

Experiment proves music sounds better at low tuning

by Hartmut Cramer

November 6, 1988 will undoubtedly go down in musical history since, on this day, in an internationally famous musical institute, the scientific proof was given that music sounds more beautiful in the "Verdi tuning" of C = 256 Hz (corresponds to A = 432 Hz) than in the higher tuning commonly used today.

In a simple but extraordinarily conclusive experiment, which absolutely deserves the predicate "unique," it was demonstrated that the sounds produced in the low tuning have a greater abundance of overtones. The result: The sounds have more color, and their volume and carrying capacity are greater. The qualitative difference, which is heard immediately when comparing the low and the high tuning, was thus objectively and unambiguously confirmed.

Prof. Bruno Barosi, director of the Physical Acoustics Laboratory at the International Institute for Violin Construction in Cremona, and Prof. Norbert Brainin, first violin of the unforgettable Amadeus Quartet, carried out the experiment together at the institute's headquarters in historic Palazzo Raimondi, one of the most beautiful buildings in this world-famous northern Italian city.

Naturally, in a place so rich in tradition, Brainin played on a Stradivarius violin—the Omobono Stradivarius of 1736, which was probably built by Omobono, one of the two violin-building sons of Antonio Stradivarius, under his father's supervision, if not by the then 92-year-old master himself.

The experiment

The idea on which this experiment was based is the following: Since the tones in the low tuning sound significantly "rounder," that is, fuller and with more color, they must be physically distinguished by a greater abundance of over-

tones, in comparison with the tones in the high register. If the attempt to make this difference in richness of overtones obvious by means of a physical experiment is successful, then the proof is produced that the lower, scientific Verdi tuning is superior to the higher, arbitrary "von Karajan" tuning.

The special importance of such a physical experiment lies, however, primarily in the fact that the question of musical tuning is removed from the realm of personal opinion and individual taste and raised to the level of scientific *fact*.

In carrying out the experiment, Brainin played on the four open strings G, D, A, and E, as well as the corresponding octaves, first in the low tuning and then in the high. Brainin's precision in intonation astonished the Cremonese experts, who have had many great violinists as guests at their institute. Without fail, Brainin each time hit the octave, "exactly to the Hertz," and thus twice the frequency of the open string, in each tuning.

Using computers, Barosi and his assistants carried out spectroscopic analysis of the recorded sounds that were finally drawn in the form of curves. Comparison of the curves produced an unambiguous picture: The sounds in the deep tuning were distinguished by their abundance of overtones, both with regard to the number of such and to the volume. The whole procedure was recorded and stored so that it can be repeated and controlled.

In a further experiment, the recording demonstrated the rate at which the Omobono Stradivarius reacted to the entire spectrum of frequencies from 20 to 20,000 Hz, the typical pattern of an "old violin of the Cremona School," and really quite similar to the famous Il Cremonese Stradivarius of 1715 that is displayed in the Cremona Town Hall. Remarkably,



From the April 9, 1988 Schiller Institute conference in Milan: left, Norbert Brainin and pianist Günter Ludwig at the close of their concert; below, Prof. Bruno Barosi of Cremona during his presentation.



the violin showed its best resonance at 259 Hz, and thus quite close to C = 256 Hz; Stradivarius, therefore, "tuned" this violin low, as he did his others as well.

The music

In order not to leave the matter on a "cold" physical-technical level, Brainin repeated in conclusion a musical demonstration that he had done earlier this summer in private. Following a suggestion of his friend Lyndon LaRouche, Brainin, using Bach's works for solo violin, demonstrated the musical superiority of the low tuning over the high; thus he extended to the instrumental field, the experiment with the human voice, with which the Italian baritone Piero Cappuccilli had so convinced his listeners in April in Milan at the historic conference of the Schiller Institute.

In Cremona, the demonstration was especially successful. It was recorded for TV, and broadcast that evening on the regional news. On Nov. 24, Professor Barosi explained the experiment to politicians at a hearing in Rome at the Ministry of Culture that is considering the proposed law formulated by the Schiller Institute for a return to the Verdi tuning.

Italy would not be Italy, and Cremona, not Cremona, if matters had been left like that. Naturally, there was, following the successful experiment, a typical Italian banquet, in this case, of course, in a restaurant boasting classical Cremonese cuisine. At a dinner featuring Cremonese salami, prosciutto, homemade pasta, exquisite pheasant, and incomparable *dolci* (desserts), the "secret" of the Stradivarius was

revealed: "All the stories of varnishes wrapped in mystery, of special wood, etc. have very little to do with the actual achievement of the greatest Cremona violin makers, of whom Stradivarius was unambiguously the best," Barosi stated.

"Cremona was at that time *the* scientific and mathematical center of Italy," he explained. "Stradivarius, an absolutely first-class craftsman, was simultaneously also a great experimenter who constantly sought new ways to build better violins. Since he had the best mathematicians in Italy around him, it is no accident that he not only created violins that are wonderfully beautiful from the craftsman's point of view, but are also violins that produce the most beautiful tone, a 'round' tone that is distinguished by an extraordinarily soft address and the greatest carrying-capacity."

In closing, there was yet another precious moment: After the espresso, the head chef asked Brainin to play his Stradivarius since she, although born in Cremona, had herself never seen or heard such an instrument. To the great pleasure of the last guests, the waiters, and the kitchen staff, Brainin played the Omobono once again.