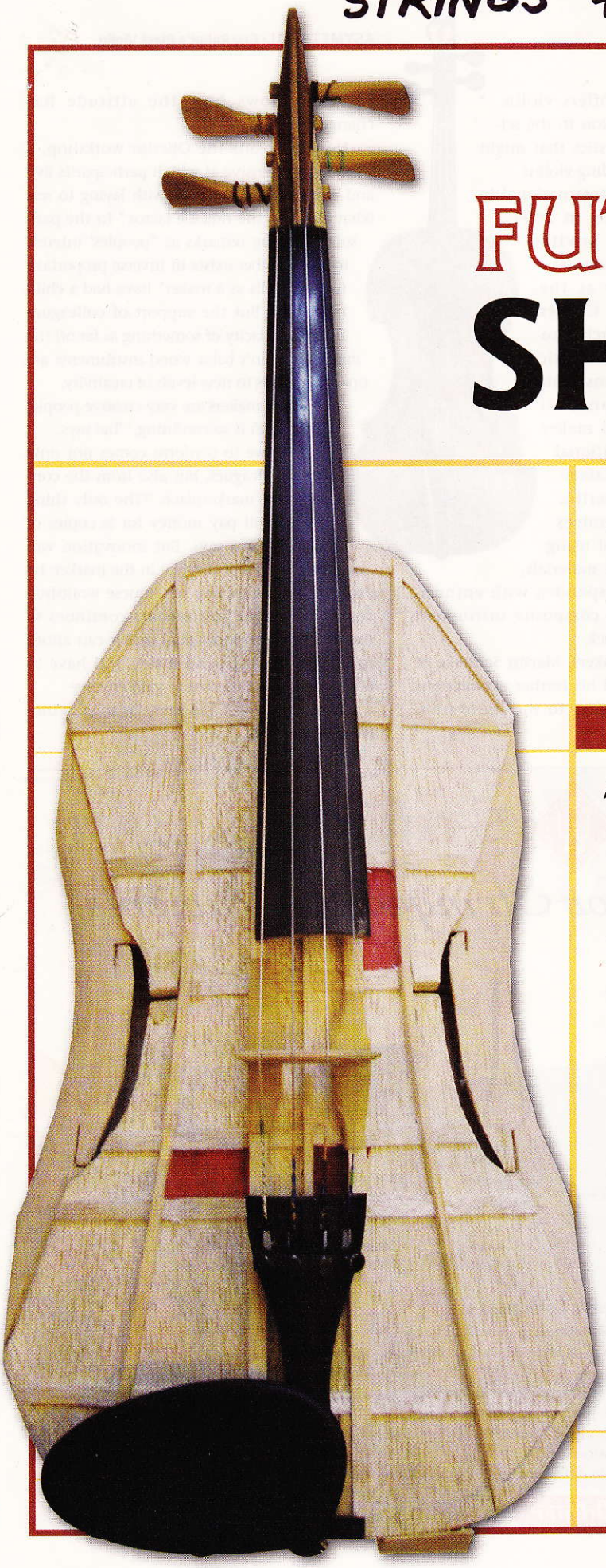


DOUG MARTIN

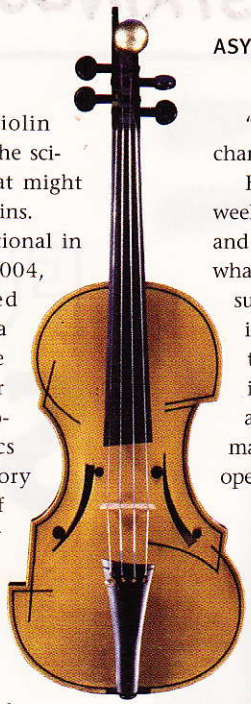
FUTURE SHOCK

VSA Innovation Exposition gives a glimpse into the next generation of instruments and bows

The traditional violin became obsolete in July 2005," wrote master luthier Joseph Curtin in the opening of an article for a recent Violin Society of America (VSA) newsletter. The unlikely catalyst for that pronouncement was a rather crude-looking instrument made of balsa strips slapped together with string and tape by a boat designer from coastal Maine. It looked something like a violin, but even more astonishingly it *sounded* like a violin. Its appearance at the VSA Acoustics Workshop in Oberlin, Ohio, expanded Curtin's and other highly successful makers' views of what is possible in violin making. Of course, no one is truly prophesying the end of the violin as we know it, or that its replacement will be boat designer Doug Martin's eccentric balsa violins. But the very fact that the VSA, an organization founded by connoisseurs of antique violins, published such an article and devoted an entire day of its most recent annual convention to presentations on innovation is evidence of a shift in a story that's been stuck on the same chapter for about 200 years.

BY ERIN SHRADER

Innovation Exposition



ASYMETRICAL: Guy Rabut's Black Violin.

The Innovation Exposition of Violins, Bows, and Accessories—an eye-opening display of nontraditional items held during the 2006 VSA Convention, November 6–12, in Baltimore, Maryland—featured a jam-packed day of presentations describing new ideas for improving the sound, durability, and playability of stringed instruments and bows, and for employing science to help expand the understanding of how the violin actually functions.

"It's hard to get people to try new ideas," says Raymond Schryer, an award-winning Canadian maker. "But people look at the VSA meeting and say, 'Hey, there's a whole day of it and a *lot* of people are attending.' They're curious. They might not be into it, but they don't want to miss out on what's going on."

What's going on as a result is nothing short of a wholesale rethinking of stringed instruments, bows, and accessories by some of the leading makers of our time.

Acoustician Fan Tao, who spearheaded the Innovation Exposition, says that the genesis for this paradigm shift lies with the VSA-Oberlin Acoustics Workshop. Co-founded in 2001 by Curtin and Tao, who is head of research and development for musical string manufacturer J. D'Addario & Co., the annual summer seminar offers violin makers an introduction to the science of violin acoustics that might result in better-sounding violins.

That mission is international in scope. For instance, in 2004, Curtin and Tao invited Charles Besnainou—a research engineer at the French National Center for Scientific Research, professor of musical acoustics at the National Conservatory of Music and Dance of Paris, lutanist, and maker of lutes using traditional and composite materials—to attend Oberlin. Tao expected attendees to resist the idea of using new, nontraditional materials, but participants responded with enthusiasm, completing a composite instrument by the end of the week.

One of those makers, Martin Schleske of Munich, contributed his further explorations of graphite composites to the Innovation Exposition.

"This shows how the attitude has changed," Tao says.

He also credits the Oberlin workshop, a week-long intensive at which participants live and work closely together, with laying to rest what he calls "the ridicule factor." In the past, such scathing remarks as "peoples' interest in carbon fiber exists in inverse proportion to their skills as a maker" have had a chilling effect. But the support of colleagues and the audacity of something as far off the map as Martin's balsa wood instruments are opening minds to new levels of creativity.

"Violin makers are very creative people, but the craft is so confining," Tao says.

Pressure to conform comes not only from colleagues, but also from the conservative marketplace. "The only thing people will pay money for is copies of antiques," Tao says. But innovation will soon be a matter of survival in the market, he explains. As the quality of Chinese workshop copies of antique instruments continues to rise at a price no individual maker can afford to match, the high-end maker will have to offer something different to gain an edge.

"The next step," Tao says, "is to convince the buying public."

GUY RABUT

THE EVENT

The idea for a public display of innovative instruments and bows came up repeatedly in seemingly unrelated conversations at the 2004 VSA meeting in Portland, Oregon, convincing Tao that the time was right. A deadline would motivate makers to spend some time putting their ideas into practice. "You can talk about innovation all you want," says Tao, "but without work there is nothing to show."

Gathering a long list of supporters, Tao approached the VSA board of directors about hosting such an event at the 2006 competition convention, then two years away.

He met with resistance.

But the following summer, VSA board member Joe Regh attended the Oberlin Acoustics Workshop and was impressed with what he saw. By that time, boat designer Martin had made significant improvements to his balsa instruments and New York luthier Sam Zygmuntowicz, who has forged a successful career making traditional instruments for top concert artists, brought his own experimental violin whimsically named Gluey.

Regh warmed up to the idea of innovation, but suggested beginning with a smaller event at an off-year convention. "The room was packed all day," Tao says of that informal 2005 symposium. Around the same time, the 53-year-old Curtin was awarded a prestigious $500,000 MacArthur Fellowship, or "genius grant," in recognition of his work with nontraditional designs and materials.

BEYOND PERCEPTION

"There's no visible measurement or point I've not seen on these violins," says luthier Sam Zygmuntowicz. But certain elements, such as the exact nature of the materials, how the instrument behaves when it vibrates, and how the air around it resonates are beyond human perception.

Those factors can be detected and recorded by the right machines, however.

Just ask Dr. George Bissinger, who runs the Violin Computer Aided Design Engineering Analysis System, a research program funded by the National Science Foundation, at East Carolina University in Greenville, North Carolina. He teaches at the Oberlin Acoustics Workshop.

Bissinger had collected years' worth of data on bad to reasonably good violins, but no great instruments. Incredibly, the world's preeminent violin acoustics researcher had never had access to the world's great violins until recently.

Last September, Zygmuntowicz borrowed the 1734 Willemotte Stradivari, the 1715 Titian Strad, and the 1735 Plowden Guarneri del Gesù—some $14.5 million worth of instruments—for three days of tests at Bissinger's lab along with Joseph Curtin, Joe Regh, and Fan Tao. The visit coincided with the loan from the Polytec company of a three-laser scanner of the type used in industrial research to measure, for example, the vibration of car doors. The violins also received a CAT scan and were recorded in an anechoic chamber with Bissinger's system of 15 carefully calibrated microphones.

One theory about the difference between the sound of the old Italians and everything else is that it has to do with the amount of damping in the wood. Materials have three attributes: stiffness, mass, and damping. Damping, Fan Tao explains, refers to how quickly energy dies away. To measure damping, instruments are given a tap on the bridge from a small hammer attached to a computer. Each carefully measured tap puts a precise amount of energy into the instrument. By measuring the difference between the energy put in and the energy that comes out, it is possible to determine how much of that energy is absorbed, determining its damping properties.

There is still a great deal of "number crunching" to do, but according to Tao, preliminary evidence suggests a possible difference in damping between the old Italians and other instruments, especially in the lower frequencies.

The three-laser scanner also recorded the vibrations of the entire instrument. This data can be translated into computer-generated movies, showing exactly how all the parts move in relation to each other. Watching the way energy flows through the body of a violin at different frequencies is hypnotic. For example, the wing at the bottom of the treble-side f-hole flaps wildly contrasted to the rest of the instrument. "The fluting in the f's creates a section of a tube, one of the strongest, lightest structures," says Zygmuntowicz. "Whoever thought of fluting created a perfect stiff, light little tweeter."

Zygmuntowicz finds himself watching the movies over and over. He can't pinpoint exactly how he uses the information, but likens it to the way makers will pick up a piece of wood, tap it and twist it, intuiting information about how it will behave.

"It has altered the way I arch now in subtle ways," he says. "Ultimately, I work intuitively, but intuition is the outgrowth of the sum of all your experience. The broader your experience, the more informed and detailed your intuition will be."

—*E.S.*

BLUE MOOD: Spidlen's modified fiddle.

That award closed any credibility gap on the topic of violin-making innovation.

By Tao's count, the larger 2006 VSA Innovation Exposition featured nontraditional instruments by 18 luthiers; 18 bow makers, as part of the alternative woods exhibit; 11 commercial exhibitors and sponsors; and seven makers of traditional instruments and bows, for a total of 54 individuals and companies. The people whose work was represented came from some surprising disciplines—nuclear physics, the aerospace and bicycle industries, art and sculpture, engineering, boat design, and carbon-fiber technology.

Still, most of the items came from the traditional lutherie trade, including some of the world's leading makers.

Jan Spidlen, descended from a family of Czech violin makers, brought his famous blue violin. It was commissioned by the Czech soloist Pavel Sporcl, a passionate classical musician with a decidedly modern image. Color aside, it looks and plays like any other violin, though looks can be deceiving. Spidlen's innovations focus mainly on improved sound and stability of the instrument, including a modified outline with short corners and narrow edges, enlarged f-holes, and carbon-fiber reinforcement of the bass bar. A lead weight in the head reduces vibration there, sending more energy back into the body for a stronger sound, and a titanium screw inside the neck can adjust for seasonal changes in neck angle.

"The adjustment of the neck's angle is not a new idea at all," says Spidlen. "The neck's deformation due to climate has always caused problems to players as the string height changes. I tried to avoid any mechanical parts" that might loosen or get stuck over time, allowing the neck to "bend through its natural flexibility. The disadvantage is some delay of the effect as the wood needs time to get used to the new tension set. So it doesn't work [to adjust] the neck during a concert break, but rather for a whole season.

"But I have some ideas to improve this."

Other innovators were from outside the instrument-making tradition. For instance, Ned Steinberger, a onetime furniture designer who is not a musician, stumbled into the instrument world while sharing a shop with a maker of electric bass guitars. The need for an electric upright bass that could respond well to both arco and pizzicato playing led Steinberger to develop the Polar pickup, a pressure-sensitive piezo pickup that senses both lateral and vertical string motion. NS Design now makes the entire family of electric bowed instruments. An entirely accidental result is a new sound never available to violinists before: a liquid, sustainable pizz sound. What use musicians will make of that, Steinberger can only guess.

Bernd Müsing, founder of Arcus Bows, arrived by a different path. Müsing was having trouble playing Mozart. While admitting with good humor that much of the problem had to do with his own limitations as a musician, he also realized that Mozart's music was designed for a different bow. As a modern musician, he could not simply perform earlier repertoire on a Baroque-style bow, but required a bow to play all styles of music. Müsing needed a bow that delivered a combination of qualities that he

JAN SPIDLEN

describes as power, agility, bounce, and control—not a readily compatible combination of traits, since he found that bounce required higher hair tension, while control came with lower tension. The power needed for modern violin music required a strength that could not be had below a certain weight using traditional wood, while the agile bow for which Mozart composed was considerably lighter than today's bow.

Employing the engineering skills honed during his career in the bicycle industry, Müsing worked with a friend and expert in carbon technology to develop a composite bow that successfully delivered the seemingly impossible combination of characteristics he sought.

THE NATURE OF THINGS

Bow makers worldwide have been forced to innovate by environmental problems never faced by their predecessors. Pernambuco, the highly resilient bow wood of choice for over 200 years, is in peril. A shocking 95 percent of its unique habitat, Brazil's Mata Atlântica rainforest, has been destroyed by urban development, industry, and agriculture. The rampant deforestation was not caused by the bow trade,

THE SAGE

Editor's note: Norman Pickering, former head of R&D at J. D'Addario & Co. and a mentor of Fan Tao, is one of the world's most respected acousticians. Strings *asked him to comment on the 2006 VSA Innovation Exposition.*

I have been in touch with the developments exhibited at the VSA Convention since they began; in fact, I can claim some small share of the forces that began them. We have recognized for decades that stringed instruments reached their peak of development in the early 19th century, and that the most serious limitation is a materials problem. Whether the superior wood properties of the best of the antiques are due to better trees of that period, higher skills in selection and preparation of violin wood, or aging effect, is still not established.

Innovation concentrated on the development of improved acoustic properties is the only approach that makes sense if increased power with acceptable tone quality is the goal. Fully synthetic materials, so far, lack the randomness that is important in satisfying educated human ears. Natural woods combined with synthetics for strength and wear resistance show promise. All-natural structures using materials such as balsa sandwiched with more durable woods seem to me the most likely to succeed in the near future.

Above all, the visual beauty of the instruments must be preserved in any design that differs from the classical. Slavish copies of the Strad or any other instrument fashioned after old masters can never be more than imitations, no matter how well they sound.

Joseph Curtin, in acoustical instruments, and Ned Steinberger in electronic ones, have shown the way. Further development along those lines may be acceptable to artists. Most of the other approaches will be admired and respected, but great string players have to be able to love their instruments. Flashy demonstrations of modal laser-produced video images are impressive, but of little use to gifted makers until they are translated into facts that can be used at the workbench.

These are the views of someone who has struggled for 50 years to understand these wonderful instruments and who rejoices in the new wave of innovation, which in no way diminishes his love and respect for the great masters of the past.

—*Norman Pickering*

BALSA CELLO: By James Ham and Ted White.

which uses a statistically insignificant amount of wood, but members of the trade have rallied internationally, launching the International Pernambuco Conservation Initiative. The IPCI and its affiliated organizations have developed a multipronged approach to preserving the species for future generations: planting trees for bow wood; supporting forest conservation and restoration; pursuing genetic research and preservation; founding a Brazilian youth orchestra to help raise awareness of the bow wood; and trying out possible alternatives to pernambuco. There is reason to hope for the future: Brazilian bow company Horst John is now selling bows made from trees planted by the company's founder 30 years ago.

Still, that scarcity of pernambuco—and especially the possibility that international trade organizations might impose the same type of restrictions that are in place for ivory—has led bow makers to look elsewhere for high-quality materials, at least until the situation stabilizes.

Roy Quade of Calgary is one of the many makers trying out new woods for bows. Quade sees alternative woods as a temporary measure, at least for the high-end sector of the trade. So far, a Brazilian hardwood called ipê, which Quade found at his local wood dealer, has been the most successful. Quade has even sold ipê bows to musicians who picked them out of a lineup that included pernambuco bows, unaware that they were trying something new. The wood has an olive-green cast, which can be treated to give it a more appealing hue. But it also gives off a waxy substance while being worked that some makers find off-putting.

Violin makers may eventually face a similar dilemma, given the growing shortage of ebony and Bosnian maple. That situation hasn't yet reached the crisis point.

Tao acknowledges that some innovations might be characterized as "a solution begging for a problem." But he remains a passionate crusader for an area of the violin world that is both crucial and desperate for improvement: good-sounding, easy-to-play instruments for children. "For kids' instruments there's no debate," he says. "It's a problem begging for a solution."

Everyone agrees that scaled-down versions of full-sized instruments are hard to play and can sound awful just when the beginner needs something easy and satisfying to gain confidence.

For the individual maker, the financial incentives of making these fractional instruments are few. Kids grow quickly, and parents are understandably reluctant to spend real money. What Tao would like to see developed is a design that is easy to replicate consistently and relatively inexpensive to make. He imagines a group of people working on the design together, perhaps via the Internet.

A potential solution presented itself to Tao when he brought Martin's balsa violins to a chamber music festival. "Reactions ranged from horror to 'I want to buy it!' The musicians who teach children got it right away," he says, because it solves their problems. Balsa instruments may not compete with a Strad, but they're extremely easy to play.

"I don't care how it looks," says Tao. "As long as it plays like a violin and sounds good, why not make something cool-looking that kids will want to play? Then we will have more string players!"

And those kids will grow up open-minded about how a stringed instrument can look and sound, ensuring a new market for those innovative violins. □