10/5/65

The Giant San Andreas Fault

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(Second of four articles)

Earthquakes are caused by stresses that build up to such a point they must be relieved. When the relief comes, it comes suddenly and there is an earthquake.

While Santa Cruz sits adjacent to the Ben Lomond fault and is only 10 miles from the subterranian San Gregorio fault, very little, if any activity, is noted from those two. It is the giant San Andreas fault — some 10 miles inland — that brings most of the woe.

Seismologists and geologists admit freely they are "in the dark" relatively speaking about the San Andreas.

It has been known for decades that the San Andreas is moving. It is called a "right lateral" fault, indicating the right side is moving — relative to the left side — in a northwest direction. Although the knowledge has been a matter of record for years, it has been only recently that the U.S. Geologic Survey has started to plot it.

Senior Geologist T. W. Dibblee at the USGS office in Menlo Park has been assigned the task of mapping the San Andreas. It is a massive task and one that will take years, but from what advances he has made already in the knowledge of the San Andreas, Dibblee is recognized as an authority.

Through a series of triangulation stations, it is known that the San Andreas is moving laterally two inches a year. As it moves, it creates stresses in the rocky structure underground. The stresses build and build and when they can stand no further pressure, they crumble or slide or break — but regardless of how — they are relieved.

When they are relieved, California has another earthquake.

"We can't tell much now about future earthquakes, except that they will happen," Dibblee told The Sentinel in an interview at his Menlo Park office. "But with this study, we can plot how and where the San Andreas moves and we hope, in time, to be able to forecast quakes."

It would be a problem of comparing movement to stress and time. Of course, the fault has different strata at different levels and some areas may be less adjustable to stress than others.

Dibblee recalled the forecast of Dr. Charles Richter, seismologist at the California Institute of Technology at Pasadena. Dr. Richter is also well-known for his Richter scale of earthquake magnitude.

(There is a difference in magnitude and intensity. Intensity is measured on the ground effect of a quake. Magnitude is measured by the distance traveled by the earthquake wave.)

Dr. Richter used the known fact that in the 1906 San Francisco quake, there was an offset of between 15 and 20 feet in Marin county. It was a measurable offset. He judged it could mean release of stresses built up for 100 years.

Through Dibblee's measurements — and others — it is known that the San Andreas moves two inches a year.

Using the 1857 quake in Gorman as a starting point, Dr. Richter had forecast that another major quake would hit on the San Andreas in 1957. The "1957 big one" didn't materialize, but within a three-year span, there were two major quakes in Hollister.

In his book "Earthquake Country," Robert Iacopi wrote: "California's next great earthquake may take place while you are reading this, or it may not come during your lifetime. But one thing is sure, it is definitely on the way."

John Kepper, geologist at Cabrillo college, said it "could be nothing else but on the way." He bases his statement on the fact that California is in a new geological area, "it is building," and the state is filled with seismic faults from one end to the other.

In Santa Cruz county alone, there are countless faults. "This is not including the San Andreas," Kepper said.

He pointed to the Ben Lomond fault as one of the most outstanding vertical faults in the area. It is outstanding because its fault line can easily be seen.

When viewed from the neighborhood of La Selva Beach — or even from the River street bridge — Ben Lomond mountain shows a sloping west side and a sharp east side. "That east side is the fault," Kepper said.

The fault line is easily seen on the new Graham Hill road. At two points on the highway, a fault line runs diagonally up the face of the highway cut. On one side is a granitic formation of which Ben Lomond mountain is formed. The other contains Monterey mudstone.

Sometime a few million years ago, pressures and stresses built up to the point that what is now known as Ben Lomond mountain was shoved right up and tilted on its side. The land displacement was 3000 feet.

While there is no current seismic activity along the Ben Lomond fault, there definitely has been in the past. At many points along the fault line, huge "waves" can be seen in the Monterey mudstone and tertiary rocks.

Could the fault become active?

"I would say no," Kepper declared.

"I would say no," was the answer from Dibblee.

George Schlocker, research geologist at the Menlo Park USGS office, said the same thing, but added: — "at least there is no history of its moving."

His added comment is typical of geologists and seismologists. They know what has happened, but they are vague of the future and they are wary of forecasting.

"It is significant that it is there," Kepper said, "and it is normal being so close to the San Andreas."

In a geologic map recently completed by Dibblee, the Ben Lomond fault is shown as a slash in the form of an arc around the northern and western sides of Santa Cruz. In between it and the San Andreas fault is an expanse of twisted and wavy Monterey mudstone and sandstone.

When the San Andreas shakes, the temblor is relayed through this mudstone and into the Ben Lomond mountain. It also flows down the mudstone in the San Lorenzo valley and into Santa Cruz.

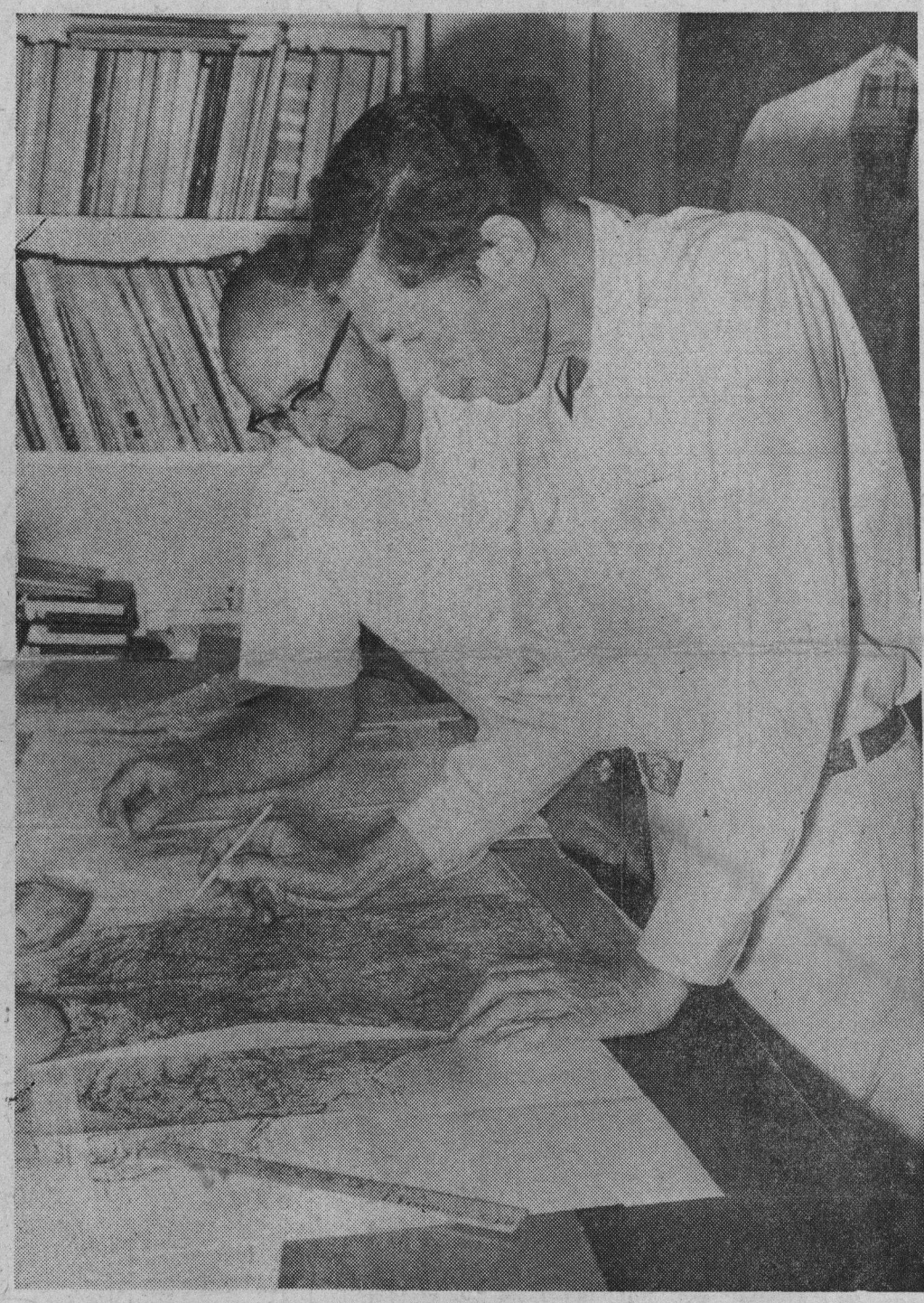
Perhaps "flows" is not a good word inasmuch as earthquake waves are shock waves, but they must pass through — or flow through — the subterranian matter in all directions from the quake epicenter.

The question arose: "If there were a severe quake on the San Andreas — one of cataclysmic proportions — could it cause action on the Ben Lomond fault."

The answer from Schloker was: "We have no knowledge of a relationship of strain between the Ben Lomond and San Andreas faults."

He continued: "If you are wondering about damage to Santa Cruz, your biggest danger is from faulty structures. Santa Cruz is definitely in an known earthquake zone and much of it is on river alluvium. All structures should be built with the fact in mind — there will be earthquakes . . ."

(Next: Dangers in structures.)



George Schlocker, research geologist at the U.S. Geological Survey office in Menlo Park, left, scans a geological map of the Santa Cruz area with senior geologist T. W. Dibblee in Dibblee's office. Dibblee is the man who was handed the job of charting the San Andreas fault and is recognized as an authority on its movements. Both men view the Ben Lomond fault as a unique one.

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