

# BENJAMIN FRANKLIN AND THE GLASS ARMONICA

**D**inner is over and you are nursing what's left of your last glass of wine. To amuse yourself between sips you dip your fingertip into the wine and then rub it around the rim of the glass. If you do this just right you are rewarded with an ethereal and amazingly pure musical tone. How did that happen? Can anybody do this?

At the risk of taking the magic out of it, here's how it works. When an object moves, the air around it is displaced. When that air movement reaches the ear, it is perceived as sound. If the movement repeats with a definable frequency then we perceive the sound as a musical note or pitch. This is what happens when a string on a musical instrument is plucked with a pick or a finger. The string is stretched and displaced as the pick engages it. When it is released it moves back and forth transferring a particular frequency of movement to the body of the instrument. The instrument then moves the ambient air and we "hear" this as music.

On a bowed instrument like the violin, the movement is similar but the sound is sustained. This is because the bow hairs, prepped with rosin, grip the string, stretching and displacing it until the string slips back only to be gripped again by the traveling bow. The grip and release action continues as long as the bow is moved.

Playing a wine glass is basically the same as bowing a violin string but, instead of using a bow, you use the tip of a finger. To play, the fingertip should be very clean and free of skin oils then wet with water, wine or other liquid. You may need to experiment to find just the right amount of pressure and speed. Your fingertip will actually grip and displace the rim of the glass up to the point where it will slip free, letting the glass relax only to stick and release again, and again. This regular frequency of motion from the rim is transferred to the entire glass and then to your ear via the displaced air around the glass.

The resulting pitch is due to the shape and material of the wine glass but you can change the pitch by varying the amount of liquid used. The liquid dampens the motion of the glass wherever there is contact. The more liquid in the glass, the shorter the resonating space and the higher the pitch. If you line up several glasses and put gradually more water into each successive one, you can play a scale and then melodies. You can tune a scale by adding or removing water as needed to achieve the appropriate sound.

Written accounts of making musical notes by striking glass can be found as early as 1492; however, references to playing music by rubbing the rim of a glass did not appear until 1677. But the "musical glasses" were not much more than an amusement until the 1740's when an Irishman named **Richard Pockrich** elevated the technique to a professional level and began giving concerts and drawing other performers to the instrument.

In 1757 **Benjamin Franklin**, then living in London, heard **E.H. Delaval** perform on the musical glasses. Franklin, like most people who heard the glasses played, was enchanted by the ethereal sound. Unlike others, however, he set to thinking about how the instrument could be improved. This was not an uncommon reaction for the brilliant Franklin who invented the Franklin stove, bifocals, discovered the Gulf Stream, started the first public library and public services for common citizens, experimented with electricity inventing the lightning rod which he gave away for, "the good of mankind," and helped shape our emerging nation in the New World.

Franklin observed that it was difficult to play more than two notes at a time, which limited the chords that could be managed on the musical glasses. He also noticed that the musician had to rush into position to allow enough time for the rubbing to set the sound in motion. This was exacerbated for the lower notes that require glasses to be larger and, thus, farther apart.

Franklin solved all these problems with the invention of his "Glass Armonica." He had a London glassblower make a graduated set of bowls with a hole in the bottom of each one. Every bowl was tuned to a different note and painted a different color to make it unique and easy to find. The bowls were arranged in order by pitch. A cork fitting was used in each hole so they could be nested and mounted on an iron rod. The rod was attached to a wheel that was turned with a foot pedal, like the old treadle sewing machines. Some say that the bowls dipped into a bath of rosin and water as they spun; others classify this as an urban myth since the rosin-water bath would affect the sound.



GLASS INSTRUMENTS	SOME DIFFERENCES
Musical Glasses	Wine glasses tuned by adding/removing water.
Glass Harp	Glasses blown and ground into permanent tune. No water required.
Glass Armonica	Glass bowls tuned and mounted on a rod that spins.

The new instrument became very popular. Over 400 compositions were written specifically for the instrument including some by Mozart and Beethoven. More than 6000 Glass Armonicas were produced and the instrument flourished until 1830 when it all but disappeared. Composers quit writing for it and manufacturers quit making the instrument. What could have caused such a thing to happen?

One answer appears in writings from that era. There were warnings that the music of the glass armonica had profound emotional effects especially on its players, causing melancholia and dementia. It was noted that the high

lingering harmonics and the friction of the wet glass forced many performers into early retirement because of nervous disorders. **Dr. Franz Anton Mesmer**, the famous hypno-therapist, integrated the glass armonica into his magnetic séances using its influence to get his subjects into a relaxed state. All these things led to fear and rejection of this music and of Franklin's wonderful instrument. Interestingly enough, the source of the problem turned out to be the lead-based paints used on the glass bowls. The performers absorbed the lead into their systems and actually displayed the symptoms of lead poisoning. It was not until 1983 that the manufacture of glass armonicas began again.

If you search the web you will discover the availability of more CD's for the glass harmonica then you might have imagined. One of these, "Cristal: Glass Music Through the Ages" has music composed specifically for the glass armonica. This CD was produced by **Linda Ronstadt**, who also used a glass harmonica on her own CD, *Dedicated to the One I Love*. You can also find other links and play a Virtual Glass Armonica at [www.fi.edu/franklin/musician/virtualarmonica.html](http://www.fi.edu/franklin/musician/virtualarmonica.html). If you are interested in finding out more about glass music you can Google these terms: Harpe de Verre, Glaspiegel, Seraphim, Glass Harmonien, Grand Harmonicon, Crystallophone, Angelick Organ, Cristal Baschet, Verrillon, Verrophone, Glassychord, Glasharmonika, Harmonika and Harmonica de Verre.

So keep on making music but get the lead out first and, of course, stay tuned.

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