BIOGRAPHY

19.1 Charles Richter

Richter is the most recognized name in seismology due to the earthquake magnitude scale he codeveloped. But Earth science was never a subject of interest to this bright young physicist, until a mentor made an interesting suggestion and a "happy accident" introduced him to seismology.

The unexpected path

Charles F. Richter was born on April 26, 1900 in Hamilton, Ohio. When he was 16, Charles and his mother left their Ohio farm and moved to Los Angeles. Richter attended the University of Southern California from 1916–1917, and then earned a bachelor's degree in physics at Stanford University.

It was during his Ph.D. studies in **theoretical physics** at the California Institute of Technology (Caltech) that Richter began his work in seismology, quite by accident.

In 1927, Richter was working on his Ph.D. under the Nobel Prize winning physicist Dr. Robert Millikan. One day, Dr. Millikan called Richter into his office and presented him with an opportunity. The Caltech **Seismology** Laboratory was in need of a physicist, and although Richter had never done any Earth science work, Dr. Millikan thought he might be a good person for the job.

Richter was a little surprised, but decided to talk to Harry Wood, the lead scientist in charge of the lab. Richter became intrigued and decided to join the seismology lab located in Pasadena, California. Richter described this introduction to the science that would become his life's work as a "happy accident."

Doing something ordinary

One of Charles Richter's most famous sayings is based on looking back at his own life: "Don't wait for extraordinary circumstance to do good; try to use ordinary situations."

When he first started at the seismology lab, Richter was busy with the routine work of measuring **seismograms** and locating earthquakes, so that a catalog of epicenters and occurrence times could be set up. At the time, this kind of earthquake study was new. Harry Wood was leading the effort to use southern California's active seismic setting to gain a better understanding of earthquakes.

This creative setting allowed Richter to attempt to develop new ways to "rate" earthquakes based on the seismic waves they produced. Since the lab used seven seismographs to record activity, Richter suggested that they compare quakes to one another using the amplitude of each quake measured at all seven locations. To do this, the seismic readings needed to be corrected to take into account the differences in distance from the epicenters. Richter had learned of a method to do this based on large earthquakes, but the magnitudes that Richter was studying ranged from tiny to very large.

Collaboration and success

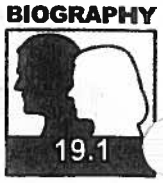
Richter thought that the size difference in the magnitudes was unmanageably large. Fellow scientist Dr. Beno Gutenberg suggested that they plot the magnitudes using powers of 10. A **magnitude** two earthquake would represent 10 times the amplitude of ground motion of a magnitude one. A magnitude three would be 100 times a magnitude one, a four would be 1,000 times a magnitude one, and so on.

Richter realized this was the obvious answer to his problem. When he used this method and graphed the results, it worked! At first it could be used only for southern California, because the system was only meant to compare quakes of that region using the seven **seismographs** in their lab.

A new way to rate earthquakes

In 1935, Richter and Gutenberg published their magnitude scale system. By 1936, they had worked out how their system could be used in all parts of the world, with any type of instrument. Before this, the Mercalli scale had been used to rate the magnitude of earthquakes, but it was based on local damage to buildings and people's reactions to a quake.

Richter and Gutenberg's scale allowed for a more absolute and scientific method to be used by anyone, anywhere in the world.



Reading reflection

1. Look up the definition of each boldface word in the article. Write down the definitions and be sure to credit your source.
2. What do you think you would feel like if a world reknown scientist like Dr. Robert Millikan recommended you for a job? How would you feel if accepting that job meant that you could no longer work closely with Dr. Millikan?
3. How did Richter respond to his new job?
4. Who helped Richter refine his idea into a working model?
5. Name a scale other than the Richter scale that scientists use to evaluate earthquakes.
6. **Research:** Why do scientists use different scales to rate earthquakes?
7. **Research:** What is the difference between a seismograph and a seismometer?