhattan.
- **Acoustical phonons** can be confined in a planar cavity consisting of a layered semiconductor structure, according to a paper in the 25 November issue of *Physical Review Letters*. The resonant acoustic microcavity consists of two semiconductor superlattices enclosing a spacer layer whose thickness is an integer multiple of the acoustic half wavelength at the center of one superlattice minigap. Optical Raman scattering experiments in a GaAs/AlAs structure have shown evidence of such novel excitations which may lead to coherent generation and control of phonons. The double-resonator structure may resonate at optical frequencies (with photons) and acoustical frequencies (with phonons) simultaneously, according to a commentary on this paper in the 20 February issue of *Nature*.
- The January/February issue of *Acta Acustica/Acustica* is a special issue on **computational acoustics**. The issue begins with a review article by Otto von Estorff about "Efforts to reduce computation time in numerical acoustics—an overview." Three papers discuss boundary element methods (BEM) and two papers report on modal analysis and sound radiation from a complex submerged structure.
- **Functional mapping of the primate auditory system** is the title of a paper in the 24 January issue of *Science*. Cerebral auditory areas were delineated in rhesus monkeys by comparing the rates of glucose utilization in an intact hemisphere and in an acoustically isolated contralateral hemisphere of the same animal. Several auditory areas overlapped with previously identified visual areas, suggesting that the auditory system, like the visual system, contains separate pathways for processing stimulus quality, location, and motion.
- The influence of road surface texture on the generation of **tire noise and the resistance to skidding** is the subject of an article in the January/February issue of the *Acoustics Bulletin*. Texture depths of about 0.7 mm have been identified as being the limit below which skidding resistance dramatically falls with speed, but on some surfaces this still generates relatively high noise levels. The difference between random and transverse textures is discussed.
- A letter to the editor in the February issue of *Physics World* calls attention to a phenomenon sometimes observed in **violin strings**. The vibration amplitude of the G-string on the author's violin alternately died down and increased within a period of several seconds, at the same time emitting a note which a skilled violinist described as discordant. This behavior could be suppressed by moving the sound post 1.5 mm toward the center of the violin.
- Short-term synaptic plasticity, which is common in the central nervous system, may contribute to the signal processing functions of both temporal integration and coincidence detection. **Synaptic depression** has been noted in the **localization of sound**. The authors combine an empirical description of this depression with a biophysical model of signalling in the nucleus laminaris to obtain a model that predicts that synaptic depression provides an adaptive mechanism for preserving time-delay information despite the confounding effects of sound-intensity-related information.
- A team of chemists has used **acoustic levitation** to levitate a microlitre drop of supersaturated protein solution to control crystal growth, according to a paper in *Anal. Chem.* 10, 1021 (2003) cited in the 6 March issue of *Nature*. Crystallization agents are injected into the levitated drop. Measurements of light scattering indicate the onset of precipitation while microscope imaging records the drop's volume.
- Mechanical devices with **resonance frequencies above 16 GHz** are described in the 30 January issue of *Nature*. Silicon carbide epilayers, grown on silicon wafers, are used to fabricate clamped beam pairs, roughly 1100 nm long, 120 nm wide, and 75 nm thick, in the GHz range. Their motion is detected by balanced magnetomotive techniques.
- **Acoustic design of schools** is discussed in an article in the November/December issue of *Acoustics Bulletin*. In the UK, as in the USA, there is a growing interest in classroom acoustics. Approved Document E of the Building Regulations, which comes into force in July 2003, requires that new and refurbished schools will have to meet strict standards for noise levels, sound insulation, and room acoustics.
- **"Pipe organs: physics in an action"** is the title of a paper on pipe organ actions in the December issue of *Physics World*. Electric actions prevailed during the first half of the 20th century, but many players began to lament the lack of a direct connection with the pipes. Consequently, there was a return to the centuries-old "tracker action," although there is a practical limit to the size of organ that can be built with mechanical action alone. A few large organs boast dual consoles, one with mechanical action and one with electrical action.

# Acoustics in the News

- “The Rumble of Destruction,” a science review article in the 24 January issue of the *San Francisco Chronicle*, points out that infrasound has been used to predict volcanoes, tornados, and earthquakes. Infrasound detectors are used at 60 monitoring stations to listen for nuclear weapons tests around the world. Infrasound signals from bolides have been detected as far as 5000 miles away (see *ECHOES*, Summer 2001). Infrasound is useful for warning of impending volcanic eruptions, and elephants use infrasound for communication.
- Trials of a new sonar intended to protect whales have been suspended, because of fears that the device itself could damage the animals, according to a news note in the 16 January issue of *Nature*. Biologists at the Woods Hole Oceanographic Institution in Massachusetts say their sonar could alert sea users, such as large ships and oil exploration companies, that whales are in the area. The researchers wanted to test the sonar off the coast of California, but environmentalists said it should not be used because the noise it generates could injure migrating grey whales. On January 8 a federal court agreed and suspended tests pending further evidence.
- Humans are not the only species able to learn the sound of a mother's voice while still in the womb. Larvae of some species

of coral reef fish can identify the sounds of home and family from inside their eggs, according to a news note in the 17 January issue of *Science*. Reef researchers have found that larvae as small as 1 or 2 centimeters find a suitable reef to settle on by imprinting on the squeaks, grunts, and whistles of their parent. The hatchlings use tiny stones in their heads called otoliths to pick up the sounds and find home. Some of this research was reported in session 1pAB at the Pan-American/Iberian acoustics meeting in Cancun in December 2003.

- Neuroscientists met with artists, musicians and architects on January 11 at the University of California, Berkeley, in an effort to discover some clues to the neurological basis of artistic taste, according to a news note in the 23 January issue of *Nature*. Many experts believe that artistic choices are entirely dependent on cultural influences, but proponents of neuroaesthetics think there are pointers to taste, and that studying the brain will help to find them. The most noted results in this new field have been in music. Researchers have found that infants find more dissonant musical intervals, such as tritones, less pleasing than consonant ones such as perfect fifths. Perfect fifths appear to produce smoother firing patterns in auditory nerves than tritones do.



**ACOUSTICAL SOCIETY OF AMERICA**

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