

Edward J. Olsen

The most stupendous earthquake of them all

It has been called the most stupendous earthquake in the recorded history of the North American continent. It began in the early hours of December 16, 1811, in and around the small settler's community of New Madrid, in the far southeastern corner of Missouri. About 2 a.m. a series of creaks and rumblings were felt in a gradually increasing crescendo. House timbers cracked and walls broke away from each other; furniture tumbled around and shelves were emptied onto floors. Sharp shock waves shattered the area at short intervals. Houses tottered and chimneys fell. By dawn all the inhabitants stood out in the cold morning air, away from their houses.

Heavy shocks were repeated and earth waves were seen to roll across the landscape, lifting and lowering everything as they passed, like long low swells seen on the open ocean. Trees swung back and forth as the waves passed under them, frequently locking together their branches as they tipped toward each other, and ripping themselves apart as they then tilted the

other way. Landslides broke loose on steeper slopes and poured into adjacent valleys. Ground water, disrupted from its normal flow patterns, popped up as instant springs in unlikely places and filled low-lying areas. Some large areas sank several feet while others were bucked upward into small impromptu hills. Along the adjacent Mississippi River, high banks slumped into the water, carrying away trees and creating huge waves that smashed the opposite shore, destroying more trees and swamping boats in their path. Small islands sank out of sight under the roiled waters.

On land, long fissures—600 to 700 feet wide, 20 feet deep, and up to several miles long—suddenly opened in the soil, some people tumbling in, to be rescued with difficulty. Sand geysers 10 to 100 feet across formed as the churning dirt ejected underlying sands and sulfurous decaying organic matter.

The rumblings continued, but no more sharp shocks were experienced—until January 23rd, over a month later, when

a new shock hit the area, fully as intense as those in December. Then all became relatively quiet—until February 7th, when a series of shocks repeated all the former destruction with, some thought, greater intensity than the earlier episodes. The rumblings and aftershocks continued at moderate intensities for days, gradually fading, but not ceasing. Distinct aftershocks, almost 2,000 of them, were felt for over a period of a year, and minor ones up to two years later!

As far as any historical records show there has never been another earthquake of such magnitude and duration on the North American continent. Compared to large earthquakes elsewhere in the world, it was certainly on a par with the devastating ones in Shensi, China in 1556 and the Tokyo quake of 1923.

The damage created by the New Madrid earthquakes was large in terms of the natural environment. Approximately 150,000 acres of forests were destroyed. Two lakes were

created as land sank and filled with inrushing river and ground water: Reelfoot Lake, 18 miles long and 3 miles wide, and Lake St. Francis, 40 miles long and half a mile wide. Certainly thousands of animals were drowned by these sudden inundations. In terms of the settlers, however, losses were small. In the 1811-1813 period the population of the region was still low. Many of the dwellings were log cabins, which became disjointed by the shock waves, but did not always tumble. Only one person was known to have been killed in a falling building. An unknown small number drowned when river banks caved in and when boats were swamped by churned river waters.

Although the town was damaged badly enough that the site had to be abandoned, it was not a major catastrophe *at that time*. Perhaps of greater significance is the damage suffered in other, more populous areas, and the great distances at which the shocks were felt. About 50,000 square miles were hit the hardest—which means that points up to 130 miles from New Madrid could have suffered severe damage had there been any great population centers within that radius at the time. St. Louis lay just beyond this range. It was then still a small trading town and suffered mainly from fallen chimneys and cracked walls. Farther afield, chimneys also tumbled in Cincinnati, Ohio, 350 miles away!

Along the river below Vicksburg, Mississippi, 300 miles to the south, river-banks caved in. In Charleston, South Carolina, 650 miles away, some buildings were cracked and chimneys fell, and Washington, D.C., 700 miles away, was severely shaken! Noticeable tremors were felt in Baltimore, Maryland, 750 miles away, and in Boston, Massachusetts, 1,100 miles away! Weak vibrations were also felt in Montreal, along the Gulf coast at New Orleans, and northwestward along the upper reaches of the Missouri River. All in all, an area approximately 2,500 miles in diameter, centered on southeastern Missouri, was affected to varying degrees depending on local geological substructures.

created this lake...



Cypress along the shore of Reelfoot Lake in northwestern Tennessee.
Photo courtesy of Tennessee Department of Conservation.

earthquakes...

A sobering question arises. What if we were to see a repeat performance in that area today?

Although the western portion of California is much publicized as a high earthquake area, mid-westerners are probably not aware that a region that registers a high frequency of weak to moderate earthquakes includes southeastern Missouri, western Tennessee and Kentucky, southern Illinois, and northeastern Arkansas. The map here shows, in a much generalized way, the main zones of

Chicago lies a bare 350 miles from this region. Within the past four years, tremors from two earthquakes have been felt here. The one September 15, 1972 originated near Amboy in northern Illinois. The other, a moderate strength quake November 9, 1968, was centered over 300 miles south of Chicago near McLeansboro. A series of strong quakes from southern Illinois or southeastern Missouri could have damaging effects on so populous an area as Chicago. This city was not built with earthquakes in mind.

piles that go down to bedrock, but rather "float" on caissons sunk into the glacial sands and clays that overlie bedrock to an average thickness of seventy feet. It has been observed in other regions—as for example during the medium-strength earthquake in the St. Lawrence Valley February 28, 1925—that buildings constructed on soil or landfill suffered more damage than ones built on bedrock.

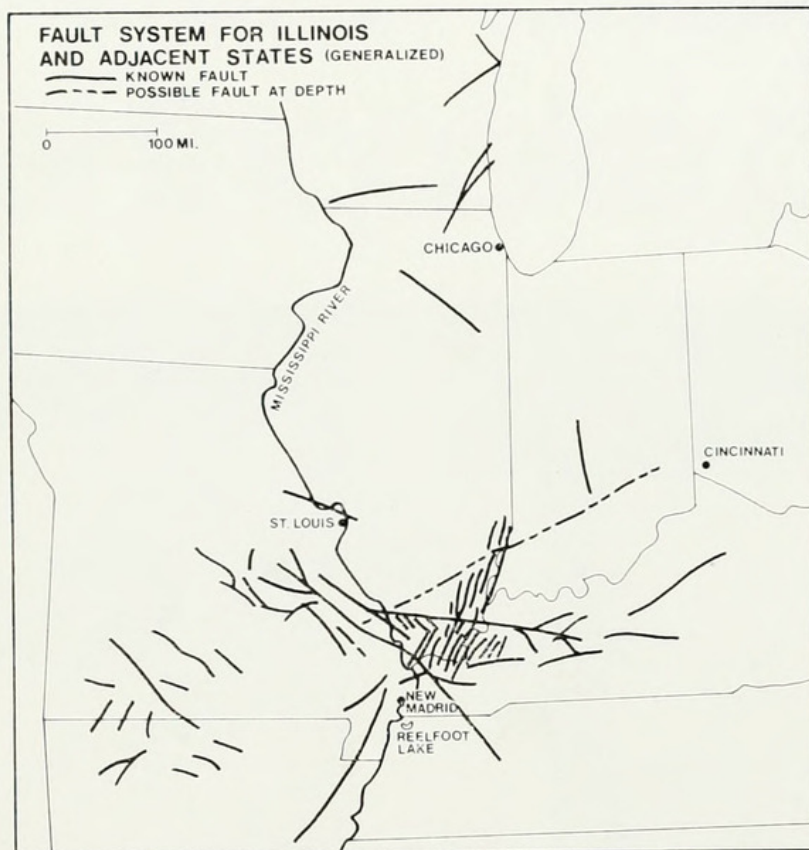
There is, of course, no way to predict the effect on Chicago. It would depend on the magnitudes of the shocks and the spacing between them.

Nevertheless, a repeat of the New Madrid episode, which was capable of causing damage in Cincinnati, Ohio, and as far away as South Carolina, would not leave Chicago unaffected. Closer cities, such as St. Louis and Memphis, would suffer major destructive effects.

The geologic substructure of the western California region is pretty well understood, and we know with certainty that a major earthquake will devastate some portion of California in the near future. A great deal of current research in the discipline called *geophysics* is focused on measuring and gauging fault movement activity in California, hopefully to provide a means to predict the time of the next major quake, and minimize the loss of life that will occur.

Far less is known about the midwestern region. Yet midwesterners cannot indulge themselves in a feeling of complacency with respect to their less fortunate California cousins. No major quakes have occurred in the midwest since the area has been built up. There is no reason to believe that a repeat of the magnitude of the 1811-1813 earthquakes will ever occur again—nor any reason to believe it will not!

Dr. Edward J. Olsen is Curator of Mineralogy, Department of Geology, Field Museum.



faults (breaks in the bedrock) along which earthquakes occur. The most significant feature is that there are so many intersecting faults. This is especially dangerous, for quake movement on one fault can initiate movement on others, compounding the shock effects.

Large portions of the Chicago area consist of landfill, covering old swamps and glacial lakebeds that dotted the region before the city existed. Virtually all of the smaller business and residential buildings are constructed on this landfill or on soil. Even some of the taller buildings are not built on



Olsen, Edward John. 1973. "The Most Stupendous Earthquake of Them All."
Field Museum of Natural History bulletin 44(2), 8–10.

View This Item Online: <https://www.biodiversitylibrary.org/item/23046>

Permalink: <https://www.biodiversitylibrary.org/partpdf/375807>

Holding Institution

University Library, University of Illinois Urbana Champaign

Sponsored by

University of Illinois Urbana-Champaign

Copyright & Reuse

Copyright Status: In copyright. Digitized with permission of the Field Museum of Chicago.

Contact dcc@library.uiuc.edu for information.

Rights Holder: Field Museum of Natural History

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.