

When the Earth hits back

Earthquakes cause enormous damage — and change the course of history

HISTORY

James McConnachie

EARTH-SHATTERING

EVENTS Earthquakes, Nations and Civilisation
by **ANDREW ROBINSON**

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Big earthquakes far surpass the human scale. The most powerful recorded, in Chile, in 1960, unleashed 20,000 times as much energy as the Hiroshima atomic bomb. The quake that launched the Boxing Day tsunami in the Indian ocean in 2004 caused the slippage, by 10m, of an undersea area half the size of California, setting in motion tidal waves that killed 230,000 people across three continents.

In this ambitious book, the science writer Andrew Robinson tackles something even harder to imagine than the gargantuan physical force of earthquakes. He tries to trace their historical impact, and tells the stories of 10 earthquakes, from London and Lisbon in the 1750s, Venezuela in 1812 and Tokyo in 1923 to the 2004 tsunami. His claims are large. Venezuela? Enabled the liberation of South America from Spanish rule. Tokyo? Accelerated the militarisation of Japan. The tsunami? Helped end long-running wars in Indonesia and Sri Lanka.

But London, his first case study, is

about how a quake changed science. Earthquakes are not that unusual in Britain. In 1248, one caused the vaulted ceiling of Wells Cathedral to collapse. In 1580, another made a section of the white cliffs of Dover subside into the sea. In 1884, a London train driver was thrown out of his cab. But 1750 was bigger. That year, a series of strong tremors “induced the usual panic in the public and righteousness among religious preachers”. They also introduced something new: British scientists began to study earthquakes scientifically.

Before then, seismology had barely advanced since the Ancient Greeks. Some thought the Earth floated on troubled oceans, others that subterranean rock falls caused tremors. Aristotle guessed that the

underground fires of volcanoes left empty chambers that eventually collapsed. Measurement was nonexistent — although a Chinese astronomer invented a device in AD132 that supposedly recorded an earthquake’s point of origin by means of a bronze ball that dropped with a clang into one of eight dragon heads arranged around the points of the compass.

It was the calamitous 1755 Lisbon earthquake that gave scientists data to work on. Violent shaking, fires and a 60-ft tidal wave left just 3,000 of the city’s 20,000 houses habitable,

and the Atlantic tsunami caused “pandemonium” as far away as Cornwall. The quake’s cultural reach was equally extensive. Goethe and Voltaire wrote about Lisbon, while a Cambridge astronomer, John Michell, used maps of the spread of the shock to work out that quakes were “waves set up by shifting masses of rock miles below the surface”.

The Lisbon quake transformed Portugal, as well as seismology. Thousands were crushed in collapsing churches. Capitalising on anti-clerical feeling, the marquis of Pombal tightened his grip on power

and, in 1759, had the powerful Jesuit order expelled from all Portugal and its empire.

The Venezuelan earthquake of 1812 also had profound colonial consequences. Robinson tells a stirring story of how the rebel leader Simon Bolivar was spotted clambering on the ruins of Caracas, calling: “We will fight nature itself if it opposes us, and force it to obey.” The quake led to the failure of his young republic, but his resulting exile ultimately allowed him to become the “liberator” of much of the rest of South America from Spanish rule.

The historical effects of the famous San Francisco earthquake of 1906 are rather less stirring — though Robinson does tell some



classic stories, such as how Enrico Caruso, the Italian opera star, wandered among the ruins in his pyjamas, smoking and muttering: “ ‘Ell of a place! ‘ell of a place!” The quake’s lasting effect, according to Robinson, was the creation of the US Federal Reserve, a

response to the economic crisis driven by the sheer number of insurance claims.

In some ways, the catastrophic Tokyo earthquake of 1923 had surprisingly little impact. The largely wooden city was almost totally destroyed by fires, and the deaths were in the tens of thousands — and they were horrific, with Tokyo residents trapped by 200m-high vortices of fire and canals that boiled in the heat. But the city was rebuilt by 1930. What had changed was Japan’s

politics. In the weeks after the quake, rumours that Korean labourers had deliberately started fires led to thousands being lynched by vigilantes. And in the years that followed, a national financial crisis drove ever-increasing militarisation.

The deadliest of modern quakes, the one that levelled the Chinese city of Tangshan in July 1976, provoked the end of the Cultural Revolution, claims Robinson. A Chinese fighter pilot, flying over in the

immediate aftermath, was asked if he could see the city yet. “Yes, where it used to be,” he radioed back. Across four square miles, less than 3% of buildings were left standing, and perhaps 750,000 people died. Only the region’s 10,000 coal miners survived. The story of the miner who emerged to find that all eight of his children were dead is not a horrifying outlier, it is typical. Mao Tse-tung

was dying at the time (the report on the earthquake was the last official document he read) but the inadequate response of the Gang of Four who succeeded him helped enable their overthrow and the rise, according to Robinson, of a less collective, more individualistic form of Chinese communism.

Of course, China might have changed anyway. One problem with Robinson’s argument is that the historical effects of earthquakes seem as unpredictable as everything else about them. After the 2004 tsunami, for instance, violent conflicts were resolved in two of the hardest-hit areas, Aceh in Indonesia, and Sri Lanka. But peace came to Aceh quickly, as a kind of humanitarian earthquake dividend. In Sri Lanka, it was the result of a new, hardline government taking advantage of the Tamil Tigers’ weakness.

Earthquakes are more catalyst than cause, perhaps. If anything, their effects seem surprisingly small, for all Robinson’s evidence of their destructiveness. Tehran was demolished in AD855, 958, 1177 and 1830. Managua, in Nicaragua, was ruined 10 times in 200 years. The only city permanently erased was Port Royal, in Jamaica, which largely slipped into the sea in 1692. “Elastic rebound” is a technical term for the causes of earthquakes. It could equally apply to how we respond to them.

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Destroyed by fire

An enormous amount of damage was done in San Francisco in 1906, not just by the earthquake itself, but also by the subsequent fire, which burnt for three days, devoured 508 blocks and more than 28,000 buildings, and extended over 4.7 square miles

— some 75% of the city and an area about eight times that destroyed by the Great Fire of London.

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