

Mystery solved: Chemicals made Stradivarius violins unique, says professor

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Answering a question that has lingered for centuries, a team of scientists has proved that chemicals used to treat the wood used in Stradivarius and Guarneri violins are the reasons for the distinct sound produced by the world-famous instruments.

The conclusions, published in the current issue of *Nature* magazine, have confirmed 30 years of work into the subject by Joseph Nagyvary, professor emeritus of biochemistry at Texas A&M University, who was the first to theorize that chemicals – not necessarily the wood – created the unique sound of the two violins. Nagyvary teamed with collaborators Joseph DiVerdi of Colorado State University and Noel Owen of Brigham Young University on the project.

“This research proves unquestionably that the wood of the great masters was subjected to an aggressive chemical treatment and the chemicals – most likely some sort of oxidizing agents – had a crucial role in creating the great sound of the Stradivarius and the Guarneri,” Nagyvary says.

“Like many discoveries, this one could have been accidental. Perhaps the violin makers were not even aware of the acoustical effects of the chemicals. Both Stradivari and Guarneri wanted to treat their violins to prevent worms from eating away the wood. They used some chemical agents to protect the wood from worm infestations of the time, and the unintended consequence from these chemicals was a sound like none other,” he adds.

The team tested several instruments, including violins and cellos, produced by Stradivari and Guarneri from 1717 to around 1741, using spectra analysis and other methods.

The results and those previously reported by Nagyvary showed that two specific areas of the instruments accounted for their unique sound – chemicals used in the varnish and fillers of the instruments, and the overall wood treatment process used by Stradivari and Guarneri.

“This is highly gratifying for me, because it proves what I first proposed 30 years ago – that the chemicals used to treat instruments and not the unadulterated wood itself – were the reasons for the great sound of these instruments,” Nagyvary explains.

“I was criticized and ridiculed when I made these claims, and to have undeniable scientific proof that I was correct is very satisfying, to say the least.”

Antonio Stradivari (1644 to 1737) made about 1,200 violins in his lifetime and kept a large inventory of them, and would only sell one when he was ready to part with it. Today, there are only about 600 Stradivarius violins remaining and they are valued at up to \$5 million each.

Although lesser known, Guarneri del Gesu was a contemporary of Stradivari and his instruments are considered equal in quality and price by experts.

Nagyvary, a native of Hungary who learned to play the violin by using an instrument that once belonged to Albert Einstein, has wondered for years how Stradivari, who could barely read and had no scientific training, could have produced instruments with such a pristine sound.

“I started researching this in the early 1970s and from the beginning, I was convinced that the chemicals used to treat the instruments were the real key, not the wood itself,” he says.

There is still a missing piece of the puzzle, Nagyvary believes.

“The next step is to identify the chemical agents involved. To do that, more precious wood samples are needed,” he adds.

“But in the past, there has been a lack of cooperation from the antique violin business, and that has to be overcome. It may help us to produce violins and other instruments one day that are just as good as the million-dollar Stradivarius. And this research could also tell us ways to better preserve instruments, too.”

Source: Texas A&M University

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