

BELL ROCKS

Bell rocks (also referred to as ringing rocks, sonorous rocks or lithophonic rocks) are rocks that resonate like a bell when struck. Bell rocks are not common but they have been found in a number of locations around the world including Australia, Namibia, Sudan, Mongolia, India, England, Scotland, Mexico and the United States and have been scientifically studied since at least the early 1900s. Probably the most well-known of the bell rock locations in the US are in Pennsylvania and Montana. There are three sites in Pennsylvania that have been established as parks (Ringing Rocks County Park, Ringing Hill Park and Stony Garden) and are readily accessible to the public. People are encouraged to bring along a metal hammer and search for bell rocks that are scattered among the numerous boulders at the sites. Click on the following url to listen to a “Rock Concert” at the Ringing Rocks County Park. (<https://www.youtube.com/watch?v=Y5cJbcoWaH8>).

Southern Arizona hikers don’t have to take a long trip though to experience the sound of ringing rocks since a number of these rocks have been found in the Tucson area by archaeologists who were surveying petroglyph sites. Surveys taken at the Cocoraque Butte site in the Sonoran Desert northwest of Tucson in 2015 and 2018 documented 11,200 petroglyphs, 69 grinding features, 34 surface artifacts and 120 bell rocks. Sometimes stones used to strike the bell rocks were found nearby. According to the archaeologists, petroglyphs were present on half the boulders that exhibited wear consistent with use as bell rocks. The bell rocks at this site are distributed among more numerous boulders bearing petroglyphs, and all are situated suitably for ceremonial gatherings. The dints tell us that the rocks were struck by humans, and the relatively dark patination of the dints tells us they were used in ancient times. It seems highly probable that these bell rocks were first identified by humans when they were creating petroglyphs.

The term “rock and roll” was popularized by disc jockey Alan Freed in 1951 but it’s likely that Arizona’s first “rock concerts” were performed as early as 900 years ago during the Hohokam Early Classic period (AD 1100 to 1250) when the majority of the petroglyphs were made. The Hohokam may have played them similarly to how musical instruments are played today and used them in sacred or ceremonial rituals. The Hohokam people might have gathered in the center, and when the rocks were struck, a form of ancient surround sound could have resulted. The gatherings may have been an early form of participatory music in which a core of skilled musicians created a rhythm into which others joined, in a sort of communal jam session. Based on usage patterns and distribution, some bell rocks may have been played by more than one person, or one person may have played more than one rock. The euphonic sounds travel for a considerable distance. Each bell rock produces a specific pitch with the various pitches ranging across approximately two and a half octaves. Some bell rocks were found to be in fairly close proximity to each other making it possible for a group of individuals to produce multi-tonal sound patterns (music). See Figure 1 for a photo of a bell rock with a large strike zone.

But why do some rocks in a pile of boulders ring while others do not? Humans have experienced this phenomenon for many years but scientists don't really have a definitive answer as to why some rocks ring and others do not. Physically, bell rocks in a boulder field look no different from regular rocks. It is not until you lightly strike them with another object that the rocks reveal their sonic secret. The rocks themselves are composed of diabase, the same type of rock that makes up most the earth's crust. One theory is that compressive stresses remained in the rocks when the boulder fields formed, and the slow weathering rate keeps the stresses from dissipating. The "ringing rocks" were under high compressive pressure when they were formed. When the lava solidified into these rocks, they kept that high pressure, and that high pressure strength is why they ring when you hit them. A test of this theory was accomplished on some bell rocks in the 1960s by a Rutgers University professor that strongly indicated that the ringing ability is a direct result of high internal compressive stresses. It is also felt that the density of the rock is a factor.

Another part of the mystery is while all the rocks in a boulder field seem to be made of the same material only a small portion of them generate the ringing sound when hit. Conditions such as the size and shape of the boulders and the way that they are supported or stacked certainly influence the sounds that the boulders make but do not in themselves impart the ringing ability. The site's rocks come in a variety of sizes, the largest of which weigh about 5,000 pounds, the smallest weigh about 100 pounds, and the average weigh about 1,000 pounds. The ringing may have something to do with the way the rocks lay against one another. Larger flat ones seem to produce an especially impressive sound when struck and rocks lying on the earth or simply removed from the rock pile do not produce bell tones. Rocks that ring are known as "live" rocks, and those that don't are referred to as "dead" rocks.

It was previously indicated that using a metal hammer to identify and produce sound from bell rocks in the boulder fields in the Pennsylvania parks was acceptable and encouraged. **This is definitely not the case for the bell rocks in the Cocoraque Butte area. The use of metal hammers or striker rocks to generate the musical tones would further damage the surface of the bell rocks. Damaging the items in an archeological site is definitely not something you want to do.** The only implements that should be used are softer items such as wooden or hard plastic mallets. Wooden mallets are the most preferable since they do not damage the boulder but produce the same pitch as occurs when the boulder is struck with a stone. Some of the boulders are so sensitive they will produce a tone when tapped with fingers. The Cocoraque area was listed in the National Register of Historic Places on 10 October 1975 as the Cocoraque Butte Archeological District and in June 2000 became a part of the newly created Ironwood Forest National Monument. These actions provided emphasis to the effort to discourage any action that would potentially damage the site. Figure 2 depicts a hiker checking a rock for tones with a plastic hammer.

Summarized by Terry Ferguson and T. Johnson in July 2023 from a variety of sources including Wikipedia, Old Pueblo Archeological Bulletin 73, *Petroglyphs and Bell Rocks at Cocoraque*

Butte: Further Evidence of the Flower World Belief among the Hohokam by Janine Hernbrode and Peter Boyle, *Rock Concerts* by RJ Brenner and *Ringing Rocks USA* by Earthly Mission Crew. Figure 2 by T. Ferguson, Figure 1 from the Flower World Belief article by Janine Hernbrode and Peter Boyle.



Figure 1. Bell Rock with Large Strike Zone



Figure 2. Checking for a Bell Rock