Music notes

Old myths, new ideas concerning acoustics

By ELLIOTT W. GALKIN

Acoustics—the scientific study of sounding bodies—is probably as old as music. It may be traced back to Pythagorus, about 500 B.C. Its theoretical foundations in modern terms were proposed by Lord Rayleigh, a British physicist in 1877; and as a result of the electronic era, it has become an effective engineering science in which its various features may be measured in the most precise terms.

Yet in spite of the fact that many significant investigations into the nature of sound have been accomplished—especially since World War II—there are some individuals who persist in maintaining that its characteristics defy analysis—and that, for instance, the creation of a violin, or the construction of a concert or opera house, each with optimum sonic conditions—is a haphazard affair.

For example, Alberto Bachmann, who has written extensively about the violin, has conceded in his "Encyclopedia of the Violin," that important discoveries about the qualities of the instrument's timbre have been made; nevertheless, he concludes categorically, "none of those who would improve the violin has produced instruments which can equal in nobility of tone, the instruments made by Stradivarius, Amati and other great Italian masters."

Similar acoustical prejudice accompanies the construction of new auditoria and opera houses; again, such opinion is unsupported by scientific evidence. Old concert halls are the best, it has been said—and the reasons for their sonic beauties are inexplicable.

There are many other myths: Gold paint is supposed to impart the sound in a hall with a particular sheen. Statues make the nature of the sound elegant.

Broken bottles give the tone quality on stage a particularly diffusiveness.

But, as the noted acoustician and architect Leo Berananeck has written, not without a measure of irony, "Precise acoustical measurements reveal that broken wine bottles under stages, in attics, in walls, or even heaped in the corners of a hall, have no effect on acoustical quality. Broken wine bottles are often found inside the construction of European halls simply because workers, during the construction, flung the remnants of innumerable dejeuners into the most convenient and the most hidden places.

"I invite anyone sufficiently interested, to remove all the broken bottles from one of these halls and to demonstrate to himself that the effect on the acoustics is nil."

However, since the public as well as, paradoxically, the musicians seem reluctant either to investigate the subtleties of sound projection and dispersion, or to challenge the unsupported proposition, such acoustical old wives tales continue to persist.

There is overwhelming evidence to disprove these hypotheses—even on the most rudimentary aural-psychological levels. For instance, it is known as a result of "blindfold" tests of violins, that the qualities of the best of the modern-made instruments are considered by musicians and the public at least comparable to those of the most renowned Italian masters.

At the Peabody Conservatory, some 15 years ago, a public test of some dozen violins took place. The instruments ranged in quality from that of a factory-made cheap model to a Stradivarius. Each instrument was played twice—by two different individuals—interestingly, by a male and female violinist—and the audience was challenged to rate the violins in terms of their sound.

When the votes were tallied, a violin made by the Baltimore luthier, Carl Holzapfel senior, who created instruments during the first decades of this century—was adjudged comparable to that of a Stradivarius. Thus the modestly priced instrument by this Baltimore maker was considered worthy of consideration as being in the company of an instrument worth many thousands of dollars.

To be sure, the mystery of acoustics is not without its snob appeal. There are also financial considerations; since Stradivarius made at most only about 500 instruments (and of these only a fraction were fashioned entirely by him—the rest, in parts, were carved and assembled by his many assistants), it is the privilege of connoisseurs to own such instruments, no matter how they may sound. And it must be admitted that some, if not many, of the violins ascribed to him are far from distinguished in tonal qualities.

Nevertheless, to own a Stradivarius places one in a very elite society—a society which is affluent. The price of some of Stradivarius's products has risen astronomically—to as much as a quarter of a million dollars in isolated instances—and their value continues to increase.

As a result, the buying and selling of stringed instruments is as commercial an activity as the stock market. The market, of course, would drop if it became commonly recognized that it is possible to buy an outstanding violin for a few thousand dollars. Therefore those who own Strads, no matter how cracked the wood may be, or uneven the characteristics, imbue these instruments with a mystique: their qualities are supreme, and inimitable.

Similarly there are those who maintain that it is impossible to build new halls with acoustical features comparable to those built two centuries or so ago.

Again, the evidence disproves such contentions. Symphony Hall in Boston, completed in 1900, is recognized as the first hall in America whose design is based upon scientifically understood principles of acoustics; thus, what might be called the new age of construction for musical purposes is a relatively recent phenomenon.

Bruno Walter has called Boston's Symphony Hall "the most noble of all American concert halls," and Herbert von Karajan has said that it is superior to the Grossermusikvereinsaal in Vienna, which was erected in the Nineteenth Century.

Interestingly, neither hall is constructed of wood, thus contradicting the oft-repeated statement that optimum conditions of warmth and resonance depend upon utilization of wood. Both halls are made, primarily of plaster; wood is used only in the trim.

Other great halls, built during the past four decades are Buffalo's Kleinhaus Hall (constructed in 1960), which has been described as an architectural gem; Cleveland's Severance Hall (1930), Salzburg's Neue Festspielhaus (1960), which has been characterized as having acoustical qualities "unsurpassed by any other house in Europe"; Vienna's Staatsoper (1955), Vancouver's Queen Elizabeth Theater (1959), and the three halls of Kennedy Center (constructed during the 1960's).

No—acoustics is not a mystery. Indeed, it is possible to analyze the characteristics of sound, and to enhance them, in terms of resonance and volume, diffusion and uniformity, reverberation time, absorption and echo.

For musicians, such analysis remains primarily a perceptual rather than a scientific one, and forms in many cases, important bases for their activity. A violinist, for example, will change the speed of vibrato and intensity of his sound in muffled hall from that in a resonan chamber. A conductor will modify hi tempi, dependent upon the sonic reverber ations of a theater.

It might also be maintained that ther is an inter-action between the develop ment of audiences and acoustics. In thos cities in which the halls are recognized a outstanding—La Scala in Milan, Coven Garden in London, the Staatsoper in Vien na, Symphony Hall in Boston, Carnegi Hall in New York and Kennedy Center i Washington—where attendance at a musi cal event is enjoyable not only because o the elements of sonic clarity, but becaus the aesthetic surroundings in which a feel ing of spatial intimacy exists, providin an impression of direct communicatio between artist and public—there are inev itably large audiences which identify wit musical events.

To be sure, there are many subjective aspects of acoustics, and much to be learned about the psychology of musica perception. Architects and acousticians recognize such facts.

But they also are convinced that there is no reason for which it is not possible t build new halls worthy of rivaling the most famous halls of the past.

The conclusion must be proposed that in view of today's technology—the crea tion of new building materials, the ability to measure sound through the most subtle computerized procedures, and the opportunity to consult with enlightened musicians, looking to them for insightful subjective evaluations—that the greatest halls for the presentation of music will be built in the future.