By Joshua Kors

GLASSICAL MUSIC

Jamey Turner makes sweet sounds with dinner glasses.

In a music career that has spanned six decades, Jamey Turner has mastered an orchestra's worth of instruments—piano, violin, flute, clarinet, saxophone. But one instrument remains closest to his heart: the glass harp.

Glass harp? Turner chuckles at the question. The instrument, he admits, is not well-known and can't be found in a music store. It's a collection of dinner glasses—common wine goblets that can be purchased in any housewares department. By rubbing the rims of the glasses, Turner produces musical notes. And by selecting glasses of different types and filling each one with a different amount of water, he can play every note in the musical scale, from A to G-sharp.

"It's a magical instrument," Turner says, one he fell in love with 64 years ago when he was 6. It's a night he remembers fondly. "Another family had come over for dinner, and they all started playing their wine glasses. They made chords; they made harmonies. I was

From top: Tom Williams/Newscom; Jamey Turner (2) absolutely glued to the sound. I had played other instruments, but when I heard that family with their wine glasses, I thought, *This is it. This is my sound.*

"[That night] I washed the dishes, then took the glasses up to my bedroom. I was so excited, I woke up in the middle of the night and began to play. I kept waking my brother up," he recalls with a laugh. "He was not too happy about it."

Turner has put in countless hours of practice on the glass harp. But only after learning about the science behind its vibrations, he says, was he able to move from making random sounds to playing everything from classical standards to the Beatles to the theme from *Star Wars*.

GOOD VIBRATIONS

Watch Turner's hands at work, flying across the glasses, and it may look as if he's tapping them like a drummer. Playing the glass harp is actually a subtler art. "The key to controlling the sound is rubbing around the rim," he told *Current Science*. The rubbing creates *friction*, the force of resistance that occurs when the surface of one object (such as a finger) slides against the surface of another (a drinking glass). The friction jostles the molecules in the glass, causing its sides to move in and out hundreds of times every second and vibrate like a bell. The vibrations compress the air around the glass, inducing sound waves. (See diagram.)

The number of times a vibrating object moves back and forth each second is called its *frequency*. If a rubbed glass's frequency is high, it emits a high-pitched sound. If the glass's frequency is low, it emits a low-pitched sound.

Scott Metcalfe, the director of recording arts and sciences at the Peabody Institute of the Johns Hopkins University, says the glass harp is an especially exciting instrument because minor alterations can create extraordinary changes in pitch. "Think about the size of each glass: how wide it is, how tall it is, how thick the walls are. All of those variations make a big impact on the harp's sound," he says.

Size and shape aren't the only variables. Filling the glasses with water also alters the pitch. "If a glass has water in it, its walls won't vibrate as much," explains Metcalfe. "With that lower frequency, the glass's pitch will be lower. If you want to make it lower still, you can add more water. If you want to make its pitch higher, you can pour the water out."

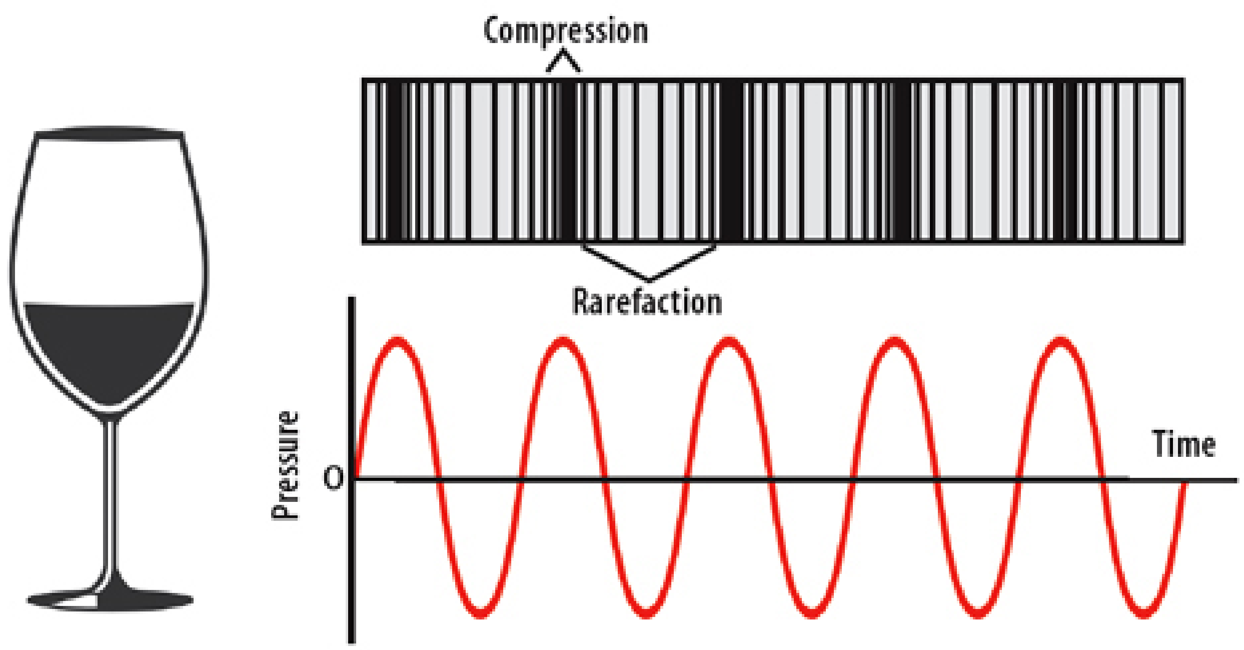
Thanks to his diverse collection of glasses—each one a different shape and size, each one filled with a different amount of water—Turner's glass harp has almost as many notes as a standard keyboard. "I'm still experimenting," Turner says, "but right now I'm only three notes away from creating all the notes on a keyboard, a full piano's worth of notes."

FISH TALE

Turner has also experimented with other variables. "I've noticed that *distilled water* [water that has been boiled to remove impurities] works much better," he says. "Tap water doesn't create enough friction with the glass, so I don't use it anymore."

It also surprised him to learn that diet affects his music. "Desserts create oils that come out of my skin and affect my fingers' friction with the glass," he says. "So before a concert, I stay away from ice cream and cookies."

Turner laughs as he recalls one particular time when the science of his glass harp was put to the test. "I was at a mall in New Hampshire, performing for a crowd of about 1,000 people, when suddenly they all started roaring with laughter," he recalls. "Someone had thrown a goldfish into my biggest glass. That glass's note was middle C. Once the goldfish was there, absorbing some of the sound waves, immediately the glass became an E-flat." **CS**



Atmospheric Disturbance

When Jamey Turner rubs a drinking glass, it vibrates and disturbs the air around it like a pebble tossed into a pond. The moving air alternates between areas of *compression*, where the molecules are closely packed, and areas of *rarefaction*, where the molecules are more spread out. Those variations in density are represented as a *sound wave*, a wavy line whose crests represent compression and whose troughs represent rarefaction. The *wavelength* of the sound wave is the distance between two crests.

When the disturbed air rattles your eardrums, they vibrate in sympathy with the original vibrations of the drinking glass. The inner ear translates the vibrations into a signal that travels via a nerve to the brain and is perceived as a sound.

Glass: Fotolia

See Jamey Turner play the glass harp. Check out these videos: bit.ly/jameyturnersong1, bit.ly/jameyturnersong2, and bit.ly/jameyturnersong3.