AMPHIBIANS & THE HISTORY OF EARTHQUAKE PREDICTION

Dr. Vic Eichler, BU1850

China is one of the most earthquake prone countries in the Orient, and in recognition of the need for widespread awareness of the dangers caused by ground shaking and splitting, the country has issued many postal stamps that dramatize the dangers. Two such recent stamps are shown below. Both are from a philatelic sheet titled "Earthquake Relief" and each carries a surcharge to support this purpose.

Earthquake Relief
(damaged buildings)
Taiwan, 1999, Sc#B17a

Earthquake Relief
(fault line)
Taiwan, 1999, Sc#B17b

The modern science of seismology (the detection of movements in the earth's crust) dates to 1703 in France with the invention of an early instrument that could detect earth tremors caused by earthquakes or volcanic eruptions.

This rather crude device could detect the general direction and magnitude of the force. Since then, very elaborate and more scientifically precise seismographs have been created that are able to determine the time, location and severity of earthquakes much more accurately.

However, the very *first* effective seismometer dates from the 2nd Century CE, an invention that was created in China **fifteen centuries** earlier than the French device. It has largely been overlooked until the recent past when images of the invention appeared on several Chinese stamps.

The Chinese seismometer was invented in the year 132 CE by Zhang Heng (78-139 CE), a royal astronomer of the Han dynasty.

Although Zhang believed, as did many scholars of the time, that the winds were responsible for earthquakes, the unique seismometer that he developed was able to roughly determine the power and direction of quakes hundreds of kilometers distant. This detection allowed the government to send aid to areas affected by the disaster.

Replica of Zhang's seismometer showing toads around the base (from Wikipedia)

Part of the working mechanism of this device, which is shown here, incorporates the use of small cast metal toads.

In keeping with the prevailing world view at the time, Zhang created a large bronze urn with heads of eight dragons extending out at equal distances around the perimeter. Each of the dragon heads held a bronze ball in its mouth. When a tremor occurred, the bronze ball facing that direction was dropped into the mouth of a waiting toad, also fashioned of bronze.

Three postal issues are known that recognize this early instrument. The first was issued in 1953 by the People's Republic of China, and clearly shows the small toads a short distance from the base of the urn.

Earthquake Detector
China P.R., 1953, Sc#199

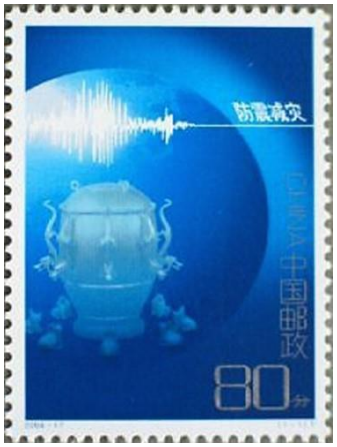
In 2005, Macau (which like Hong Kong is a special administrative district of the People's Republic of China) issued a souvenir sheet depicting the same instrument. This sheet, with title translated, "Great Inventions of China," recognizes the first device to measure direction and strength of earth tremors. A drawing of Han Dynasty Royal Astronomer Zhang Heng appears at left.

Great Inventions of China
Macau, 2005, Sc#1183

The most recent stamp illustrating Zhang's early seismometer was issued by China in 2006 to bring attention to the country's efforts to protect towns from earthquake disasters. It appears below a seismograph record of a seismic disturbance.

Many countries depict frogs and toads as the main element of their stamps to emphasize their unique features, or to bring attention to the threatened nature of these sensitive amphibians.

It was of special delight to the author of this article to be able to put together the story in which these amphibians were a very minor and easily overlooked item on the stamp.



Earthquake Protection
China P.R., 2006, Sc#3520