

Media release

Duebendorf, St. Gallen, Thun, December 9, 2011

On the road to creating an affordable master instrument

New financial support for the "fungus violin"

Violins made of wood treated with fungus need not hide their lights under a bushel when compared to a Stradivarius, as a blind test before an expert audience has already suggested. However, these "tonal masterpieces" are only available as a few individual instruments. In order that these biotech violins may be built in larger numbers, Empa researchers are currently working on optimizing and standardizing the fungal treatment of wood. Financial support for the project is being provided by a generous new sponsor, the Walter Fischli Foundation.

What talented young violinist has not dreamt of playing on a Stradivarius, that non plus ultra of the violin-maker's art? Unfortunately, of course, these instruments are rare, and well beyond the budget of most musicians. "Imitations" of similar tonal quality are therefore very sought-after, and the Empa researcher Francis Schwarze has managed to achieve this feat with the help of a Swiss violin maker. By treating the wood with *Physisporinus vitreus*, a white-rot fungus which attacks and destroys certain structures in spruce, he was able to create a material with resonance properties quite out of the common. These new "fungus violin" could even put its own role model in the shade. At a scientific conference in 2009 two of the new instruments were compared in a blind test to a Stradivarius and both the jury of experts and the conference audience judged they preferred their sound to that of the violin made by the Italian Master of Cremona.

Schwarze now intends to develop a standardized biotechnological process so that sufficient fungally-treated wood can be produced to make instruments in respectable numbers. This is the only way that would allow an industrial partner interested in the technology to manufacture the violin making wood on a larger scale. In order to create the necessary bridge between science and industry it is vital to develop technologies which offer potential partners significant commercial advantages. In this case this means standardizing the wood treatment parameters to such an extent that a specific material "quality" can be guaranteed. This is not an easy task to accomplish with a material such as wood which is subject to natural fluctuations in properties.

Generous support from the Walter Fischli Foundation

In the Walter Fischli Foundation the Empa scientist has found financial support which will enable the "fungal violin" project continue. Explaining why he decided to provide funding for Schwarze's work, Walter Fischli,

who is co-founder of the biomedical company Actelion and an enthusiastic hobby violinist, says "In my opinion it would have been unforgivable to allow such an interesting project – one that so ideally links science and the art of violin making – to wither for lack of funding." Fischli hopes that the Empa specialists will finally uncover the secret of why violin makers such as Stradivarius and Guarnerius managed to make instruments of such fantastic quality around 1700. Their craftsmanship is, of course, one decisive and undisputed factor but it seems that the wood they used also played a vital role. "Using modern science to explain the technical details of the material properties is something I find enormously interesting," says Fischli.

Interdisciplinary research and development of a standard wood treatment process

The project, which commenced at the beginning of September and will run for three years, is led by Iris Brémaud, a specialist in the field of tonal woods. The French scientist relates mechanical and acoustical research with the notion of "quality" of wood for craftsmen and is responsible for ensuring that the treatment with the white rot fungi *P. vitreus* and *Xylaria longipes* optimally "ennobles" samples of spruce and maple woods. In addition she is already in contact with Michael Baumgartner, the renowned instrument maker from Basel. Under his guidance the "fungus violins" using the treated wood will be created.

Before this luthier can take delivery of the first violin blanks of "fungal wood", however, numerous tests on both treated and untreated wood samples must be carried out. Empa researchers are currently systematically measuring the density of the wood, the speed of sound in it and its acoustic damping. Specialists in the field of ultrasonics are developing methods to determine where the fungus was active and where not. Scientists expert in optical measurement techniques are using their specialist methods to create images showing how sound is radiated by the different woods and also complete instruments. The final steps should involve collaborations with specialists of psychoacoustics to understand how musicians and listeners perceive these "mushroom violins."

Literature

«*Physisporinus vitreus*: a versatile white rot fungus for engineering value-added wood products», Francis Schwarze, Mark Schubert, Applied Microbiology and Biotechnology, DOI 10.1007/s00253-011-3539-1

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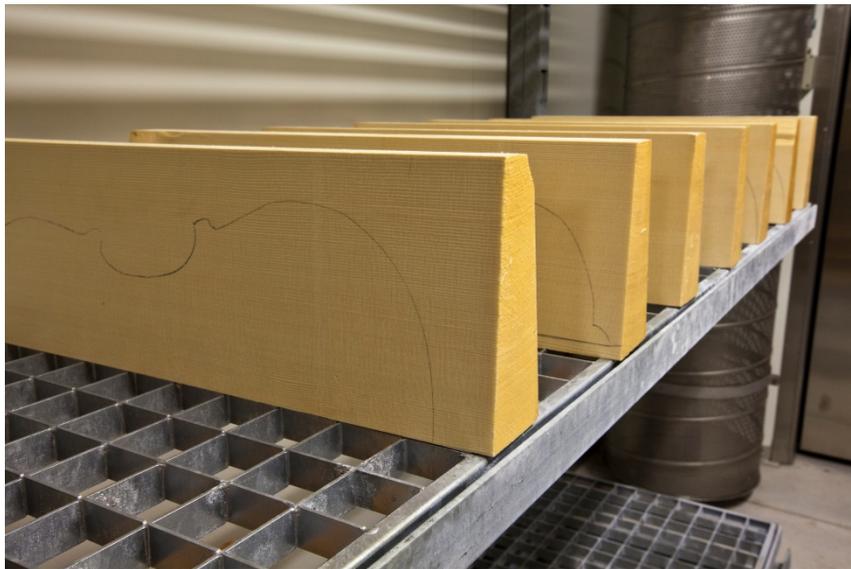
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In the Biotechnology group of Empa Wood Lab, tonal woods are systematically treated with rot-inducing fungi. Markus Heeb and Iris Brémaud regularly check to see how the fungal attack is progressing.



The blocks of wood are stored under controlled conditions in a climate chamber at Empa. Michael Baumgartner, the master violin maker from Basel, will later use the wood to create new violins.

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