

LIFE ON THE LINE

Along its transit, the San Andreas fault is studied, discovered, lost and sighted, feared and ignored. BY TOM CHAFFIN

Naked sand dunes glow sienna in the late afternoon light. The Sonoran Desert—set into waves, swirls, ripples and eddies—glistens like butterscotch pudding. I'm standing atop a dune looking out on State Highway 78 as it winds toward the saw-toothed Chocolate Mountains, purple and hazy to the east.

A subterranean country begins somewhere near here. I say somewhere near here because its precise boundaries remain unmapped, still open to scientific inquiry. It's a country evidenced but rarely seen, a domain of fractures, crushed bedrock and silent, millennial convulsions deep in the earth. Beginning just south of here in the Gulf of California and running through Sand Hills all the way to Point Arena on the north coast is a network of subterranean gashes known as the San Andreas fault.

Other faults slice California: the Garlock, the White Wolf, the Santa Ynez, the Big Pine. There are thousands of them, most without names. But the San Andreas remains California's dominant fault, the spine of its geological nervous system.

California's natural vistas have nourished expansive dreams, escapes from history, New World innocence. As the landscape's most

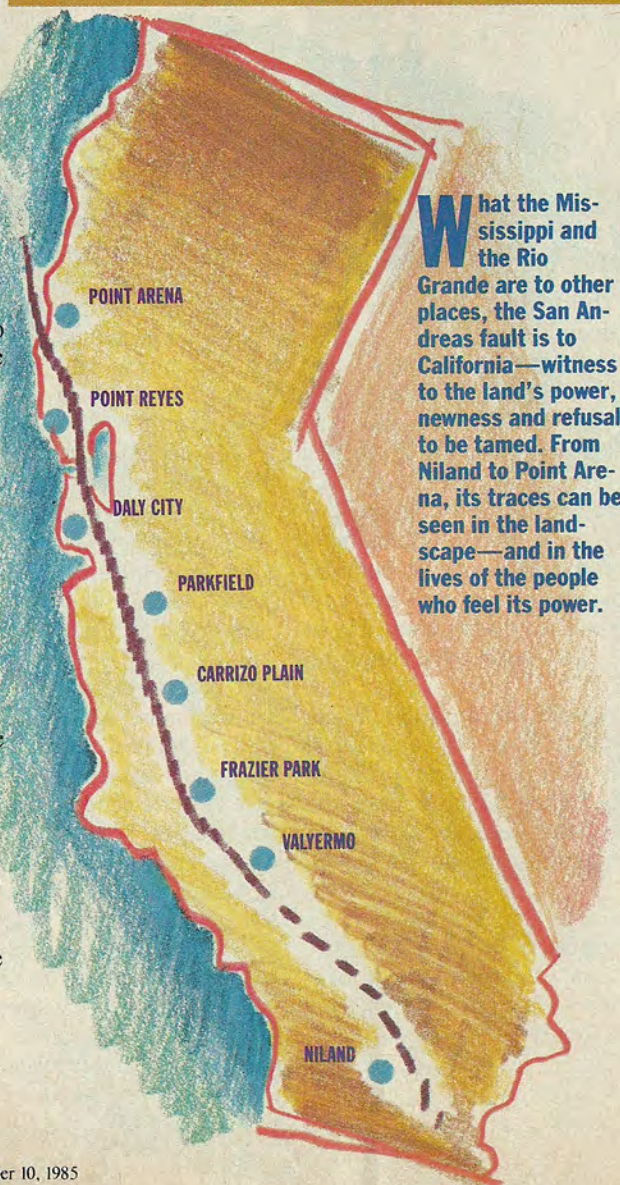
volatile expression, the San Andreas inflames our imaginations. No river stretches over the length of the state, so what the Mississippi, the Ohio, the Rio Grande are to other places, the San Andreas must be for California—sublime witness to the land's power, newness and refusal to be tamed.

Think of the San Andreas, then, as an unseen, usually silent seismic river. More than ten miles deep, from a few hundred yards to a mile across, it sprints 700 miles up the state to Point Arena, where it disappears into the Pacific Ocean. Along its transit, it is studied, discovered, denied, lost and sighted, feared, beloved and ignored.

One can follow its traces, a topography of shadows—valleys, rivers, lakes, estuaries, roads and mountain passes. "Let me show you something," people along the way will say, unrolling a yellowed property map with a dark line running across it. "It runs right out there," others swear, with the certitude that comes from years of repeating fiction.

In the end, one can ponder maps and books and never fully know the San Andreas, only know about it. But one can find the shadows—in the land and in the people who live on the fault. In their works and days, the San Andreas reveals itself.

FOLLOWING THE FAULT

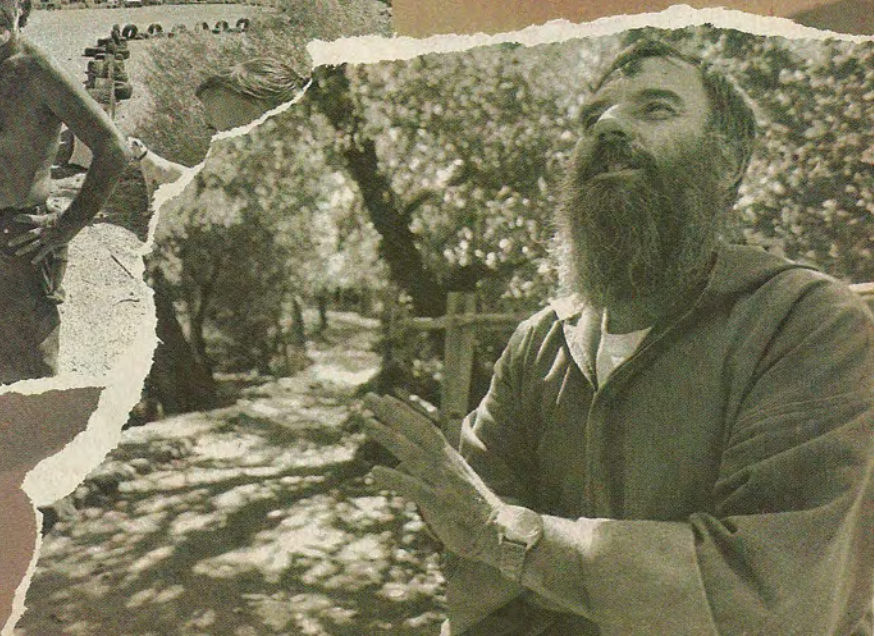
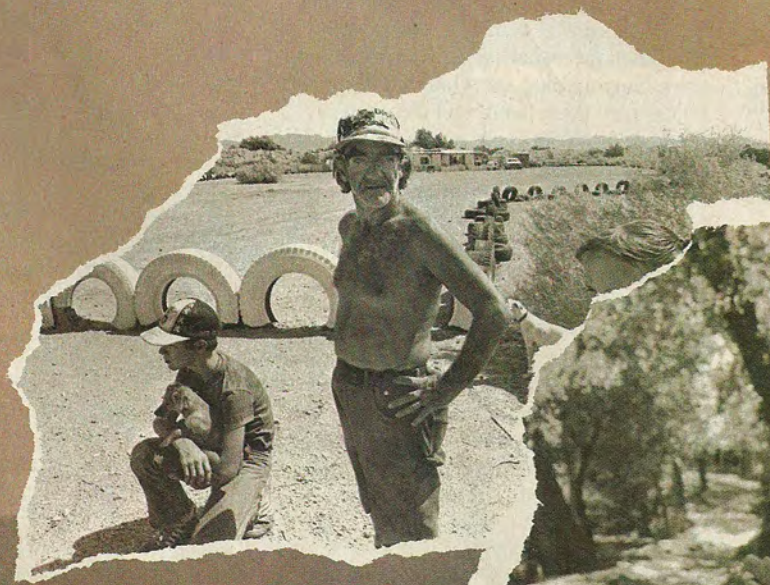


What the Mississippi and the Rio Grande are to other places, the San Andreas fault is to California—witness to the land's power, newness and refusal to be tamed. From Niland to Point Arena, its traces can be seen in the landscape—and in the lives of the people who feel its power.

THE SOUTH

Sand Hills sits at the southeast end of the San Andreas fault system. Squatter Don Davis (inset, left) lives in the desert near Niland: "I'm not worried about any fault, and that's all there is to it."

Father Philip Edwards (inset, right) of Saint Andrew's Priory near Valyermo: "Maybe we're too blasé. The truth is, earthquakes haven't made us any better or worse around here."



THE SOUTH



On geological maps, a solid line traces most of the San Andreas fault's land passage. Only in deep southeastern California does the line become dotted, the fault become *subterra incognita*. Some geologists say the San Andreas is down there. Others say the fracturing is too complex, too extensive to talk of a single fault system.

Geologists may stutter, but Don Davis knows exactly where the San Andreas winds its way through Niland. "It runs right across there, just past that water tower," he says, gesturing at the shrub-dotted desert that spreads in all directions from his trailer.

"A fellow from the chamber of commerce came out here with a geologist a few weeks ago, and he told me, 'Right across there.' Course, it's hard to tell. It all looks like the desert to me."

Davis is a grizzled man of 56 who's spent his life working and wandering. Now he and his wife, two kids and at least four dogs get by on his monthly \$400 Social Security checks. A squatter, Davis has two acres enclosed by split tires placed tread up in the sun-baked soil.

Davis's brood is not alone out here. There are at least a dozen other trailers. When winter comes, there will be hundreds. These 640 acres served as a training base for General George Patton's army in 1942; now only stone markers, empty bunkers and some concrete slabs recall Patton's days here. But as Davis and others will tell you, those slabs make ideal trailer and tent platforms. Slab City, they call it—no taxes, no rent, no running water.

As for earthquakes and faults bearing names of saints, Davis is stoic, albeit not without faith. "It's real simple," he says. "When that ol' boy up there reaches into that box and pulls my number out, I'm gonna die. I'm not worried about any fault, and that's all there is to it."

At dawn, the desert rocks of Painted Canyon bloom in oranges, grays and greens. They are alternately monolithic and columnar—bent, torn, sheared and uplifted by the fault. One comes to places like this looking for a neat demarcation one can call San Andreas. But here there are many faults. We speak of the San Andreas fault, but this is a misnomer. It is more precise to speak of the San Andreas rift zone or fault system.

In 1893, Scottish-born geologist Andrew Lawson took a steamer trip from San Diego to San Francisco and identified one part of the zone. The valleys of San Francisco, San Benito and Santa Clara—all long, narrow and trending north to south—led him to envision a fault stretching along the San Francisco peninsula. Two years later, he gave his rift a name—San Andreas, after a

lake that fills the rift valley just south of The City.

Lawson published his observations, but they received little attention—until 1906. In that year, an earthquake along the San Andreas, probably an 8.3 on the Richter scale, immortalized the name.

Since Lawson's steamboat trip, geologists have advanced his observations, extended his fault to the Gulf of California and sounded it with sophisticated equipment. The notion of the San Andreas fault dovetails neatly with the theory of plate tectonics: Most geologists now believe that the earth's crust is fractured into at least twelve major plates up to 60 miles thick. Empowered by heat from decaying radioactive matter in the earth's mantle, the plates "float"—pushing over, under, against and alongside one another. The San Andreas forms part of the line of collision between the North American and the Pacific plates. The North American plate pushes southeasterly; the Pacific moves northwesterly.

Put another way, when we speak of Los Angeles as a town in southern California, we are speaking—geologically—in the short term.



Father Philip Edwards, an affable, bearded man of 55, recalls an earthquake felt at Saint Andrew's Priory, near Valyermo, in the early '70s.

"It was about 7:30 a.m. I had just begun the morning prayer—'Oh God, come to my aid, oh Lord, make haste to help me . . . '—and it hit. It shook enough to give everyone pause, but I don't derive any particular insight from it. I guess the theological angle is that you always have to be ready to go."

A Benedictine monastery and retreat, Saint Andrew's sits in a cool river valley of willows, cottonwoods and King David apple trees. Surrounding the white buildings, the landscaped duck pond, and the open-air theater on the 560-acre grounds are Joshua trees, cacti whose name comes from their pantomime of the frenzied gestures of the Old Testament figure, a disposition totally incongruent with the sober theology of the Benedictines.

Saint Andrew's was founded in 1956; Father Philip says the presence of the San Andreas was one reason for the name. Beyond that, he says, it's not an important factor. Apocalyptic literature, especially the Book of Revelations, makes much ado about earthquakes. But he cautions against the sin of literal interpretation.

"Earthquakes are acts of God in the sense that everything is. Perhaps we're too blasé. The truth is, earthquakes haven't made us any better or worse around here."

I suggest to the father that this fault-rid-ded locale is wasted on Catholics. Fire-and-brimstone Protestants might make shrewder use of the fault as an audio-visual

conversion tool.

"Well," he says after a pause, "there was the woman here on retreat who had missed morning Mass. She was sleeping in when a quake hit and knocked her bed across the room. She managed to show up for the afternoon Mass. So we do, in a sense, get some conversions out of it."



Elevation 4,710 feet, population 1,830. Seventy-two miles north of Los Angeles, Frazier Park sits on the X formed by the junction of two of California's major faults, the north-south San Andreas and the east-west Garlock.

Arthur Novak, 91, retired lumberer: "We've got a fault coming right through this town, and a damned good one, too. I been here through some good quakes. I was out on the porch with the kids, and you could see the earth shake, going up and down—before the last war. I saw one over there by Lancaster, and it just cut through that highway—just pulverized that road."

"I guess God's got something to do with it. But we ain't seen nothin'. I think we're gonna destroy this world by shooting these damn missiles into space. God might put these earthquakes on the earth as punishment. You can't tell; people are going crazy anyway. The world's just going to hell."

In novels and Hollywood movies, the San Andreas portends disasters of biblical proportions, the wrath of God visited upon prideful cities. Geology textbooks, smug in their hindsight, speak of mankind's folly in building cities on the fault.

Actually, wilderness cloaks most of the San Andreas's passage; it skirts the state's major cities. Still, Los Angeles and San Francisco have reason to contemplate the fault, as 1906 proved. Earthquakes along the San Andreas and its ancillary faults have damaged towns up to 50 miles from the actual rift zone.

Collapsing buildings and fires from ruptured gas lines do most of an earthquake's damage. In rural locales, where buildings tend to be single storied and wood framed, tremors can be absorbed with little damage. Thus the San Andreas poses less of a threat to those living directly on it, more to those who live away from it—in the cities.

MID-STATE



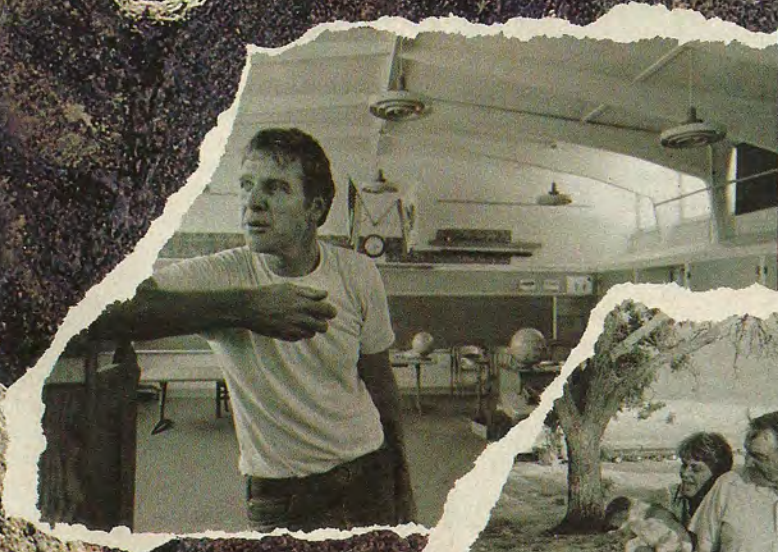
From the air above the Carrizo Plain, the San Andreas looks like a long, straight zipper sewn into the flat, brown earth. Most movement along the San Andreas is horizontal; the action shows when streams are "offset," forced to bend angularly to resume their flow after a quake. Vertical movement creates scarps—long ridge lines sheer on one side, gradual on the other. The Carrizo Plain is a textbook case of both offset streams and dramatic scarps.



MID-STATE

The jagged rocks of Pinnacles National Monument, just west of the fault zone, were formed by earthquakes.

Geologists are betting that Parkfield, where Duane Hamman (inset, top) teaches school, will be the site of the next big one. The arid Carrizo Plain, where Ned and Debi Collins farm (inset bottom), is textbook earthquake country, marked by offset streams and dramatic scarps.



This plain that begins about 110 miles north of Los Angeles is one of the most remote places in the state. Sparsely inhabited, 50 miles long, six miles wide, landlocked by mountains, the Carrizo is an arid basin made green by ranchers like Ned and Debi Collins.

On the day I talk with them, the dying sun makes their freshly plowed fields glow. Sheep bells ride a gentle wind from the west, and the mountains have the soft pleated look of purple blankets piled atop one another.

"I felt one about a year ago," says Debi, sitting under a cottonwood behind their ranch house.

"No, you didn't," says Ned.

"I sure did. It was during earthquake weather."

"What's earthquake weather?" I inquire.

"Not stormy—just kind of balmy and gray."

I ask Debi if her dog can sense quakes before they occur.

"Only thing you can tell from him is when it's dinner time."



A Newtonian logic informs the seismic gap theory, the font of modern scientific attempts to predict earthquakes. Simplified, it goes like this: Plates rub against one another. Friction inhibits the action; when two plates get "snagged," stress develops. The more stress, the more rebound when the plates snap. The more frequently tension is released, the less traumatic the tremor. If fault slippage is constant, earthquakes are marginal. If a fault section becomes snagged for many years, expect the worst.

The northern end of the San Andreas, from San Juan Bautista to Point Arena, which snapped in 1906, is snagged but not due for another severe quake until well into the next century. The fault's north-central section, from Parkfield to San Juan Bautista, experiences constant slippage and is not considered imperiled. The south-central section, from Cajon Pass to Parkfield, has been inactive recently. The last great quake there was in 1857, and it's due for another.

There's a State Forest Service fire station in Parkfield. There used to be a bar. And according to one local, if you look long enough, you might be able to come up with 150 people.

But that's not counting the geologists. During certain months, this valley is crawling with them.

"They don't talk too much," says Duane Hamman, an energetic 43-year-old who teaches in the one-room elementary school. "I kind of wish they would. I'm just as curious as you are about this stuff."

"This stuff" is an arsenal of sophisticated earthquake-monitoring equipment implanted around the area. With more than a

hundred meters and sensors in the valley, Parkfield is wired: Geologists think this locale is the logical epicenter for the next "great" earthquake—any tremor 8 or higher on the Richter scale.

Near Appletree Campground, in Angeles National Forest, a stream has cut a cross section through a scarp, and you can pick up granite that collapses in your hand because it has been pulverized by the grinding of tectonic plates. Near the desert town of Palmdale and stretching from the Mojave Desert to the ocean, there's a swelling in the earth called the Palmdale Bulge that realtors don't want to think about.

In a nearby desert, electric power transformers chatter like rattlesnakes above hogbacks—giant, weather-smoothed sandstone slabs, battleship gray and tilted into the earth by the San Andreas.

Most of the rift zone's topographic shadows are as unspectacular and indirect as they are silent. In search of the San Andreas, look for the things Andrew Lawson first noticed—long, narrow valleys and basins, estuaries and lakes. Look for scarps and streams that zigzag. Look for stands of cottonwoods, willows and palms where they shouldn't be. Their roots often tap bloated aquifers, underground waters blocked by a wall of clay that fault movement has put in their way. If the water table rises enough, or if the surface water fills a fault basin, a sag pond is created—one more fault shadow.

THE NORTH



On Longview Drive in Daly City, a San Francisco suburb divided by the San Andreas, I knock on some doors of houses that sit smack dab on the rift.

The first three homeowners I talk to say they're unaware of any fault. The fourth, 56-year-old building engineer John Witham, says he's not really concerned that his two-story white stucco house overlooking the sea appears in geology textbooks in aerial photographs intended as a warning to builders who ignore geology.

"Listen, if I was a cake-maker instead of an engineer, I wouldn't be any less concerned. I have a brother who lives in Florida, and he has to deal with hurricanes. Anywhere you live, you're going to have to deal with something."



"I'm sure a lot of the people who come to this park would like to have something like Earthquake USA, some sort of theme park with a vibrating sidewalk and a button that you can push and see tectonic plates move."

Ranger Greg Gnesios, 37, is a naturalist at Point Reyes, a seashore park on the Pacific plate.

We're sitting under a live oak looking at a splintered gray fence. Actually, it's not

just any fence; it's the most famous fence in California. It's in two sections offset sixteen feet by the 1906 quake.

"People come from all over to see this fence," says Gnesios. "A few weeks ago, we had five bus loads of geologists—mostly Asians—out here. The fence was the first thing most of them asked to see."

For a moment, we both stare at the fence. Most of its original planks have been replaced since 1906. Still, it's a consolation. "If it hadn't been here, it'd be hard to see where the quake hit. By now, everything's grown over."



Five miles north of Point Arena, breakers pound a lonesome beach littered with drift logs. Breaking the high bluffs that rise from the beach is Alder Creek, its brackish waters clotted with soup-green frog spawn.

This could be any cold and windy northern California beach—but it's not. This one, I suggest to rancher Don Fraser, who owns the surrounding land, is special. It's here, near where Alder Creek breaks the bluff, that the San Andreas disappears into the Pacific Ocean. And that makes Fraser the last (or first) man on the fault.

"Last one, huh? I don't think it's any hell of an honor." A lean, taciturn man of 57, Fraser has taken time off from repairing his barn to give me his fault tour. We walk to a precipice high above Alder Creek. "You can look down and see how unstable it is," he says, pointing to where the stream cuts through the bluff.

I look at the sandstone beddings beneath us; they seem to run in all directions and no direction. "For a while, subdividers were licking their chops over this property," he says, "but they got scared off by this fault."

Later we drive across the cattle and sheep pastures he's owned since 1952, and Fraser points to a long, thin, south-trending thicket of tule reeds.

"The water table seems a little higher in those areas," he says. "This land has been farmed and plowed for so long it's hard to see. But from the air it's real clear. You can trace the San Andreas by the tules."

Fraser says he doesn't worry about earthquakes. For a while, Pacific Gas & Electric wanted to build a nuclear power plant just south of here. The San Andreas geology finally killed the project, but Fraser's main concern wasn't the plant. "This area hasn't been really shaken since 1906. The only thing I would've minded was the influx of people coming in here to work on the thing."

I remind Fraser that the entire city of Los Angeles is moving northward at the rate of two inches a year and will eventually float up his way. That concerns him.

"That'll be worse than a nuclear power plant." □

Tom Chaffin lives and writes in Paris.



THE NORTH

The fault veers into the sea here, at the mouth of Alder Creek near Point Arena. That makes rancher Don Fraser (inset, top) the last—or the first—man on the fault line. Daly City is subdivided by the fault, but engineer John Witham and his wife (inset, bottom) aren't concerned: "Anywhere you live, you're going to have to deal with something."

