

Shake, Rattle, Richter!

By Trista L. Pollard

¹ When people think of earthquakes, they usually think of the **Richter scale**. However, you may be surprised to know that measuring the effects of earthquakes has been a hot topic among seismologists for centuries. Although Dr. Charles Richter is one of the most famous seismologists, he had many before him to study.

² The first known seismograph was invented in AD132 by Chinese astronomer Chang Heng. Heng built his device by mounting eight dragon heads on an urn. This urn was encircled by eight toads with opened mouths. Inside the urn Heng placed delicately weighted pendulums. When the device experienced vibrations from nearby earth tremors, the pendulums would release a mechanism. This mechanism would drop the bronze ball from a dragon's mouth to a toad's mouth. Each dragon's head stood for a specific direction or location. Heng would use the dragon's head, which dropped the ball, to determine the location of the earthquake. I guess you could call this Chang Heng's "earthquake trap."



³ In the early 1890's, British geologist John Milne developed the first accurate seismograph with other scientists in Tokyo, Japan. While studying and working at the Imperial College of Engineering, Milne helped to monitor the frequent quakes and other seismic activity that occurred in Japan. He then returned to his home in Great Britain during the early 1900's. Milne continued to study earthquakes, and he was responsible for setting up twenty-seven seismograph devices throughout Great Britain. When John Milne died in 1913, there were about forty seismograph stations worldwide that monitored earthquakes on land.

⁴ Even though Milne's work helped to advance seismology, the seismograph was only placed on land. This gave scientists a small amount of data about earth's seismic activity. It was not until the late 1990's that underwater seismograph networks were used. Geologists used undersea coaxim cables no longer used for telecommunications to detect and measure earthquakes.

⁵ One American scientist who was considered the founder of seismology was John Winthrop (1714-1779). He was the first to study and analyze earthquakes. In 1909, an Austro-Hungarian meteorologist named Andrija Mohorovicic studied data from an earthquake in Zagareb (present-day Croatia). Mohorovicic discovered the boundary between the earth's crust and mantle. The boundary is called the **Mohorovicic discontinuity** or **Moho**.

⁶ One of the most famous and widely recognized seismologists is Dr. Richter of the United States. Richter invented the Richter scale in 1935 based on seismogram measurements. This scale is used by seismologists and geologists to help determine the magnitude of energy released by an earthquake. Dr. Richter worked at the California Institute of Technology. The Richter scale measures the amplitude of seismic waves in whole number and whole number-decimal notations. It is a logarithmic scale which means that for each whole number you increase on the scale, the amplitude of the seismic waves is ten times greater than the amplitude of the seismic waves produced at the previous whole number measurement. The energy produced also increases as you move between each whole number magnitude on the scale. In fact, for every whole number magnitude you increase, the energy produced is thirty-one times greater than the energy produced at the previous whole number magnitude. The scale does not have an upper limit; however the highest recorded earthquake to date was measured at 9.0 on the scale.

⁷ In addition to the Richter scale, seismologists use the **Modified Mercalli Scale** or **Intensity Scale**. Both scales allow scientists to provide detailed information about the effects of earthquakes worldwide. The Mercalli scale was developed by an Italian volcanologists/meteorologist named Guiseppe Mercalli in 1902. This scale is used to measure the intensity of an earthquake's effects or the damage caused by an earthquake at different locations. The Mercalli scale is subjective, which means that its rating system is based on observations of damage after an earthquake has occurred. It is also subjective because different types of buildings and structures behave differently during earthquakes.

⁸ The values on the scale range from **I** "Not felt except by very few under especially favorable conditions," to **XII** "Damage total. Lines of sight and level are distorted. Objects thrown upward into the air." Since the scale measures the damage from earthquakes at different locations, the same earthquake can produce different Mercalli ratings.

⁹ Even though earthquakes are generally unpredictable, the work of these seismologists has given the world more effective methods for studying and measuring earthquakes. As today's seismologists use the tools and knowledge passed down throughout the years, they will continue to find ways to monitor and measure earthquakes.

Shake, Rattle, Richter!

<p>1. The first known seismograph was built by _____.</p> <p><input type="radio"/> A Dr. Charles Richter</p> <p><input type="radio"/> B Guiseppe Mercalli</p> <p><input type="radio"/> C John Milne</p> <p><input type="radio"/> D Chang Heng</p>	<p>2. The Richter scale measures the amount of damage produced by an earthquake.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>
<p>3. Coaxim cables were first used in the late 1990's to _____.</p> <p><input type="radio"/> A Detect and measure underwater volcanoes</p> <p><input type="radio"/> B Detect and measure underwater landslides</p> <p><input type="radio"/> C Detect and measure underwater earthquakes</p> <p><input type="radio"/> D Detect and measure underwater animal life</p>	<p>4. What was John Milne's contribution to the area of seismology?</p> <p>_____</p> <p>_____</p>
<p>5. The Modified Mercalli Scale measures the intensity or damage produced by an earthquake.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>	<p>6. The Mohorovicic discontinuity is _____.</p> <p><input type="radio"/> A The boundary between the coast line and the mid-ocean ridge</p> <p><input type="radio"/> B The boundary between the earth's crust and mantle</p> <p><input type="radio"/> C The boundary between the earth's crust and core</p> <p><input type="radio"/> D The boundary between the earth's crust and the sand</p>
<p>7. Why is John Winthrop the founder of seismology?</p> <p>_____</p> <p>_____</p>	<p>8. The Mercalli Intensity Scale ranges from _____.</p> <p><input type="radio"/> A I to X</p> <p><input type="radio"/> B I to XII</p> <p><input type="radio"/> C I to IX</p> <p><input type="radio"/> D I to infinity</p>

