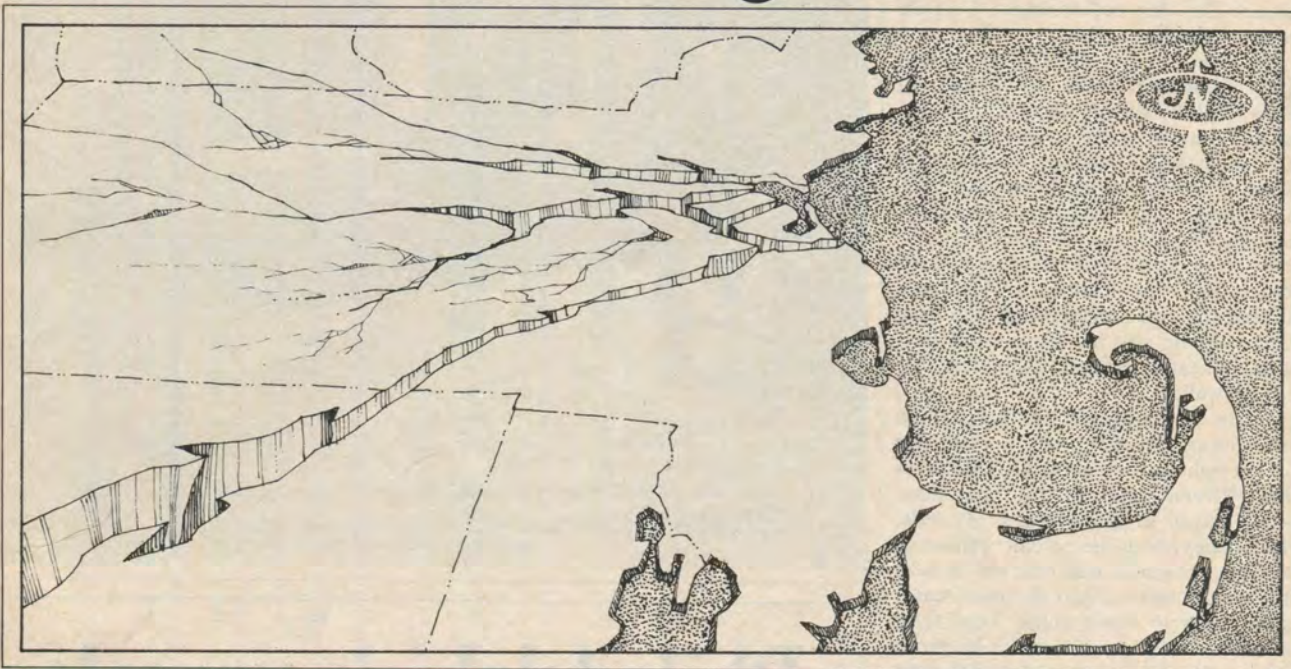


# DISASTERS

By John Sedgwick

## The Next Quake



**S**uddenly the whole city of Boston started to shake. For nearly a minute, buildings swayed, furniture slid across floors, books tumbled out of bookcases, chandeliers tossed wildly, plaster cracked and fell. Citizens ran screaming into the streets by the thousand, many of them nearly naked in their haste to escape buildings they were sure were about to collapse. Movie theaters around the city were scenes of frenzy. At the Exeter, according to a *Herald* account of the day, "suddenly and inexplicably the whole theater seemed to be rocking from side to side . . . The danger was accentuated when some timid girl in the gallery yelled 'fire' which caused a wild stampede for the exits in which many women fainted." On the waterfront, Rowe's wharf shook as if a ship had rammed it. Prisoners clamored to be released from jail. Telephone lines were put out of commission by the flood of phone calls to the police, to the newspapers, to scientific laboratories, to *anyone*, to find out what in hell was happening. One call did get through to the police. "Come and get me quick," the woman screamed. "The world is coming to an end!"

Well, not quite. Boston was having an earthquake, that's all. The year was 1925. That quake, which was felt all over the

Northeast, as far south as Washington and as far west as Chicago, actually originated four hundred miles to Boston's north in a deserted region of the St. Lawrence River. There it struck with an awesome force measuring seven points on the Richter scale, the strength of ten nuclear bombs. By the time the tremors reached Boston, they were only enough to topple a few rickety old buildings and smash a lot of china. Even so, it scared Bostonians out of their wits. But they were lucky. If the quake had hit much closer to the city, well, you must remember the San Fernando earthquake that killed fifty-eight and destroyed a billion dollars' worth of property in Los Angeles in 1970. That one was only 6.6.

An earthquake could strike in 1979, and it could strike a lot closer. In 1638, for instance, Governor William Bradford reported that at Plymouth Colony, "ye earth shooke with ye violence as they could not stand without catching hold of ye posts." In 1727, a quake hit the Merrimack River, causing in Boston what Cotton Mather described as "an horrid rumbling like the Noise of many Coaches together . . . attended with a most awful *Trembling of the Earth*, which did heave and shake so as to Rocque the Houses." In 1755, one of the most powerful quakes

ever felt in North America struck fifty miles off Cape Ann, sinking ships, toppling 1,200 chimneys, forcing water up from under the earth and making Boston's hell-fire Puritans wonder just what they'd done wrong. In 1870, a shock jarred the massive State House and rocked the old Studio building three inches. We know about the one in 1925.

Boston is in the heart of earthquake country. The reason you may not have heard about it is that the tremors have never hit when the city was built up enough to be seriously damaged. Earthquakes are never lethal in themselves. They kill by setting other disasters in motion—fires resulting from burst gas mains, landslides, collapsed buildings, tidal waves. (It's a rare earthquake that actually opens up a rocky maw to swallow people.) So far, New England's quakes have struck only sparsely inhabited regions. As far as is known, no Bostonian, no New Englander, has ever been killed by an earthquake. Not yet, that is. As the population grows—and continues to live in brick houses on shaky landfill as many of us do in Boston—one has to wonder how long our luck can hold.

The closest thing that New England has to an earthquake watch is the Weston Observatory, run by Boston College out

in Weston. Built in the aftermath of the 1925 quake, when everyone wanted to know where and when the next tremor would hit, the observatory is a squat garagelike building with a cement cross looming at one end. With around half a million dollars a year from various federal and private agencies, including the Army Corps of Engineers, the United States Geological Survey, and the National Science Foundation, the observatory has recently set up an extensive New England network of seismic stations—thirty-one in all, with ten more on the way. Each one consists of a battery-powered magnetic vibration detector buried in the earth and a telephone hookup to transmit its findings back to Weston. (In remote areas like northern Maine, the stations are powered by a solar-energy panel, although this hasn't worked too well because moose keep charging into them and bears have developed a taste for the insulation.) In Weston, the squiggly lines of the seismic record are displayed on a TV screen, photographed and stored for future reference in a large closet.

Behind a door bearing the sign "Earthquake: It Can Happen Here." amid piles of record books, geology monographs, and maps detailing sea-floor spreading, the observatory's forty-five-year-old assistant director, Dr. Edward Chiburis, keeps track of the results. He says the system detects on the average five definite earthquakes a day. That's one every four hours. True, for most you'd practically have to be standing at their epicenter to feel them. But several in the three-year history of the stations have been sizable, in the range of magnitude five. On the basis of this information, plus what he knows of the historical record, Chiburis has calculated that the Northeast—including portions of eastern Canada—can expect a powerful, magnitude 6.5 earthquake every forty years. "When you think about it," Chiburis says offhandedly, "that's not much more than California."

The comparison to California is not an idle one. In terms of what Chiburis calls the "potential for disaster" from an earthquake, New England runs second only to the Golden State. And it's not such a distant second either. For one thing, New England quakes affect a much larger area than that of their California counterparts. A recent magnitude-five shock in Santa Barbara was felt only within a radius of about fifteen miles. When a magnitude-five quake hit the Maine-Canada border a few years ago, the ground shivered as far away as Hartford. The difference is that New England, as every farmer knows, is one big lump of granite. Seismic shock waves zip through it like greased lightning.

Another factor is the widespread belief among locals that New England doesn't have earthquakes. As Chiburis puts it,

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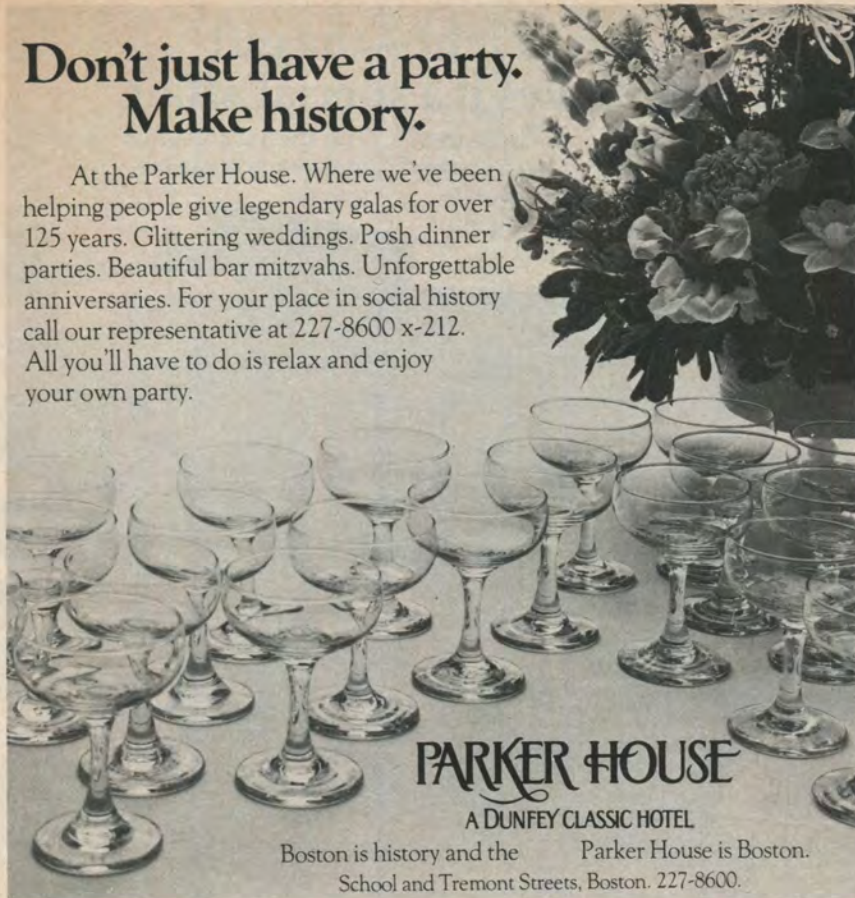


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"People here are not earthquake-conscious. When a quake hits, they'll think it's a nuclear attack or a Close Encounter." And they'll panic, just as they did in 1925, running out into the street instead of staying indoors where it's safer (under an archway is the best place). They'll yell fire, even if there isn't one. They'll faint, trapping themselves, or stampe, trampling others. For Californians, on the other hand, earthquakes are old hat. They know enough to stay indoors.

The people who establish building codes in New England aren't earthquake-conscious either. (The people who establish insurance rates are, however: a special earthquake rider costs as much in Boston as it does in San Francisco—top dollar.) In Boston, seismic risk wasn't even considered until 1971, by which time most of the city's present buildings were in place or under construction. While wind-buffed skyscrapers like the Hancock and the Prudential towers were built to withstand the kind of horizontal jiggling that an earthquake causes, the fates of the city's low-rises are less secure. Back Bay brownstones top every seismologist's least-likely-to-survive list. Brick buildings don't fare very well in earthquakes anyway—according to Chiburis, a shake of only one-twentieth the force of gravity sends them sprawling. Old ones built on unsteady landfill do even worse. Also, since they are built in rows, fire can easily spread from one to the next. With water mains severed by the quake, the ground chewed up, and the streets congested, "a fire like that is going to be pretty hard to stop," says Chiburis. By the same token, townhouses in the South End and Cambridgeport, both landfill areas, are equally vulnerable. Since New England was settled so long ago, many buildings are old and weak—and prime candidates for earthquake demolition. Engineers also point to the new precast cement structures like the Government Center parking garage, to pick one of many, as being unstable because they use few bolts to secure the horizontal girders to their vertical supports.

California, by contrast, is such a young state that few of the homes were built before this century and nearly all were constructed—thanks to the 1906 San Francisco disaster—with the earthquake hazard firmly in mind.

It's hard to believe that staid New England is number two. California is *spiritually* earthquake country, right? Some may wonder how our region could rank at all. For according to the widely accepted theory of plate tectonics, earthquakes result from the grinding together of the dozen thirty-mile-thick plates that make up the earth's surface. Earthquakes are only supposed to occur at plate borders, such as along California's infamous San Andreas Fault, where the Pacific and the North American plates gnash together. New England is nowhere near any such

border. The eastern edge of the North American plate extends all the way out to the mid-Atlantic. So what's New England doing with earthquakes?

"Frankly, we don't know what causes New England's earthquakes," says Edward Chiburis with a shrug. "We haven't the faintest idea." When pressed, however, the geophysicist will hazard a few guesses. One is that as the massive North American plate slides along, it builds up various differential stresses within its borders. As Chiburis says, "The plates aren't like dinner plates. They aren't rigid." When the stress becomes too great, the plate bursts up: earthquake. Another guess, an extension of the first one, is that "zones of weakness" have resulted from the intrusion of soft hydrated rock from the lower mantle into the harder stuff in the upper. These zones, situated between the core and the surface of the earth, give way under the strain of the shifting plate to produce the tremors. According to Chiburis, there is a third, rather remote possibility that the Northeast is still recovering—with a quake here and a quake there—from the weight of the last mile-high glacier that departed 11,000 years ago.

Since no one really knows why they happen, predicting where earthquakes will strike in the Northeast is tricky. In California the fault lines are visible and well mapped, so citizens at least know where the tremors will most likely hit, even if they don't know when.

There are few empty spaces on the Weston Observatory's map of all the Northeast earthquakes since 1534. Yet Chiburis can point to four general areas in the Northeast where seismic activity seems to be concentrated. The most prominent of these by far is the region responsible for the 1925 quake, La Malbaie in Quebec—"the hottest region you can imagine," says Chiburis. After that comes the area from northwestern Vermont out to Montreal. Then Cape Ann. Then a stretch from the extreme southwestern tip of Connecticut down to northern New Jersey. Even if three of the zones are centered outside of New England, a magnitude 6.5 heave in any of these spots would set all six states rocking.

But Chiburis doesn't want to scare anybody. He emphasizes that a New England earthquake has yet to kill anyone, while lots of people have died in car accidents, fires, hurricanes, flu epidemics, blizzards, and a host of other catastrophes. Yet there are more earthquakes still to come. Judging by Chiburis's once-every-forty-years calculation, the next magnitude 6.5 quake—powerful enough to shift some large buildings, flatten others, and burst underground pipes—is due any time now. Chiburis, who has never been in an earthquake, can hardly wait. "We learn more about earthquakes from one big one," he says, "than from a heap of little ones." That's fine for him to say. □

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