

Zhang Heng's DRAGON seismoscope

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INVENTED IN the second century AD, the Zhang Heng¹ seismometer (more accurately ‘seismoscope’, as it didn’t make a time record of the earth-shaking it detected²) represented a significant scientific development of that day. It was almost lost to Chinese history and is only known from historical records and later reconstructions based on these.

This seismoscope, designed to detect when an earthquake had occurred and from what direction, was invented by Zhang Heng (AD 78–139). He was a Chinese polymath and statesman who lived during the Eastern Han Dynasty (AD 25–220). His breadth of achievement was extraordinary; a royal astronomer, distinguished cartographer, mathematician, poet, painter, and inventor. Zhang Heng has been referred to as the “da Vinci of ancient China.”³ He designed and built many original scientific instruments, timepieces, and calendars, and improved others. But his seismoscope is the most famous.

Zhang Heng’s seismoscope is believed to have been the world’s first. A Han Dynasty history compiled some three centuries later, *The Book of Later Han*,⁴ describes in detail (but without illustrations) the bronze device’s inner workings and appearance.

The main body of the device was surrounded by eight symmetrically spaced downwards-facing bronze dragons (fig. 1). Each dragon held a bronze ball in its mouth. The head of every dragon was positioned above one of eight bronze toads, sitting with open mouth gaping upwards. Inside the jug-shaped body, eight transmitting rods were attached to a central pendulum.



Fig. 1.
A modern replica of Zhang Heng's seismoscope
housed at the Chinese Museum in Calgary, Canada

When an earthquake shook the ground, one of these rods would swing in the quake's primary direction. Intricate mechanisms guided by tracks transmitted the force so as to open the jaws of one of the eight dragons, causing its ball to drop into the waiting mouth of the toad below. This would trigger an alarm, notifying that an earthquake had occurred. The direction from which the quake had struck was indicated by which of the dragons had dropped its ball.

On 13 December 134, Zhang Heng's seismoscope, located in the then Han capital, Luoyang, proved itself when a magnitude 7 earthquake struck in Longxi in modern-day Gansu province. Its epicentre was over 800 km (500 miles) to the west.⁵

Though not felt by residents of the capital, the device registered its occurrence and direction. This was confirmed days later by visiting Longxi officials who reported deaths, property damage, and collapse of hills and riverbanks.³

Zhang Heng's original device has not survived, but based on the Han Dynasty text, later reconstructions (including working models) were made, including the modern replica shown in fig. 1.

Take-home lessons from Zhang Heng

With Genesis as a historical framework for understanding, several things come to mind.

Earthquakes are part of the fallen creation

Genesis 1–2 describes a perfect world, free of death and suffering. Earthquakes were therefore not part of that original, “very good” creation (Genesis 1:31), prior to the Fall. They are now part and parcel of life on Earth. The Flood itself was associated with globally widespread seismic events.⁶ Zhang Heng's device was the first we know of to record and warn of such events.

Dragons represent cultural memories of dinosaurs

At this time in Chinese history, dragons were considered just as real as any other animal, including toads, as Zhang Heng's seismoscope suggests. The Chinese Zodiac confirms this, where a cycle of 12 years is represented by 12 animals—the dragon is one, the 11 others are all commonly known animals (rat, ox, tiger, rabbit, snake, horse, goat, monkey, chicken, dog, pig).⁷

The Chinese are known for decorating many objects with dragons; some early examples are reminiscent of recognizable dinosaur species,⁸ later ones become increasingly stylized. All this is no surprise when we recognize that the stories and depictions of dragons derive from memories of the dinosaurs of history, which survived on board Noah's Ark. After the Flood, various types of dinosaurs, some more successful than others, dispersed across the earth. As a result, stories and depictions of dragons occur in virtually every culture—including China. Yet evolution teaches that dinosaurs all supposedly died out long before people walked the earth.

Humans have always been intelligent

God created humans in His image—from the beginning, they have been intelligent, resourceful, and capable of discovery, innovation, and invention. Following Babel, some of the previously developed technology and know-how was lost by some groups, awaiting later rediscovery.⁹ As far back as archaeologists delve, evidence reveals that humans were intelligent. Examples include the still-unsurpassed artistic masterpieces by European ‘cavemen’,¹⁰ ancient calendrical monuments like Stonehenge¹¹ with its astonishing construction achievements,¹² and the Antikythera computing mechanism from c. 60 BC.¹³

Zhang Heng's second-century earthquake-detecting device is one more such demonstration of ancient ingenuity and skill. ■

References and notes

1. Zhāng (張) = family name, Héng (衡) = given name.
2. Zhang named it 候風地動儀 (*hòufēng dìdòngyí*), literally ‘seasonal wind and earthquake instrument’.
3. Yan, H-S., *Reconstruction designs of lost ancient Chinese machinery*, Springer, The Netherlands, pp. 127–129, 2007. Note that ‘da Vinci’ was not Leonardo's surname; it just means ‘from Vinci’ in Tuscany.
4. An official Chinese historical text covering the history of the Han Dynasty from AD 6–189, compiled by Fan Ye in the 5th century.
5. Feng, R. and Yu, Y-X, Zhang Heng's seismometer and Longxi earthquake in AD 134, *Acta Seismologica Sinica* 19:704–719, 2006. This paper by Chinese seismologists aimed to clarify the exact year and location of the quake, due to some differences among sources.
6. Walker, T., Tsunami tragedy, *Creation* 28(1):12–17, 2005; creation.com/boxing-day-tsunami
7. Wieland, C. The year the water dragon roared, creation.com/chinese-new-year-dragon 31 Jan 2012. The Chinese word for dragon is 龍 (*lóng*), and the word for dinosaur is 恐龍 (*kǒnglóng*), literally ‘fearsome dragon’.
8. Robinson, P., A Chinese Camarasaurus? *Creation* 41(4):38–39, 2019; creation.com/chinese-camarasaurus.
9. Some groups would likely have retained much of the know-how of Noah's culture, carried through by the Flood survivors. The level of that technology is suggested by the civilizations that sprang up extremely rapidly post-Flood in Mesopotamia and surrounding areas such as Egypt.
10. Arms, J., Masters of their art: The ‘enigma’ of early European cave paintings, *Creation* 45(1):14–17, 2023; creation.com/cave-art.
11. ox, G., Stonehenge's solar secrets, creation.com/stonehenge-calendar. 17 Mar 2022.
12. ox, G., Stunning Stonehenge! ‘Stone Age’ relic or post-Babel construction? *Creation* 42(2):36–38, 2020; creation.com/stonehenge.
13. ox, G., The Antikythera Mechanism, *Creation* 43(4):17–19, 2021; creation.com/antikythera-mechanism.

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