

Death Valley

Where Rocks Go Wandering





78 At 282 feet below sea level, Badwater Basin is North America's lowest point. When it floods, the shallow pools evaporate quickly, leaving polygons of mud encrusted with shimmering salts.



80 West of Salt Creek, raging streams have carved shallow canyons into sediments laid down in former lakes over five million years. Iron oxides in the deposits paint the landscape in varied hues.

By Tim Cahill • Photographs by Michael Melford

Imagine the sight of Death Valley National Park is something akin to scientific pornography for hard-rock geologists. There are the obvious soaring mountains and abysmal valleys, of course. But in most other places on Earth, the folding and buckling of rocks, the colliding of crustal plates, the shores of advancing and retreating lakes, the evidence of volcanic activity, the scrape of glaciers across rock, the subtle and not so subtle effects of erosion are covered over in grass or dirt, in snow or ice. The Earth is a modest mother, but Death Valley is, for the most part, naked.

It is also the only place on Earth where geology itself has made me laugh out loud. I am thinking specifically of an area in the northwest section of Death Valley called the Racetrack, where, inexplicably, rocks as big as microwave ovens go zipping across the desiccated mud for distances of more than half a mile. The evidence is all there: deep tracks in the surface, with a rock at the end. One concludes, reluctantly, that the rocks somehow traveled a couple of hundred yards, leaving a telltale trail behind. There are over 150 of these roving rocks. But no one has ever seen them move.

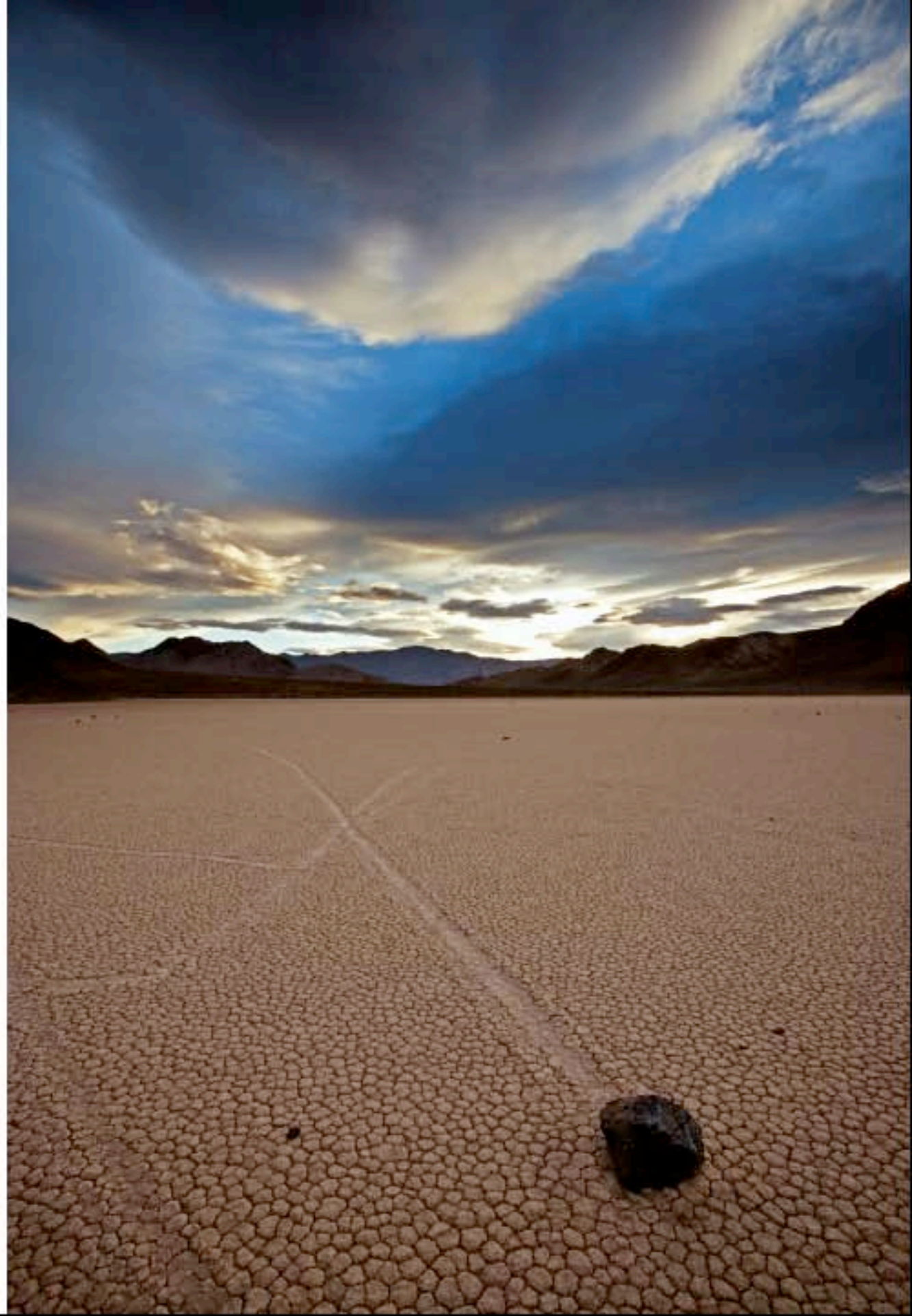
The Racetrack proper, about three miles long and a mile wide, is what is called a playa, a dry, smooth lake bed. The Racetrack is a mere two inches higher on the north end than the south. Flat as a pool table. The surface is sun-baked mud, hard as rock, and patterned in polygons the size of doughnuts. It is an otherworldly sight, and there is a sense on the playa

of post-apocalyptic silence, broken only by the whisper and wail of the wind. This impression is compounded by the Grandstand, a 73-foot-high island of rounded bedrock at the north end that looks like the summit of a mountain buried in a sea of sediment. One supposes that observers—rock-racing fans—might sit on the Grandstand, as at a horse race, and observe stones zooming toward them from the southern end of the playa.

I had plenty of time to contemplate the Grandstand. I'd driven 30 miles from Ubehebe Crater, and the gravel road proved to be less brutal than expected, so I arrived at the Racetrack in the early afternoon. The best time to see the rock raceways is around dawn or dusk, when the slanting rays of the sun show the tracks to their best advantage.

To pass the time, I climbed to a ridge off nearby Ubehebe Peak for one of the most spectacular views in the park. On this February day,

When the playa called the Racetrack gets wet, rocks of up to 700 pounds are believed to catch a wind and skim across like pucks on ice. No one's seen it happen, but tracks tell the tale.



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the temperature stood in the low 70s and made for pleasant climbing. When I reached the ridge, the slope dropped off like a cliff to the west, where I could see the sands and salt pans of the Saline Valley 4,000 feet below. Farther west, just out of the park, were the Inyo Mountains, in the Inyo Mountains Wilderness, capped with snow and rising to 11,000 feet. They were beginning to cast their shadows into the Saline Valley. Beyond the wilderness, the Sierra Nevada, all snow from my perspective, towered over the Inyos.

And that is one definition of Death Valley: It is a land of intense vertical relief. This is true of most of southeastern California, a region torn by earthquakes, once flooded with vast inland seas, and eroded by wind and rain. Nevertheless, it is primarily rising mountains and falling valley floors that create the astonishing counterpoint of land that lies hundreds of feet below sea level guarded by peaks rising two miles above. Slow tectonic torture corrugates the landscape as two massive crustal plates meet and slide past each other under California: the Pacific and North American plates. The ridge on Ubehebe Peak was a good place to contemplate this ongoing process.

When I turned around, to the east, I was looking directly down onto the Racetrack and the Grandstand. In the desolate wind on the exposed ridge, the Grandstand rocks looked like the very tips of buried buildings, like an undiscovered city swallowed up in silt, like alien and interred skyscrapers.

At the far edge of the Racetrack a multigenerational Japanese family walking on the playa

looked as if they were skating across an ice rink. Soon enough, I was walking on the flat, feeling a mild sense of vertigo, a bit of dizziness that suggested I might just fall off. How? Where? I don't know, but try talking sense to your inner ear.

At the south end of the Racetrack, where the playa abuts an 850-foot-high mountain face, rocks had tumbled from elevation out onto the playa. Some were the size of softballs, others suitcases. These rocks did not gather any moss. They were movers. Robert Sharp and Allen Glazner, in their book *Geology Underfoot in Death Valley and Owens Valley*, explain the process. The playa receives three to four inches of rain a year during winter storms and summer cloudbursts. Parts of the Racetrack flood. Fine, intensely slippery clay settles, and the winds, which may reach 90 miles an hour, must overcome the forces of friction for the rocks to break free. Once that happens, it takes only about half the wind power to keep the rocks moving.

There were levees a fraction of an inch high on either side of the tracks, and mud had piled up in front of the rocks. Looking at it all, I had no doubt that the rocks had sailed before the wind.

Some rocks made straight paths, some curved. Some traveled a hundred yards in one direction, stopped in a muddy muddle, apparently thought better of their direction, and made a 180-degree turn to ramble off in another direction. Some trails were wide for a while, narrow, then wide again. Occasionally, half a dozen rocks took off at once from the base of the mountain and seemed to race straight toward the Grandstand like horses at the derby. The tracks often crossed one another. I followed dozens of them, and when I found the rocks at the terminuses of the tracks, they seemed almost sentient. Why this made me laugh, I cannot say.

Robert Sharp and (Continued on page 90)



A Place of Extremes

At 3.4 million acres it's the biggest national park outside Alaska and has the most scorching temperatures (up to 134°F). Mountains to the west keep it arid: Precipitation reaches barely two inches a year and dries up in a flash.

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86 Thrust up, twisted, and eroded, the Amargosa (foreground) and Panamint Ranges have been pulling apart for millions of years. Death Valley formed as the land between them dropped.



88 Swept across Mesquite Flat by howling gusts, grains of sand skitter up the windward sides of hundred-foot-tall dunes and plummet down their back slopes, driving a slow march of sand.

(Continued from page 84) Dwight Carey studied the rocks starting in 1968, concentrating on 30. The geologists put an erasable letter on each and, charmingly, gave the stones women's names: Hortense (R) moved 820 feet in one winter. Karen (J), a 700-pound rock at the end of a 570-foot-long track, didn't move at all during their seven-year study and disappeared years later. Karen showed up again in 1996, when Paula Messina, a geologist at San José State University who had been mapping the paths of all the sliders on the Racetrack, found her far north of where Sharp had last seen her. "When I told him I had positively identified several of his original rocks, his reaction was a little like one would expect from a man who was just told I found his children."

Geology Underfoot was helpful in deciphering some of the tracks. Most rocks that sailed a straight course would have protruding lumps on the bottom, and you could see those striations in the track itself. Essentially, they'd been sailing with a keel. Perfectly smooth stones, without keels, might curl about in a graceful arc. Tracks might be wide where a rectangular stone sailed sideways against the wind, and they might narrow if the stone turned lengthwise.

It was getting dark on the Racetrack, and I walked back to the car, about half a mile away. A Park Service sign near the car read: "Please do not remove the rocks; they become essentially meaningless when moved out of place."

I'd walked across Death Valley a quarter of a century ago. At the time, it seemed like a good idea: Walk from the lowest spot in the United States—Badwater Basin, in Death Valley, 282 feet below sea level—to the highest point in the contiguous states, Mount Whitney, 14,494 feet high and just less than a hundred miles away. It was summer, and my partner and I started off in the cool of the night. We would run into problems we had anticipated but not appreciated.

The valley is young. It was created by about two million years ago when the land between separating mountain ranges dropped along faults. The mountains, including Telescope Peak,

at 11,049 feet the highest in the park, which loomed over us in the moonlight, catch what moisture reaches them. The water runs down steep slopes, causing erosion and mudflows, building alluvial fans, and eventually finding the lowest spot, as water will do.

The valley wants to be a lake, but the heat and constant winds cause water to evaporate and leave behind a residue of minerals, mostly salts. The ground temperatures can rise to 200 degrees Fahrenheit, and the earth itself is baked hard and flat, like concrete. But out toward the center of the valley, the would-be lake asserts itself. It is covered in only a very thin layer of minerals that would not hold my weight. I crunched through to lukewarm water and mud, sinking up to my calves, then my knees. It was like walking on crusted snow: With each step, you think the crust will hold, but when you put your full weight on it, you crash through. It was hard, sweaty work, postholing through the salty bog located in the lowest place in North America.

Worse, my mind was occupied with tall tales told by prospectors and desert rats. It was said that a team of horses or a man may have been swallowed up by the bog, never to be seen again. One fellow said he'd found a dead man, buried to the neck. "He was a Swede with yellow hair," the man said, "and he died staring at the sun. He sank standing up."

The stories are surely apocryphal, but the bog on that hot moonlit night seemed endless, and I kept thinking of the scalded and surely spurious Swede, staring at the sun.

"You want to go ahead?" I asked my partner.

"Shut up and walk," he said.

And so we did, eventually summiting Mount Whitney, which was a walk up. If we'd gone in the winter, it would have been a technical mountaineering expedition, which is why we walked across Death Valley in the summer.

At which time, according to Christopher C. Burt in his book *Extreme Weather*, Death Valley is "far and away the hottest location in North America." The valley's absolute maximum temperature of 134°F is the highest ever recorded in the Western Hemisphere and second only to

Joshua trees often grow with four and five and even six arms, their branches festooned with green, bayonet-like leaves.



A sparse stand of Joshua trees qualifies as a forest on Death Valley's western edge, where a dust storm turns day to twilight. With little water to share, the trees keep their distance. That they should grow here seems a wonder, but at 5,571 feet, Lee Flat is far cooler than the valley floor. Moisture from rain and snow lasts long enough to trickle down to thirsty roots.

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What looks like a walrus's grizzled face is actually a lesson in the limits of persistence. As wind scours away surrounding ground, only sandy hummocks anchored by the stubborn roots of arrowweed plants remain. It's an eerie landscape: the Devils Comfield. Eventually, winds can carry away so much dirt and moisture that the arrowweed withers and dies (foreground).

a reading of 136°F measured in Al Aziziyah, Libya. Because of the high July temperatures, however, Burt is willing to say that Death Valley is "perhaps the hottest place on the planet."

So my stroll across the valley wasn't as pleasant as it might have been in, say, February. The hot mud clung to my boots, and as the sun rose and the temperature approached 120°F, the boots baked themselves into odd punishing shapes. But the slopes of the Panamint Range were a revelation. I limped through labyrinthine canyons that gave way to mazes of strange, spooky rocks of the type Westerners call hoodoos. On the upper slopes, there were green trees and small streams, even a waterfall. That kind of contrast in less than 24 hours of walking excited a wonderment in me. I wanted to go back and explore Death Valley when it was relatively cool, and that took 25 years.

There is no sign for Darwin Falls on the highway—you have to make the turnoff before you'll see a sign. This is because the Park Service hides signs for certain attractions. I think this is a good idea. But no one wants to miss Darwin Falls, which features an 18-foot plunge into a shallow pool surrounded by maidenhair fern, impossibly green under beige sun-scorched cliffs. The mist from the falls cools the air to, I'd say, ten degrees lower than the open desert, and there is watercress at the pool. The water itself feels cool.

Even in February, with temperatures in the low 70s—and low 60s near the pool—it is tempting to take a quick dip in the water, but this is the drinking supply for a nearby resort, and swimming is highly impolite. Also, in the post-9/11 world, messing with someone's water supply is not a good idea: The ill-mannered swimmer could be charged with terrorism.

From the falls, I drove several thousand feet up into the mountains on Highway 190, making for the Saline Valley turnoff. The pass took me to a forest of Joshua trees. They are widely spaced plants, and they often grow with four and five and even six arms, their branches festooned with green, bayonet-like leaves, reaching to the

sun. Legend has it that Mormon pioneers saw in them a resemblance to the biblical Joshua raising his arms to heaven or brandishing his spear.

After the sun had set on the trees of Lee Flat, the western sky had that bruised, purple look of things to come, and I set up a tent and laid out a sleeping bag.

Dawn. And yes, as hoped, it was snowing lightly on the Joshua trees. I wandered about in the forest, as wet snow accumulated on the green of the growing leaves, on the autumnal brown of the dead vegetation nearest the trunks of the trees. Joshua trees are signature plants of the Mojave Desert, and the concept of desert flora in the snow contained within it a quiet thrill. I was alone, and I owned this view. And just as I began feeling especially blessed, the rising sun turned the snow into a cold, bitter rain. No matter: I'd had my half hour of beatitude.

At Telescope Peak trailhead, 8,133 feet up, I prepared myself for the nearly 3,000-foot climb to the summit. Happily, I was stopped by snow almost immediately. From that point, I plunged down various roads, making my way north to the Eureka Dunes, which are up to 700 feet high. They make groaning sounds as rounded sand grains slide down their steep slopes, playing them as a musical instrument.

Later, I hiked many of the canyons—one of the great pleasures of trekking Death Valley. Sinuous, shady walls make for cool walking in Fall Canyon, where rocks were laid down in light and dark layers. In places, these layers arched like an angry cat and eventually fell over on themselves, so that the striations looped over and under even as they rose into another peak that likewise collapsed. It is plain to see: The bandings, like the rocks in the Racetrack, have definitely moved. At this spot, on a looming canyon wall, geology itself appeared to be in a state of agitated frustration. This wall of naked rock, exposed for all to see, seemed to be blushing crimson in the light of the setting sun.

➤ **Death Valley Lowdown** Take a tour and see more of Michael Melford's photographs in an interactive map at ngm.com.

