

# Earthquake prediction and Animals



# Can humans use animals to predict earthquakes?

- ✓ 373 B.C.
- ✓ Thucydides (Greek historian)
- ✓ Records large numbers of dogs, snakes, rats, centipedes, and weasels evacuating the city. Days later an earthquake destroyed the city, and it sank to the bottom of the ocean...

Eliki (Helike) was an ancient Greek city located near the Selinus River on the southern shore of the Gulf of Corinth



# Haicheng: January 1975

- ✓ Locals reported seeing snakes and worms surfacing in winter and freezing to death, cows acting extremely upset, and dogs behaving strange as well.
- ✓ Scientists also noticed changes in land and groundwater elevation.
- ✓ A series of foreshocks also preceded the magnitude 7.3 quake.
- ✓ The city was evacuated one day before the quake, and 2,041 people died.
- ✓ Hundreds of thousands likely would have died without evacuation!



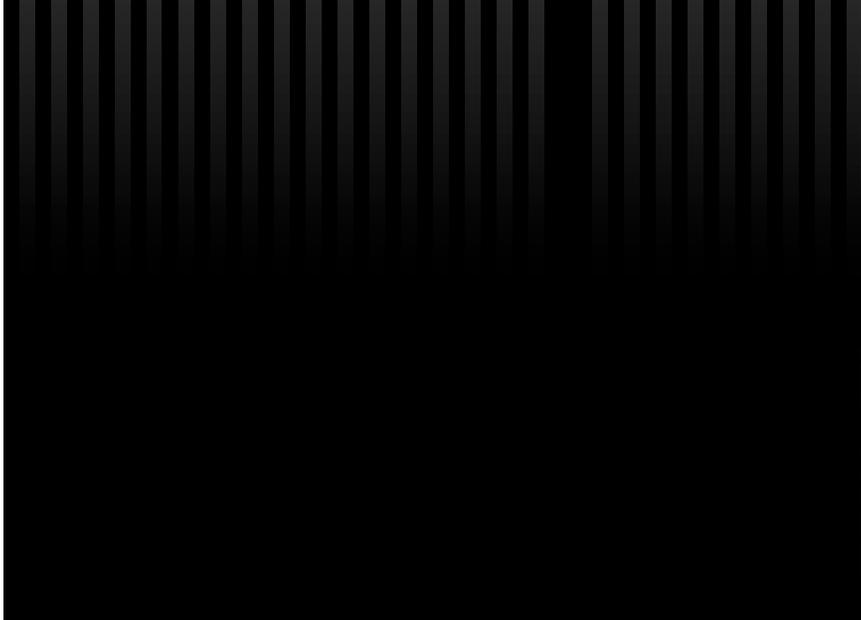
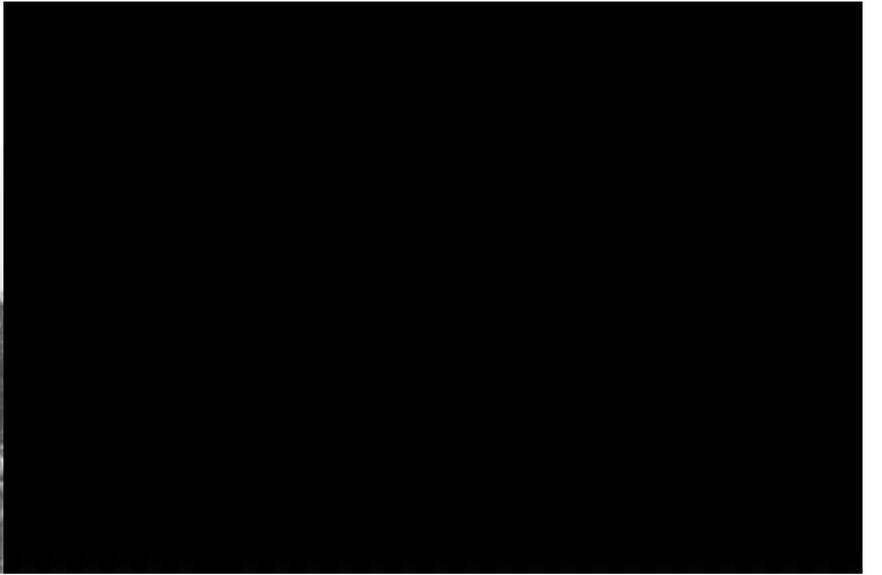
# This is what the United States Geological surveys said

- ✓ Chinese officials ordered the evacuation of Haicheng (population about 1 million) the day before the earthquake. In the preceding months, changes in land elevation and in ground water levels, and **widespread reports of peculiar animal behavior had been reported**. The increase in foreshock activity triggered the evacuation warning. It was estimated that the number of fatalities and injuries would have exceeded 150,000 if no earthquake prediction and evacuation had been made. The evacuation, along with the local style of housing construction and the time of the main shock, 7:36 p.m., saved thousands of lives.

Just one year later...

## Tangshan: July, 1976

- ✓ After Haicheng, there was frequent seismic activity in China
- ✓ It was unclear whether this activity was a result from the Haicheng quake, or a precursor to a new quake.
- ✓ Changes in groundwater levels were also noted at least a week before the quake
- ✓ The city was not evacuated
- ✓ Magnitude 7.6 quake strikes
- ✓ At least 240,000 killed
- ✓ It remains the most deadly earthquake on record in 400 years, and the second deadliest of all time.





# Other examples



- ✓ Loma Prieta 1989: many Santa Clara residents reported unusual pet behavior **Jim Burkland**
- ✓ Kobe Japan 1995: also strange pet behavior **Motoji Ikea**
- ✓ Tokyo 1923: Catfish seen jumping before quake
- ✓ Nisqually Washington 2001 (dog studies) **Stanley Coren**
- ✓ Tsunami 2004: reports in Thailand and Sri Lanka wild and domestic animals behave oddly
- ✓ Sichuan China 2008: zoo animals behave abnormally

# Theories Behind how animals do it

- ✓ 1: Some species of animals can detect **changes in the electromagnetic field**. Seismic activity can cause changes in the electromagnetic field. These changes can occur hours or days before a quake.



Earthquake Catfish Namazu



it is likely that catfish can sense minute changes in electrical currents generated underground before a quake. This could account for their sudden bursts of activity at the water surface

- ✓ 2: Some animal species pick up very low sound frequencies that humans cannot pick up, possibly even the shifting of crustal plates.



Dogs are able to detect sounds far out of range of the human ear



Hippo's can pick up infrasonic soundwaves at great distances

- ✓ 3: Some animals may actually be able to feel the rumblings of the earth deep beneath us.



Elephants can detect subtle seismic vibrations from the ground from great distances

- ✓ Many scientists discount animal behavior as purely anecdotal stating there is no substantial evidence that ~~such~~ such behavior can be directly linked to seismic and other catastrophic events
- ✓ There is a growing number of researchers studying animal behavior in relation to Seismic events
- ✓ Regardless of how animals sense these events, animal warning behavior has the potential to save hundreds of thousands of lives and warrants further research
- ✓ China is the leader in early warning animal behavior signs, most governments do not take this research seriously.

# Awesome PBS Documentary



- ✓ <http://www.pbs.org/wnet/nature/episodes/can-animals-predict-disaster/full-episode/268/>

# Sources

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