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# DIRT SIFTINGS

Michael Engelhard

**BORN FROM A NORSE WORD FOR EXCREMENT**, dirt teems with negative connotations: “dirt-poor,” “dirty work,” “dirty jokes,” “getting the dirt on somebody,” and the related “muckraker” and “mudlark.” (Among river runners and desert rats, however, “dirt bag” is an honorific.) Dirt is ambivalent.

As a catchall, it contains multitudes: sand, clay, loess, sediment, volcanic ash, minerals, molds, plant debris, and—yes—excrement. It shelters animal life also: worms, insects, rodents, reptiles, amphibians, burrowing owls, bears, and badgers. You can measure and rate biodiversity by sampling soil from different locations and taking a headcount. For the original inhabitants of the Colorado Plateau—human and non-human—dirt has been home, wealth, medicine, and the stuff of creation.

Playing in the dirt not only helps children to literally bond with the earth. According to recent research, exposure to dirt may boost mood, along with the immune system, even in adults. (A friendly soil bacterium, *Mycobacterium vaccae*, has been linked to increased serotonin production in mice.)

In canyon country, dirt is ubiquitous, from dirt roads to dust devils, from cracked hardpan to turbid rivers. Often wind- or waterborne, it runs the gamut from tan to brick red. It clings to your hair, food, and notebooks. It clogs zippers, camp stoves, and nostrils. You wear it like makeup or camouflage. It tints creeks and bushes, your vision, your very soul. It forms red squalls and deepens the color of sunsets. The smell of rain pocking red dirt—wet wool with hints of juniper and sage—uniquely signifies place.

As pervasive as it is, dirt also holds absences, from animal tracks to the chasm of Grand Canyon—grist from erosion’s mill swept to the Gulf or piled against dams. (In pre-dam times, the Colorado hauled more than half a million tons of silt and sediment per day past Bright Angel Point.) Arroyos cut into fluvial terraces testify to the dustbowl years that broke pre-Columbian cultures. Mudstone and shale keep tactile evidence of fossil dirt: the washboard ripples of ancient shallows. In geological and archaeological layers, dirt preserves a record of place that reaches back without rupture over hundreds of millions of years. It is easy to wax downright philosophical about dirt. We are stardust, dust in the wind. Ashes to ashes; dust to dust. We are dirt.

The following vignettes sift through both the minute and magnificent, to honor the residue of the eons.

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hair, food, and  
notebooks. It  
clogs zippers,  
camp stoves, and  
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You wear it  
like makeup or  
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FACING: Elves Chasm flood,  
Grand Canyon National Park,  
AZ. Photo by Michael Collier.





# LOST AND FOUND

Where *Did* All That Dirt Go?

~ or ~

*Conspicuous* by Its Absence

Wayne Ranney

**I'VE BEEN ASKED A CERTAIN QUESTION** so many times I can often foretell its delivery, having been asked it on guided walks along the edge of Bryce Canyon, or perhaps from the seat of a Jeep on the floor of Canyon de Chelly. It may be uttered when climbing a trail such as Angel's Landing in Zion, or perhaps while floating on the Green or Colorado rivers deep in the heart of Canyonlands National Park. The Grand Canyon is the one place where this question is expressed most often since its immense size almost compels the thought. But it seems that whenever a canyon in the Southwest is seen and the initial exhilaration of its beauty is grasped, a recurring question is often asked: "Where did all that dirt go?"

As a geologist I am privy to the answer and I love knowing that I can respond in a meaningful way. But I also cannot help but pretend, if only for a moment, that I don't know the answer and then I can pause and wonder for myself, where did all of that dirt go? In this silly little exercise, I am amazed and enchanted all over again as I try to comprehend how so much earth has been removed. The simplest answer to this question is that it has gone downstream in the bed of any canyon bottom. Sometimes however, that is not a good enough answer since the question seems to linger with its larger implication of where all that dirt might be right now. Of all the questions I could be asked about canyons, this is the one I enjoy getting the most because the answer explains a great deal about the geology of the Colorado Plateau.

This particular question refers back to a geologic conundrum that was articulated by the first geologist who happened upon the Grand Canyon in April 1858. John Strong Newberry was the first person with scientific training to view the canyon and contemplate its immense size. While it might seem elementary today to reflect what might have caused such a huge gash in the face of the earth, remember that very few people had studied geology in those days or had encountered such a shredded landscape, so grand and deeply carved. Newberry surely must have wondered himself if a giant fissure had been ripped open here, causing the great Colorado River to redirect its flow only after the cut was formed. Perhaps he wondered if a fault had wrenched the earth open here—his fellow companions were untrained in geologic principles and might well have suggested such a thing to him.

All we see,  
experience, and  
touch has been  
something else in  
a former time  
and nowhere is  
this more evident  
than in the rocks  
that grace this  
lovely planet.

FACING: Waterpocket Fold,  
Capitol Reef National Park, UT.  
Photo by Michael Collier.





# ACROSS THE DIVIDE

Ann Euston



**THAT BACK-EAST WORLD** where I grew up was a jungle of deciduous green—vines, shrubs, crabgrass, trees. Mats of fallen leaves blanketed woodland floors; wild blackberries draped indiscriminately over hidden shrubs. Ivy climbed up middle-class brick homes, covering their windows. It was almost too much bright green photosynthesis to bear.

But I didn't realize that until we first arrived in northern New Mexico in the fall of 1981. I was thunderstruck. There it was—the ground—just dirt and rocks. I could actually see what I was standing on. Unabashed, unadorned, the very planet itself leaped up at me. This was the landscape I recognized immediately as what I had always sought without knowing I had been looking for it.

I named it *home*.

I delighted in living in my flat-roofed mud-covered house, its earth-tone pinky brown hue blending into the juniper-studded hillside. I walked down a dirt lane, edged by high adobe walls, organic, sensuous, off-plumb and inset with occasional small mysterious turquoise doors and high rough-framed pane-less windows.

Coyote fences sagged from decades of use. On an old track I saw a bobcat, a tarantula, a rattlesnake. All without moving an inch.

We lived beyond pavement. Dun clouds rose up when anyone drove past. I could write my name on tabletops covered in thick dust. During windy spring, taupe silt crescents accumulated in corners. Back east (where dirt must have gotten its bad name) indoor dust bunnies would quickly clump into dampish dirt mice, undesirables lurking beneath beds. Out here, all that dry dirt—somehow it was clean. I decided to put dusting aside. Why bother anyway in a house made of earthen bricks?

We traveled widely. We saw arches, hiked hogbacks, explored smooth sandstone-walled canyons, climbed Angel's Landing, camped in dusty, rock-rimmed canyons, piñon/juniper and ponderosa forests. We saw a golden eagle grounded by the side of the road, too heavy from his lunch of jackrabbit to lift off. On a trip in Hovenweep country we stopped on a dirt roadside to join others looking west up a hill. A herd of horses appeared, controlled by five wranglers. In a thunder of dirt and dust all of them, cowboys and horses,

Cowboys and horses near Pleasant View, CO. Photo by Stan Euston.

FACING: Monument Valley through Teardrop Arch, AZ/UT. Photo by Kerrick James.





# DUST

Hannah Holmes

## PICTURE A JUICE GLASS SITTING ON A PORCH RAILING IN THE SUNSHINE.

It may look empty, but churning inside that glass are 25,000 microscopic pieces of dust—at least. And these dusts are a little bit of everything on Earth. One minute they're tiny crumbs chipped off Saharan sand and invisible shreds of camel hair. Then the wind shifts, and you are surrounded by spores of forest fungi and fragments of desiccated violets. A bus stops nearby to take on passengers, and flakes of human skin mixed with minuscule specks of black soot momentarily dominate.

Every time you inhale, thousands upon thousands of motes swirl into your body. Some lodge in the maze of your nose. Some stick to your throat. Others find sanctuary deep in your lungs. By the time you have read this far, you may have inhaled 150,000 of these worldly specks—if you live in one of the cleanest corners of the planet. If you live in a grubbier region, you've probably just inhaled more than a million.

Although these dusts have been waved aside for most of human history, dust is terrifically consequential. Some dusts menace the planet and its living residents. Some are beneficial to people, plants, and animals. Many are merely fascinating. All are going under the microscope. And the secret lives of dust are being revealed.

One of the most impressive revelations is how much dust surrounds us—the sheer tonnage of stuff rising off the face of the Earth. Because these specks are so small and shifty, the estimates are still rough. Nonetheless, irrefutably huge amounts of small things take to the wind each year.

Between 1 and 3 billion tons of desert dust fly up into the sky annually. One billion tons would fill 14 million boxcars in a train that would wrap six times around the Earth's equator.

Three and a half billion tons of salt flecks rise off the oceans.

Trees and other plants exhale a billion tons of organic chemicals into the wind, perhaps one-third of which condenses into tiny, sailing beads.

Plankton, volcanoes, and swamps leak 20 to 30 million tons of sulfur compounds, about half of which forms little airborne specks.

Burning trees and grasses throw up 6 million tons of black soot.

The world's glaciers slowly grind their host mountains into dust that takes to the wind—but in what quantities? No one knows.

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FACING: A hiker on the Navajo Loop Trail amid fog and the dust of debris from recent flooding, Bryce Canyon National Park, UT. Photo by Laurence Parent.





# THE STUFF WE'RE MADE OF

Kimbel Westerson

**I INSIST ON A WINDOW SEAT WHEN I FLY**, fascinated with the landscape below revealed from 30,000 feet. The Midwest, my original home, looks like a quilt, its squares green, brown, gold, and black soil that is sediment, the circumstantial evidence of a prehistoric lake. Heading west, past the point where rainfall diminishes and the land is range rather than prairie, past the 100th Meridian into the West, landscape gives way from square fields, some with round green centers, the product of center point irrigation, to muted desert landscape. From above, the Colorado Plateau is a bleached surface veined with red, brown, and black spiny mountain ranges and incised canyons, its topography flattened by the perspective of altitude. This is the earth as abstract; a cracked rough plaster tile.

At ground level, those spines and vessels become familiar. Movie star Monument Valley, the maligned and admired Little Colorado River, the Grand Canyon, ghostly Book Cliffs, Black Canyon of the Gunnison, the Colorado that Powell navigated, writing of a “poverty of sky” as the canyons closed in. Loosely bound by scrunched up mountain ranges, the science of the Colorado Plateau is about faulting, volcanic activity, and erosion. But its place names are poetry—Uinta, Wasatch, San Juan, LaPlata. Within them, more poetry: Uncompahgre, Defiance, The Great Unconformity—the even more vivid Supercrack.

Focus in tighter, to a geological level. Look at land that has been formed and reformed, torn, twisted, and contorted. This rock reveals fossilized shells, mammoth skeletons, pollen, showing that not only has the landscape profoundly changed, the climate has, too. Look past the calendar-quality mountain and canyon deserts to the materials that have arranged themselves to form them. In geological circles, the word dirt is not used—it’s too vague for science. (According to one geologist I spoke with, the word “dirt” might be used in reference to a bad research paper.) The real story here is one of sediment made of eroded materials, periods of deposition and re-deposition over millions of years.

Trace the Grand Staircase of the western plateau from the bottom of the Grand Canyon all the way to Bryce Canyon. Of course, all 15,000 feet of that layer can’t be seen at the same time in any one place over those hundred-odd miles. But underfoot and overhead along the way, a large chunk of the geologic history unfolds. In the gorge at the deepest point of the Grand Canyon is Vishnu Schist, dark basement rock from Earth’s crust. Rocks of a similar period show up around the plateau. The Black Canyon of the Gunnison, at the

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FACING: Dry Colorado River below  
Algodones, Mexico, near Yuma, AZ.  
Photo by Michael Collier.