RED ROCK
BLUE SKY

SURREAL LANDSCAPES OF THE DESERT SOUTHWEST

PHOTOGRAPHS
LINDE WAIDHOFER

AN ELECTRONIC PHOTO BOOK
FROM WESTERN EYE PRESS

2008

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RED ROCK, BLUE SKY

LINDE WAIDHOFER

Red rock blue sky
yellow earth torn clouds
frozen nights burning days
brave trees singing stones
black boulders white slabs
violet mesas purple buttes
windy clifftops sandy storms
dark canyons dark colors
black water dry creeks

sand congealing into stone
stone weathering into sand

RED ROCK, BLUE SKY

PHOTOGRAPHS
LINDE WAIDHOFER

TEXTS
LITO TEJADA-FLORES

WITH AN ESSAY BY
MICHAEL COLLIER

AN ELECTRONIC PHOTO BOOK FROM
WESTERN EYE PRESS

RED ROCK, BLUE SKY

Imagine a landscape out of a dream.
Dream a landscape out of time.
A landscape of marbled, striped, striated sandstone slabs,
sandstone seabeds, sandstone dunes,
waves and ripples of rock suspended in mid-millennia,
a million grains of sand dyed a thousand shades of rust red…

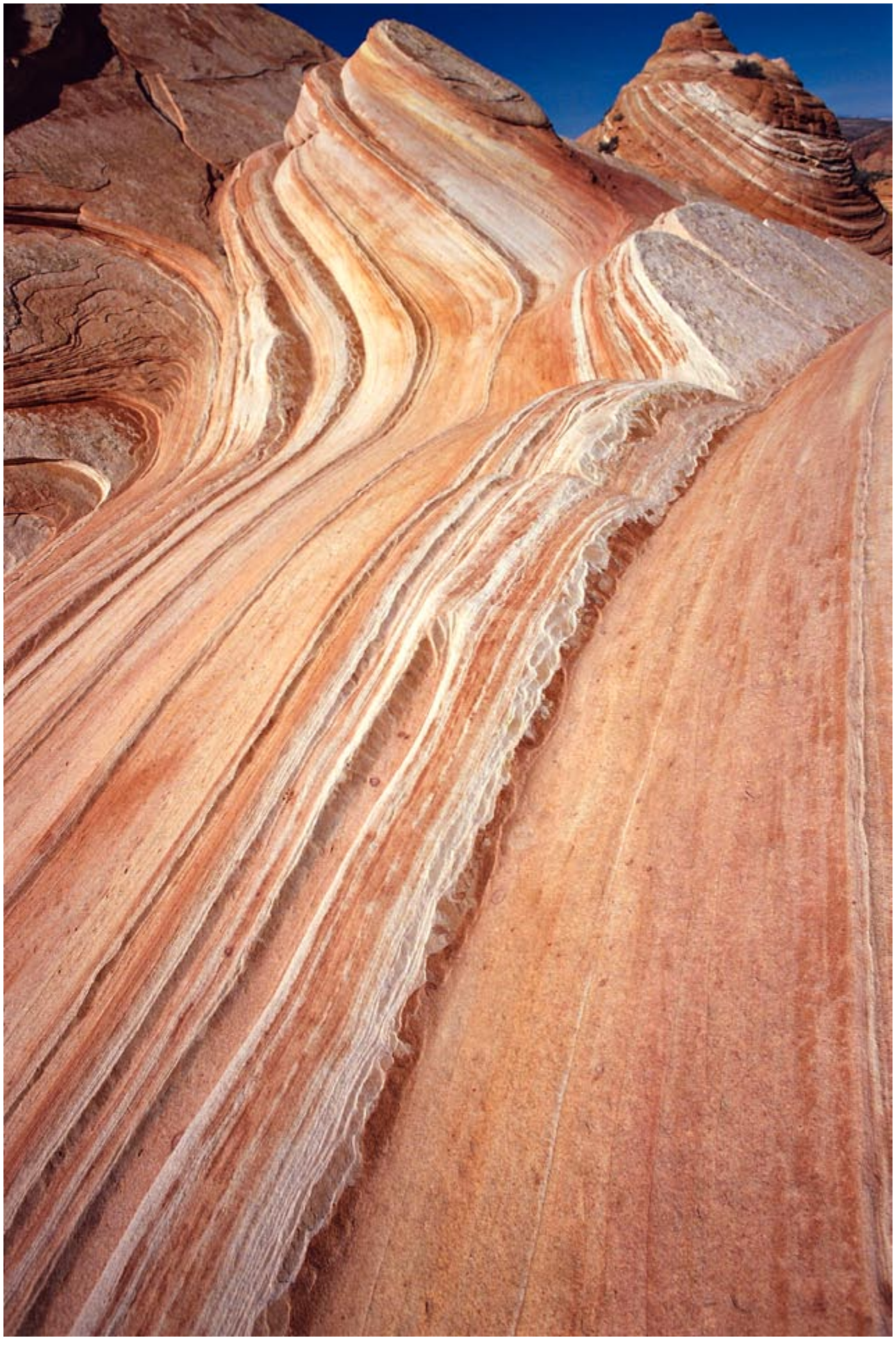
This is the magic backcountry of the Colorado plateau,
one of the last landscapes in America
with real secrets to hide…and reveal..
Too hot in summer, too cold in winter,
too dry to encourage casual aimless hiking,
too rugged and inaccessible
for anyone but a determined recluse
to explore in detail..
The back of the beyond
in back of the backcountry.

Visitors walk on tiptoe here
to avoid crushing paperlike edges of rock,
as delicate as coral, as thin as time.
Hikers feel they've wandered not just off their trail
but out of their century.
The dominant emotion here is awe,
the dominant mood mystery,
the dominant material age-old sandstone,
the dominant light harsh, direct, clear and uncompromising.
Red rock. Blue sky.

rock gardens of Navajo sandstone

Colorado Plateau

pages 5 – 15



MONUMENTS, SYMBOLS, SIGNS

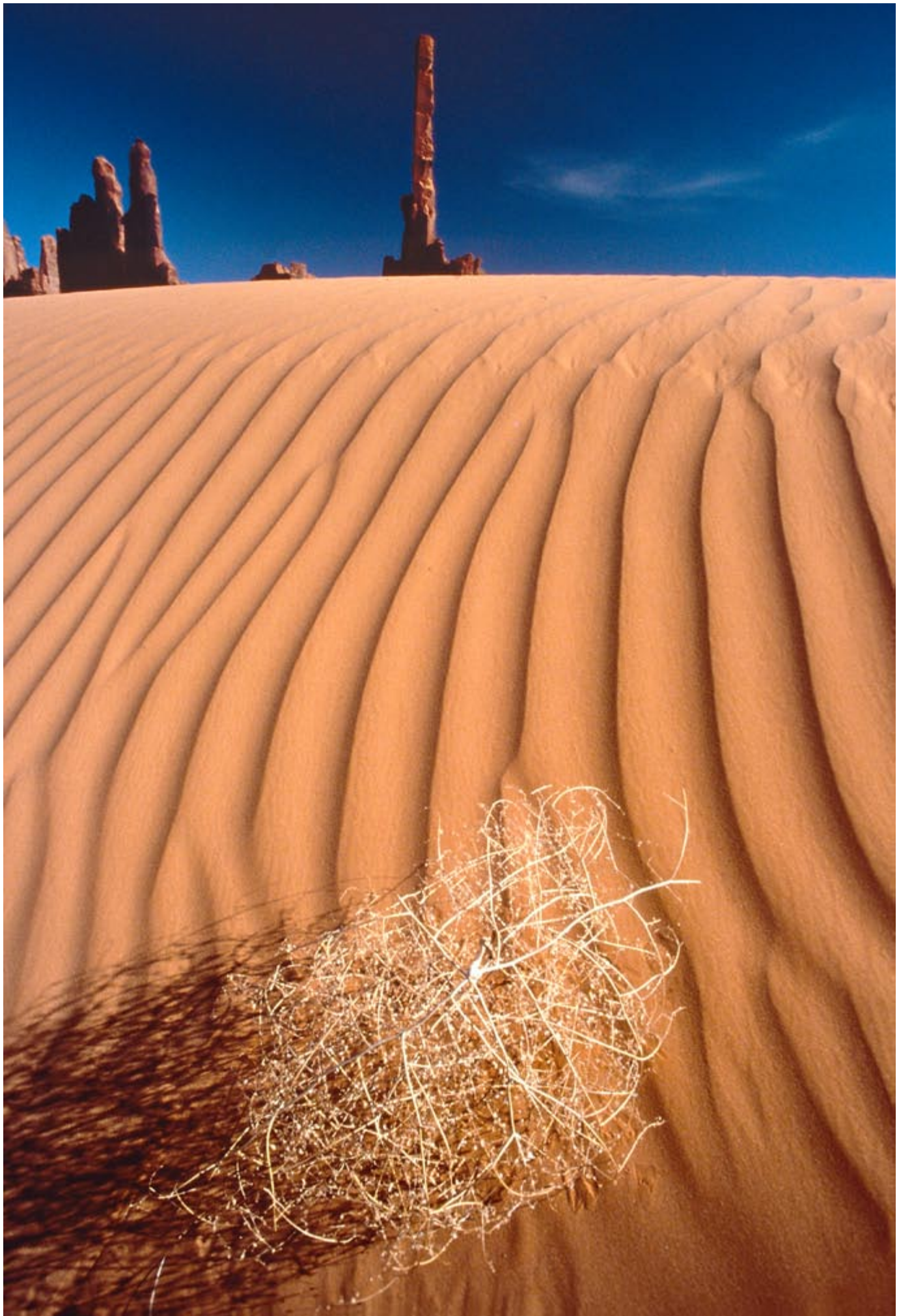
Signposts of the southwest
but perhaps a southwest that only existed on celluloid
the southwest of the silver screen
inhabited only by the Duke in a thousand disguises,
only by drugstore Indians, by gingham checked ranch wives
pretty enough for Hollywood which is where we found them.
But how ever did Hollywood find these stone symbols?
make these stones into such powerful symbols?
The monuments of Monument Valley,
scattered here across the top of the Navajo nation,
along the fictitious dotted line of the Arizona-Utah border.

The monuments of Monument Valley are so singular
that they've entered our collective consciousness
as real symbols of a not-always-real southwest.
This is the way buttes, mesas, sandstone spires
are supposed to look, supposed to be.
Just the way a good art director would design them.
A celluloid yardstick to measure the myth
of the quintessential southwestern landscape.

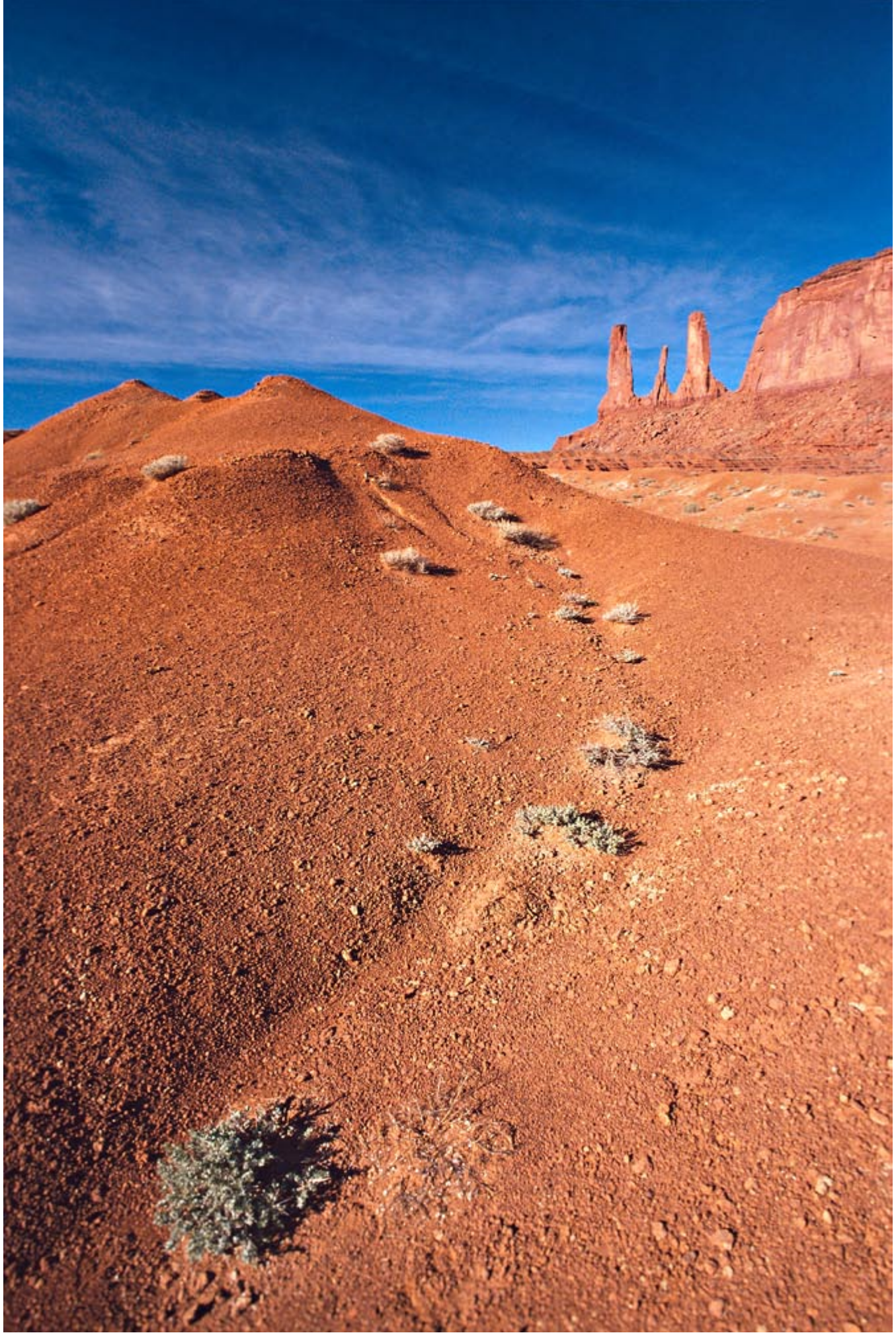
In fact, this is one place where the dream of the southwest
and the reality come together, overlap and merge.
Visiting Monument Valley we heave a sigh of relief:
It's real. Hollywood wasn't kidding.
we weren't duped.
Monument Valley is proof—did we ever really need it?—
that there's more to the southwest—did we ever doubt it?—
than Phoenix lawns, Scottsdale golf courses,
Albuquerque highrises and suburbs.
Visiting Monument Valley, for the first or hundredth time,
we understand that Hollywood didn't create these symbols
but only borrowed them,
that all images that pull us out into this landscape
repay such loans with interest.

Mitten Buttes at dawn, Monument Valley, Navajo Tribal Park,

Arizona/Utah



Tumbleweed below Totem Pole
& Yei Bi Chei rocks,
Monument Valley,
Navajo Tribal Park,
Arizona/Utah



Three Sisters,
Monument Valley,
Navajo Tribal Park,
Arizona/Utah

East and West Mittens and Merrick Butte, Monument Valley, Navajo Tribal Park,

Arizona/Utah

Monument Valley, Navajo Tribal Park,

Arizona/Utah

stock tank near
Monument Valley,
Navajo Tribal Park,
Arizona/Utah

Monument Valley, Navajo Tribal Park, Arizona/Utah

WHITE SAND, BLUE SKY

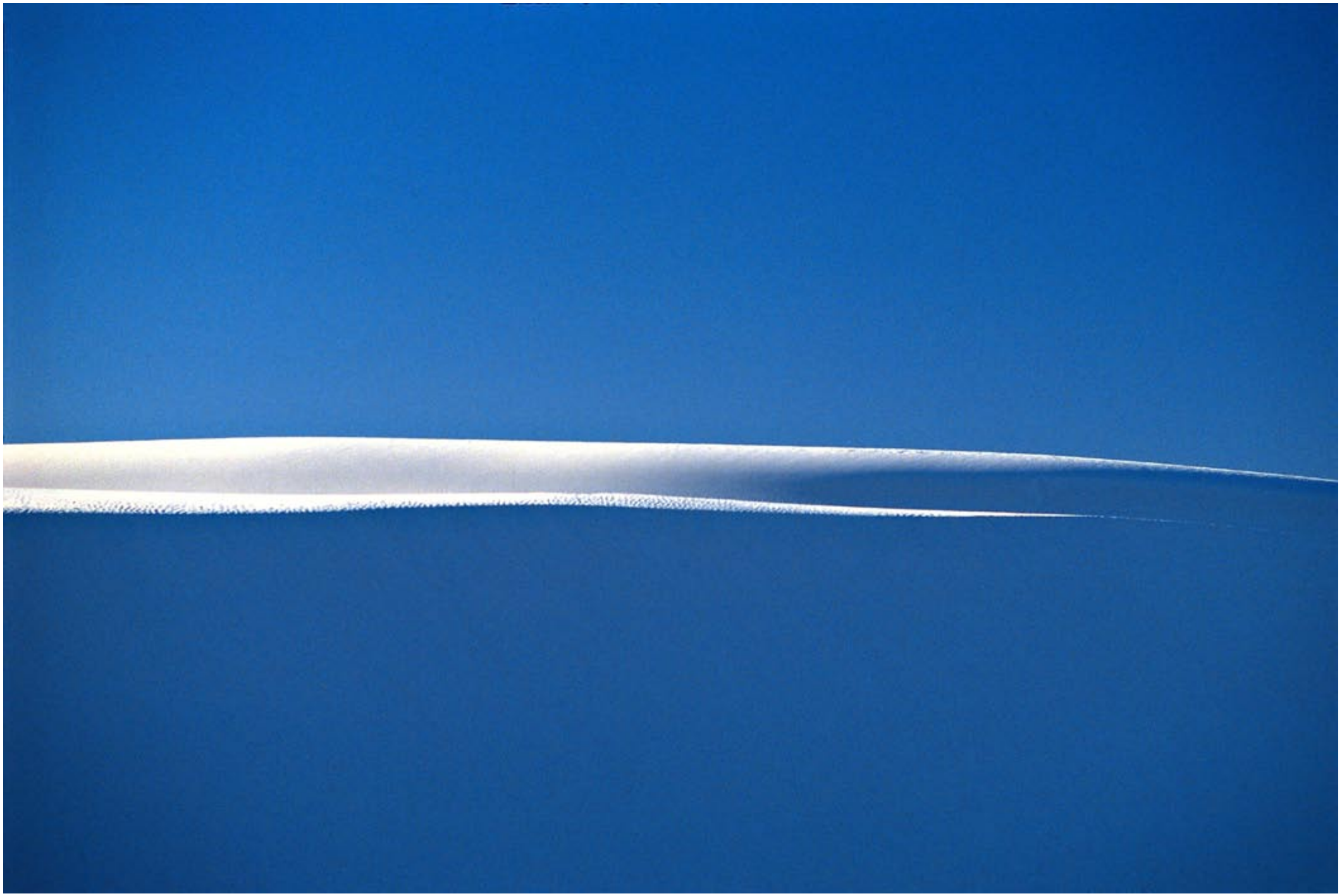
January silence uner an ice-cold sky.
A swell and heave of dunes, frozen in midwave,
rippling motionless to the horizon.
Our feet hurt. We've been walking for hours,
walked about as far out of context as two people can go
and still imagine themselves on the surface of a familiar planet.
We are lost somewhere along an uncertain interface of sand and sky.

The dunes in winter stretch like carbon copies of arctic drifts,
silica snow out of a dead lake bottom.
Bundled in down parkas, gloves, we're easily tricked,
have to remind ourselves again and again that this isn't the far north,
but a minimalist desertscape divided in threes: sky, sand and wind.
Wind is boss here, mastermind, master craftsman, shaper, eraser, sculptor.
We walk through these mirrors of sand and sky, concave and convex, white and blue,
as guests of the wind, intruders, like the tiny grasses, the spiky yucca,
surviving at the pleasure of the wind
that can bury them in the center of a new dune at any moment.
And often does.

The wind has constructed a speculative geometry
out of so much sand: catenary curves, parabolas,
delicate arcs defying, then inviting collapse, each grain poised to slip,
a million million grains stacked to an angle of repose
that only the wind can calculate.
Here in the heart of the dunes, gravity plays second fiddle to the wind,
tugging down small avalanches that the wind heals and repairs.

We sit on a crest of sand, watching a confrontation of sky and earth:
The winter sky slowly dying the dunes its own blue.
Pale dunes patiently leaching deep indigo out of the sky.
Painfully pure light refracting across a boundary
constantly rearranged by the wind.
White sand metamorphosing steadily into blue dunes.

We lose ourselves in the rippled sandskin of the dunes.
Behind our backs, the wind is softly at work
erasing the only tracks in this sea of sand,
our wobbly footprints leading back,
we think, to the twentieth century.



early evening, White Sands National Monument,

New Mexico

Yucca,

White Sands National Monument,

New Mexico

Indian Rice Grass,
White Sands
National Monument,
New Mexico

White Sands National Monument,

New Mexico

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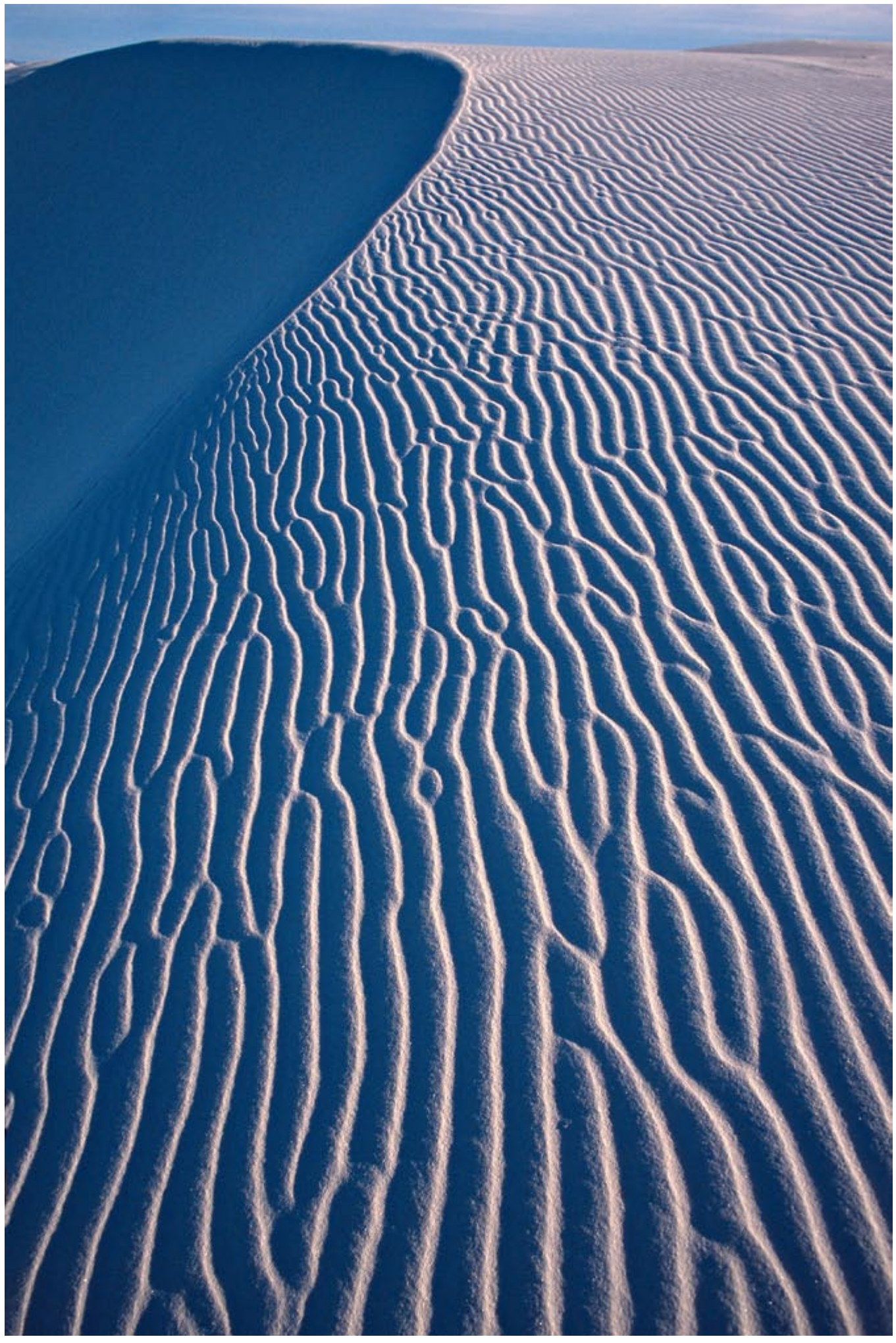
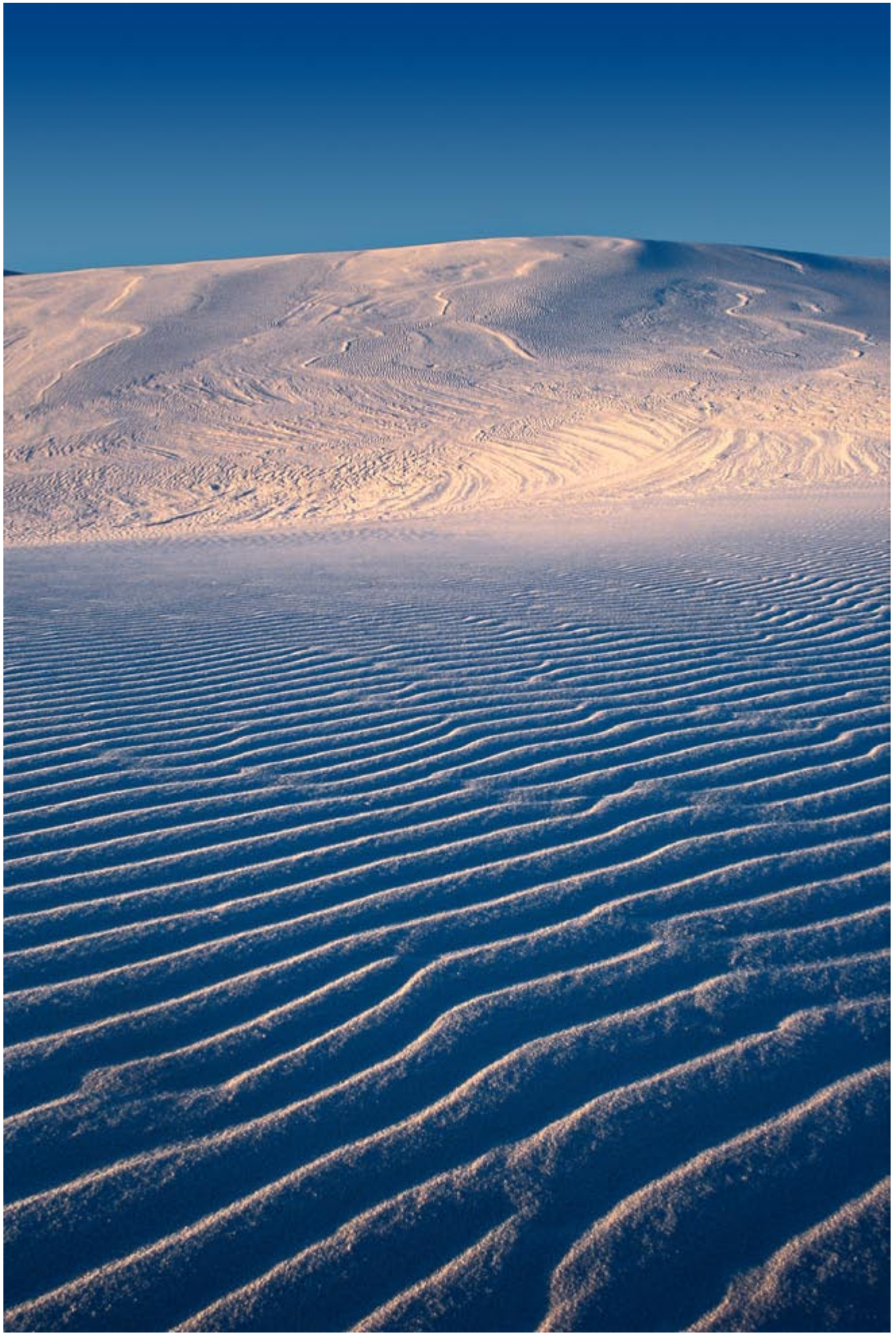
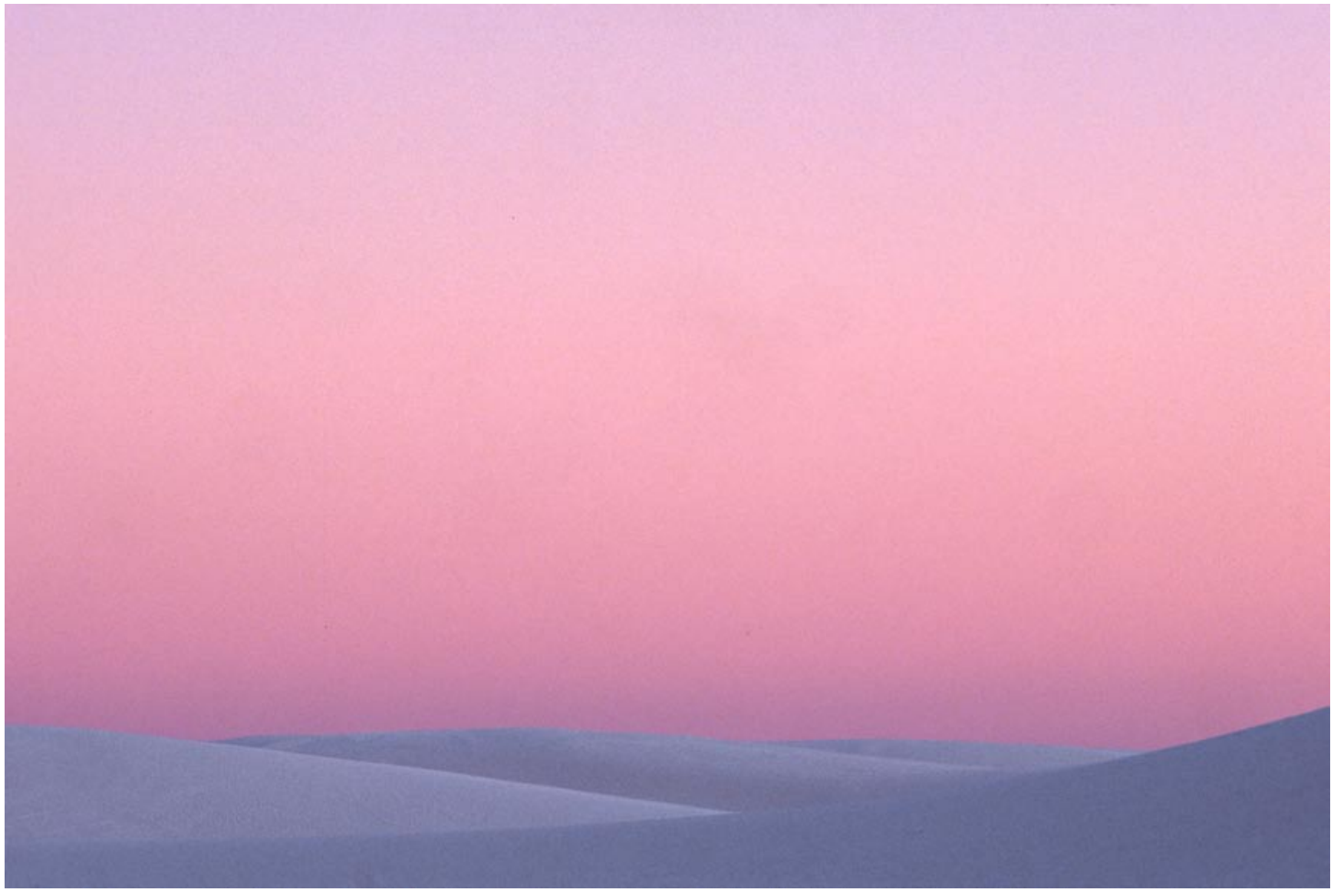




sunset in the dunes, White Sands National Monument,

New Mexico



pre-dawn in the dunes, White Sands National Monument, New Mexico

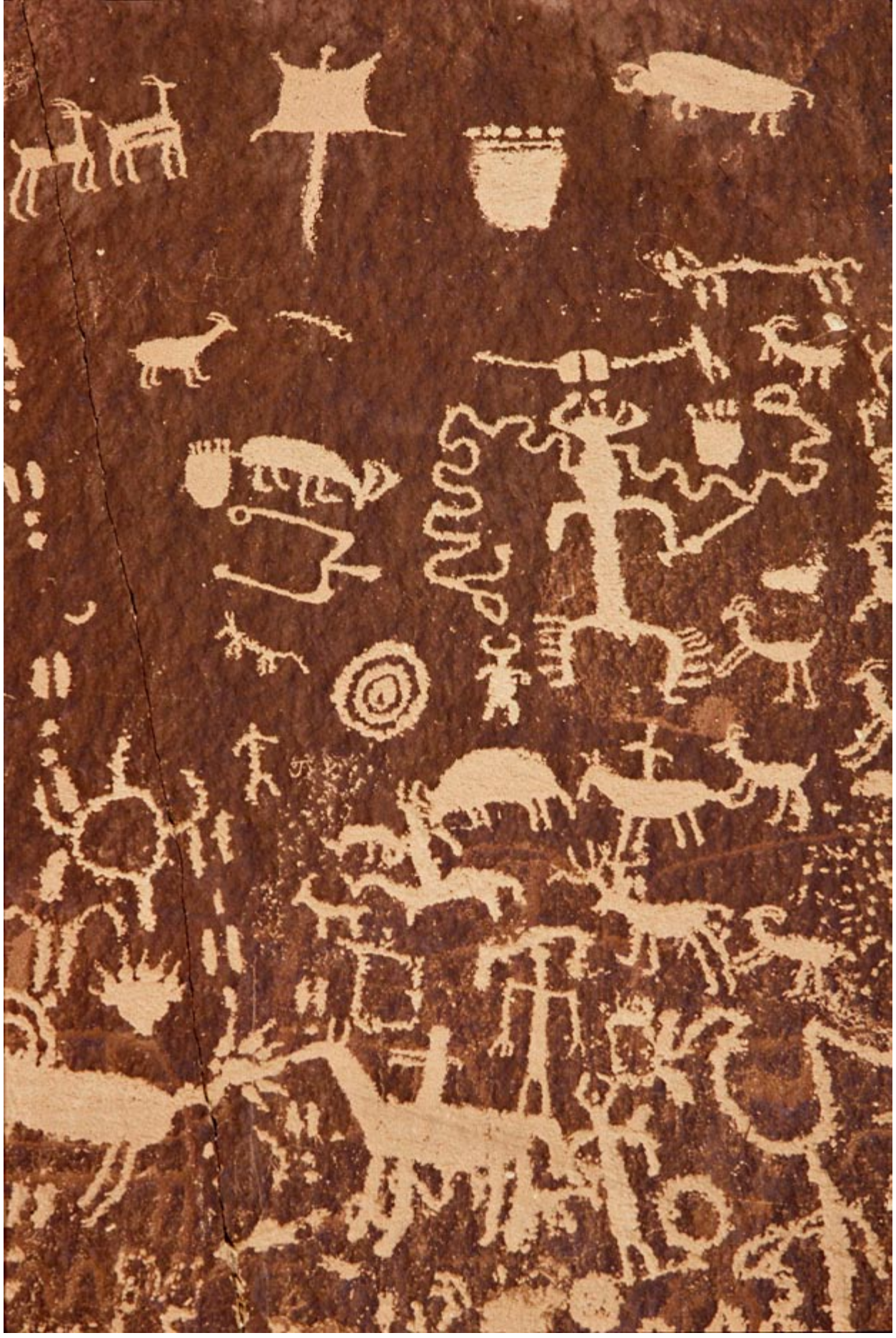
STONES & TIME

stacked by long-dead hands
into living, layered courses,
sightless window eyes staring from blind mesas,
over bone-dry arroyos where creeks almost never run,
doorways full of dust, winter snow
unswept, or only windswept.
Corn cobs and clay, rooms full of junk,
bright Anasazi graffiti all over the place
that any kid from the Bronx could read:
"Our turf. We were here first. Left in a hurry.
And all this stuff you've put into parks and monuments,
all this is just what we didn't think was worth taking
when we left..."

The ruins are silent,
send scholars away empty-handed,
suggest unconfirmable hypotheses.
Time is stonewalling us. No comment. No comment.

Protected by overhanging cliff-roofs
from rain that rarely falls,
these mortared memories still barely hold,
a dry powder of mud still binds masonry
so finely formed one can hardly believe
the builders ever covered it with adobe stucco.
They did.

Much here challenges belief.
Beliefs and manufactured myths.
Even the name, "Anasazi," ours not theirs,
our "ancient ones." Here we go again,
looking for poetry behind every potshard.
Only the walls are real, speak but not in tongues,
an eloquent language of early, urban form.
Any honest sculptor could tell us:
the walls are enough.



Newspaper Rock State Park, Utah

Pueblo del Arroyo ruin,

Chaco Canyon,

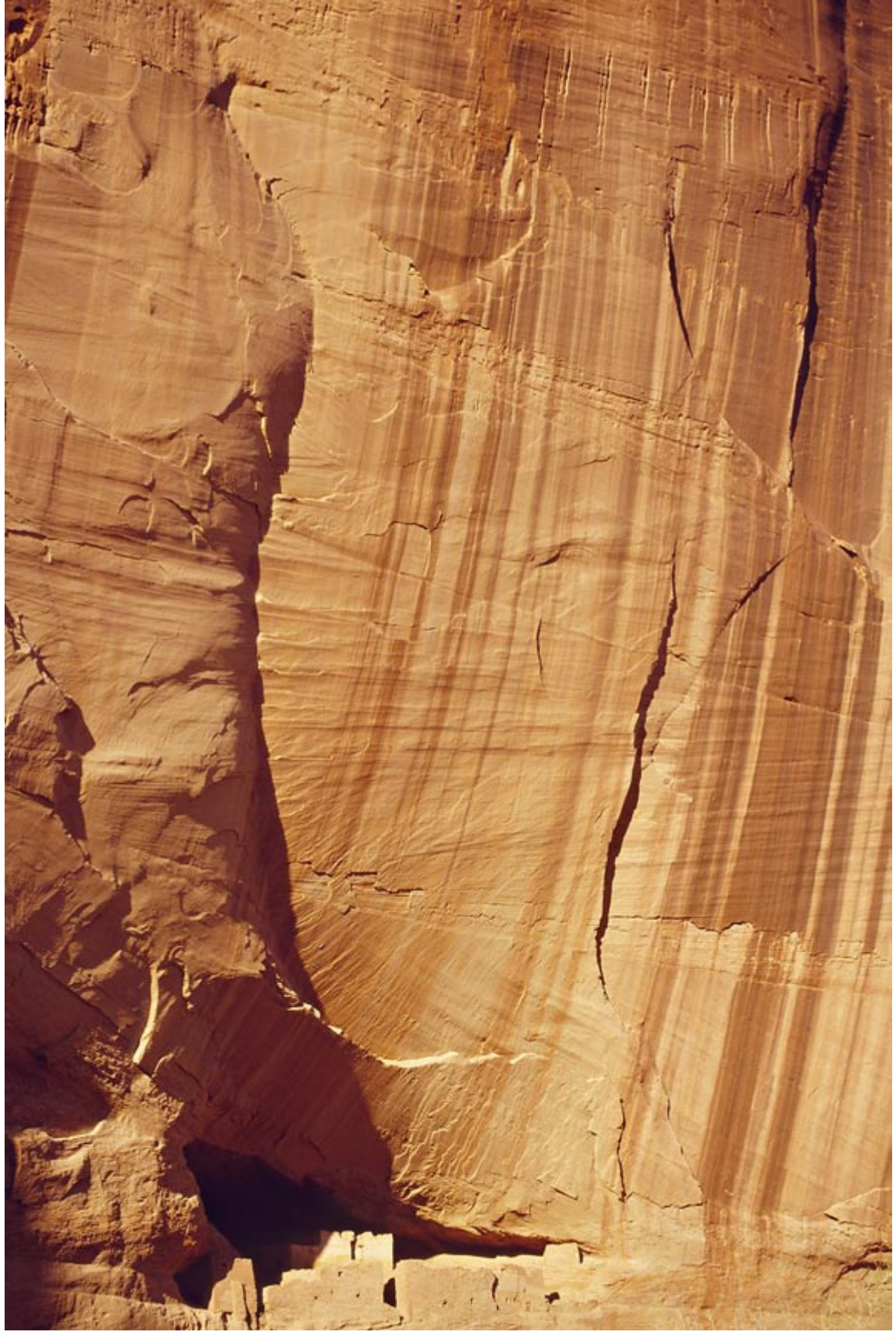
Chaco Culture Historical Park,

New Mexico

Pueblo del Arroyo ruin, Chaco Canyon,

Chaco Culture Historical Park,

New Mexico



White House ruin, Canyon de Chelly National Monument,

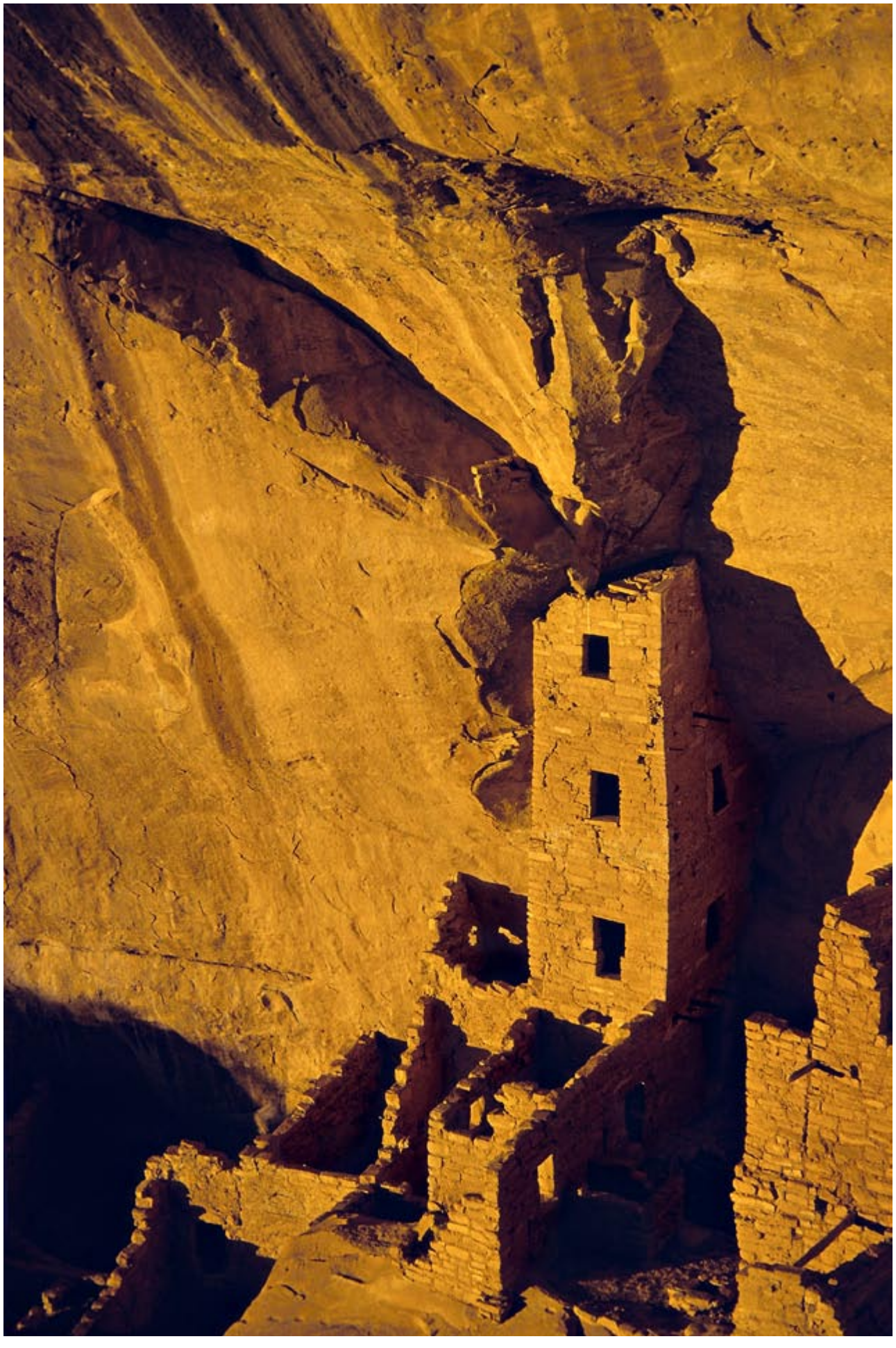
New Mexico

Cliff Palace ruin, Mesa Verde National Park,

Colorado

Five Faces pictographs, Canyonlands National Park,

Utah



Square Tower ruin,

Mesa Vedre

National Park,

Colorado

BELOW THE DESERT

light echoes off rock walls like sound.
Above the desert—
crows wheel and caw,
dark specs on the retina of the sun.
On the floor of the desert—
sundazed lizards run in circles,
lie panting on superheated slabs.

From above, from outside, this long dark fissure
looks more like an accident than a mystery,
perhaps the sun's midday hammer slipped,
hit brittle rock and broke it open,
split this chapped and sunburnt planetskin in two:
a shadowy crevasse in a glacier of slickrock slabs.
Outside, on top of the desert, summer says: back off!
100 degrees, 110, 115, still climbing.
The plateau bakes through the long high noon
of the longest days of the year
toward the deceitful promise of evening cool
that may come true in about three months.

But down here, inside, below the desert,
we're safe—
40 degrees cooler, 40 degrees stranger.
While Linde besieges certain corners, twists of rock,
with patience and a tripod, waiting for reflected light,
waiting for cool rock to go up in flames,
I wander on through this sinuous slot,
losing track of corners,
one hand on each wall,
sliding down polished chutes,
stemming up to higher ledges, balconies,
one foot on each wall,
mumbling questions that all start: how? and how come?...

Water did it—
water on a centuries-long, on-again, off-again rampage
grinding, scouring, carving, cutting
these wafer-thin slices deeper into the plateau.

I blink into the shadows of a hollow ledge;
motionless, an immense horned owl blinks back,
our face-off lasts a quick forever,
before he flaps off in slow motion
into the slow motion heat above.

Crows dive out of the sky-slit overhead,
They nest on ledges a rockclimber couldn't reach:
black shadows and their white droppings
breaking up this burned-earth light-and-shadow show,
staining the delicate contour lines of golden light.

The echo of their screeching pursues us
around blind corners,
here below the desert.

Antelope Canyon,

Arizona

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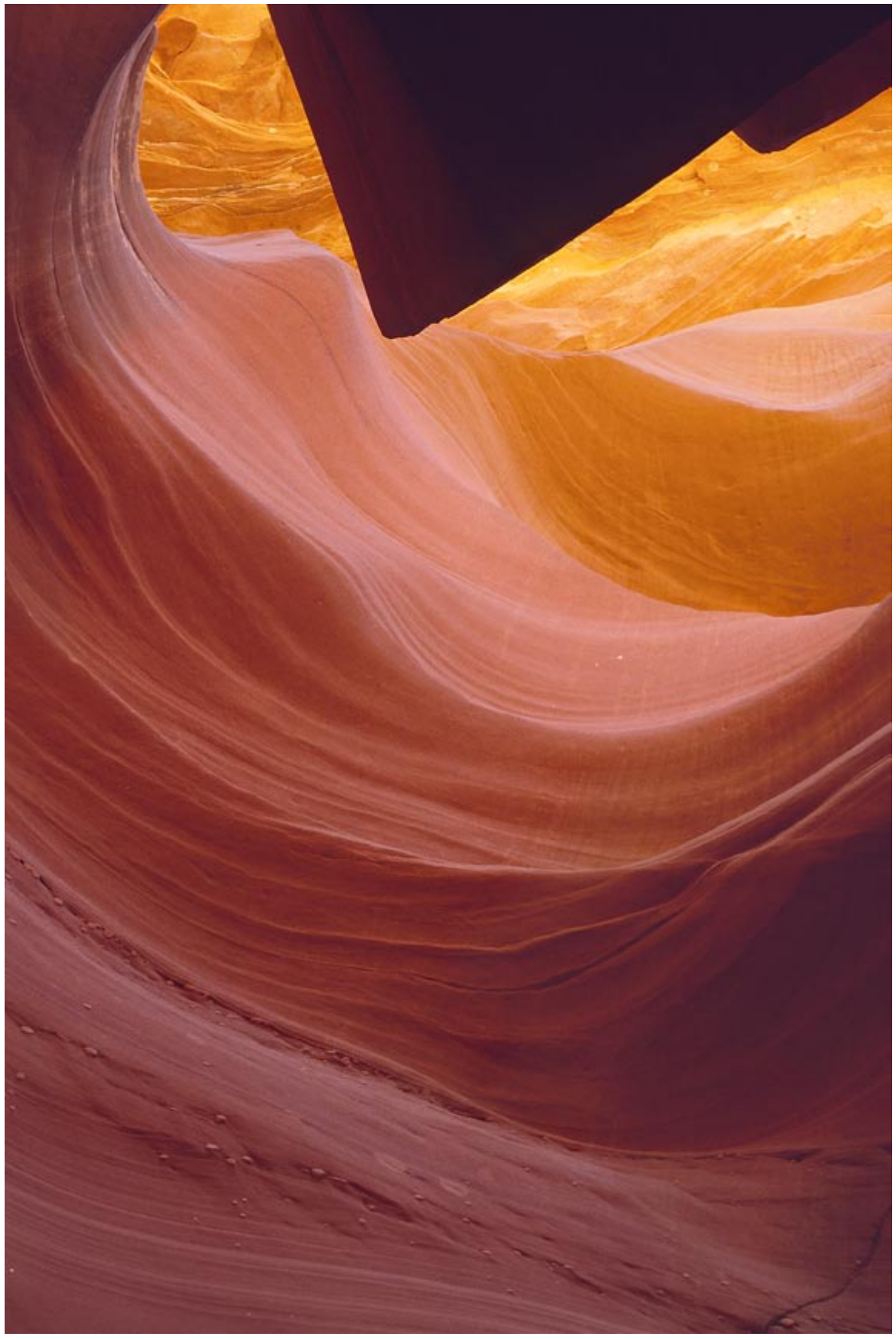
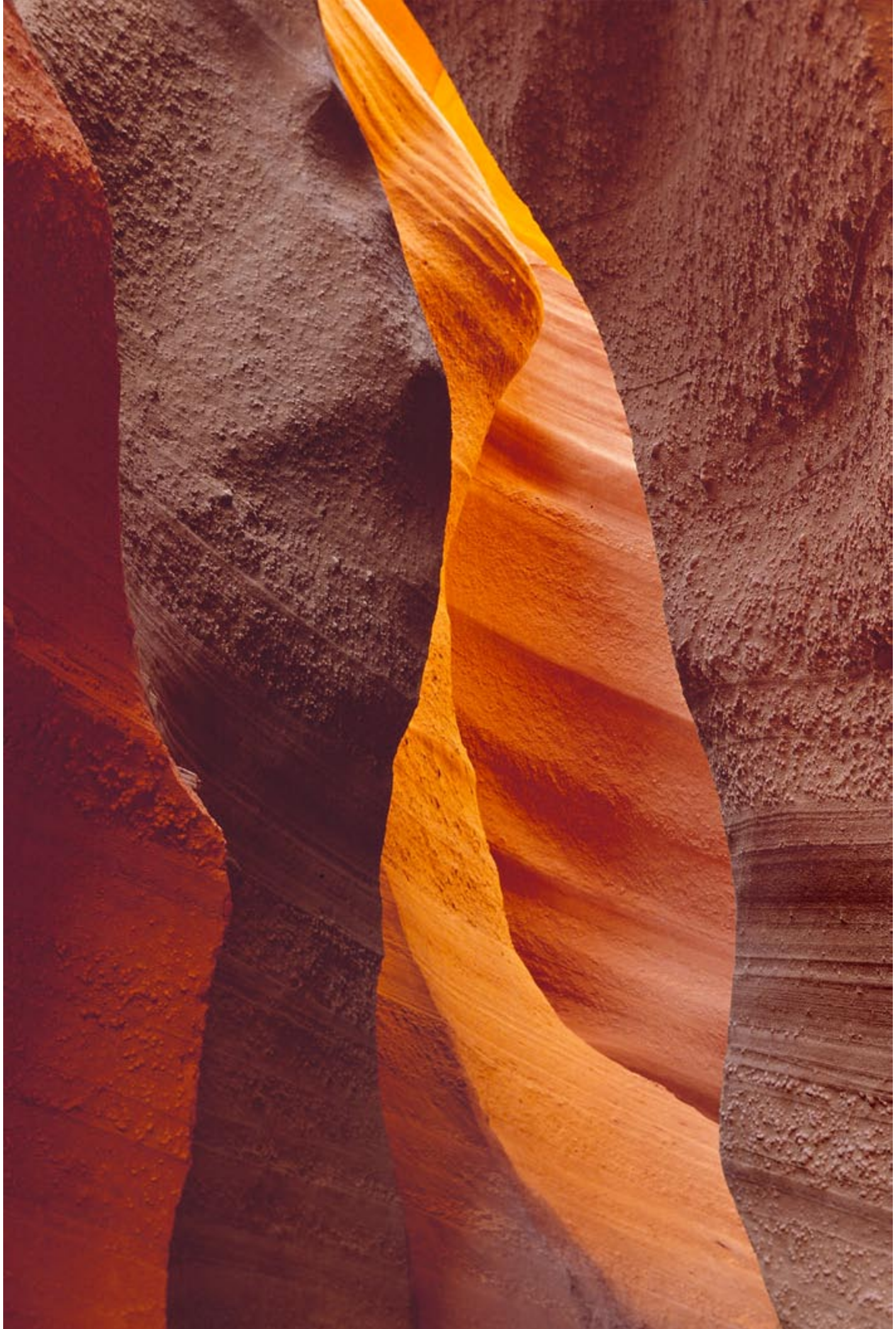
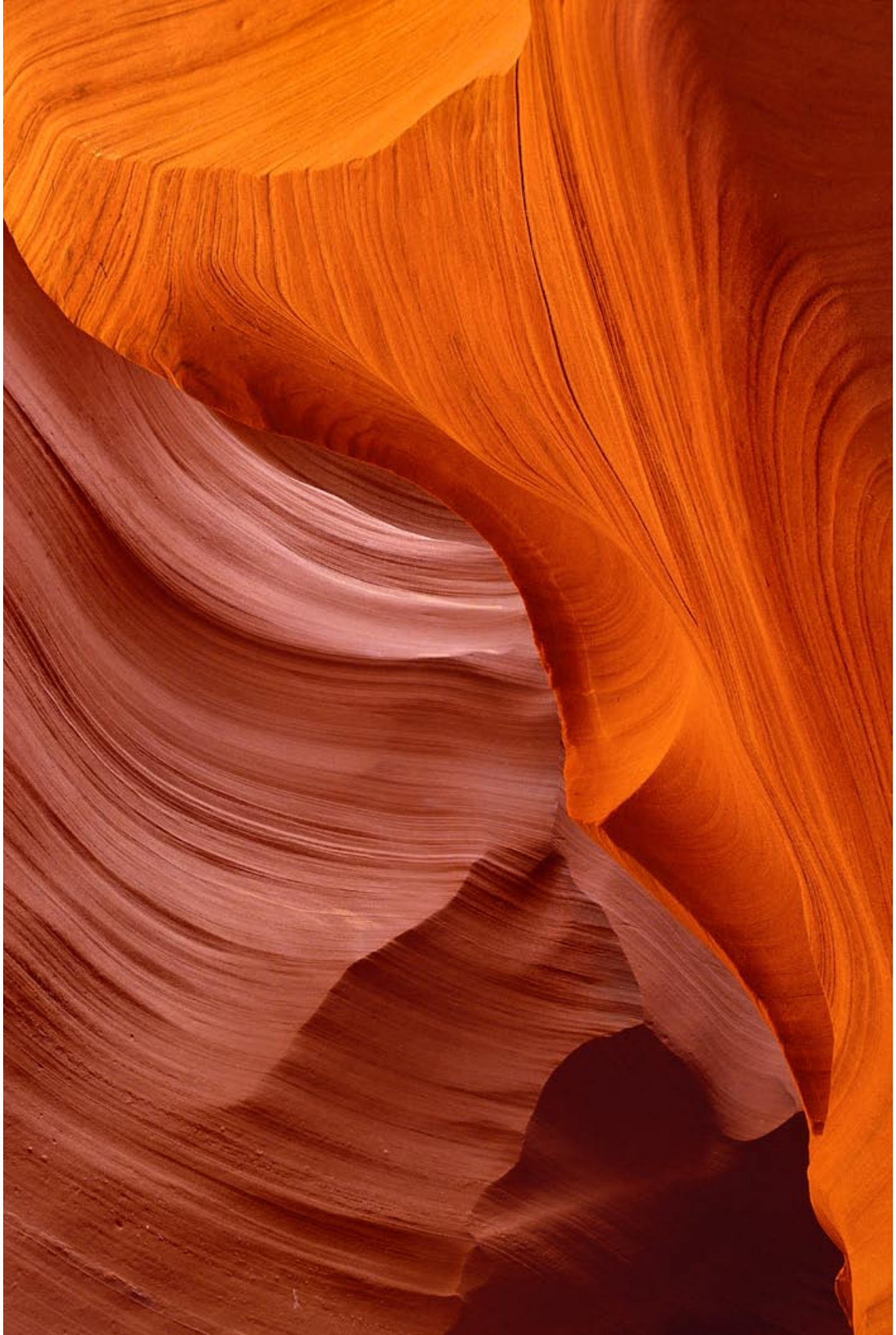






STONE, SPACE, LIGHT

Classical architecture—
space and light expressed in stone.
Desert architecture—
stone expressed as space and light.

Stone stacked and weathered
into delicate, dizzying structures
towers and turrets, arches and bridges,
cathedral-like defining a sacred space,
stone spans defying logic and gravity,
anonymous epic gestures of stone,
breathless sweeps of stone.

This soaring desert architecture
is more non-human than inhuman,
more protagonist than backdrop,
more to be wondered at than applauded.

In classical architecture
one always finds meaning, sometimes beauty.
In desert architecture
we always find beauty, sometimes meaning.

Landscape Arch,

Arches National Park,

Utah

Turret Arch through North Window, Arches National Park,

Utah

North Window, Arches National Park,

Utah

Delicate Arch, Arches National Park, Utah

Reach for the sky…

Reach for the sky II…

PAINTED DESERT, PAINTED PLANET

Colors accumulate in disorder on the dry skin of this land,
paint chips flaked off the sun, experimental sunsets discarded as too garish.
There really is a painted desert, a real place in northern Arizona.
Words and lines on the map tell us exactly where this painted desert starts,
where it stops, where it is and isn't.
There's only one problem—there are no words, no lines on the land.
Like everything else here, the painted desert defies limits.
There is color everywhere.
Like everything else here, desert colors defy common classification,
escape all sensible everyday definitions.

This is land that's mostly sky, sky that's mostly light,
(light that hammers the land into a mirror of the sky)
land where long streamers of rain never quite reach the ground,
land where the only shade is created by the fiction of cool thoughts,
land where black brushstrokes escaped from a Georgia O'Keefe painting
hover like birds in afternoon thermals,
land where the dry earth, the scraggly vegetation
is endlessly overgrazed by woolly flocks of clouds,
land where tumbleweed tumbles vertically upward
in the glass-walled elevators of dust devils,
land where the stunted trees look half-dead
and the twisted, swirling rocks more than half alive
land where the colors tell lies that we always believe.

Painted planet. Painted desert.

bleeding rock, Capitol Reef National Park,

Utah

North Window, Arches National Park,

Utah

pink rain in the La Sal Mountains,

Utah

Coral Pink Sand Dunes State Park,

Utah

Chinle formation, Lower Blue Hills,

Arizona

Chinle formation,

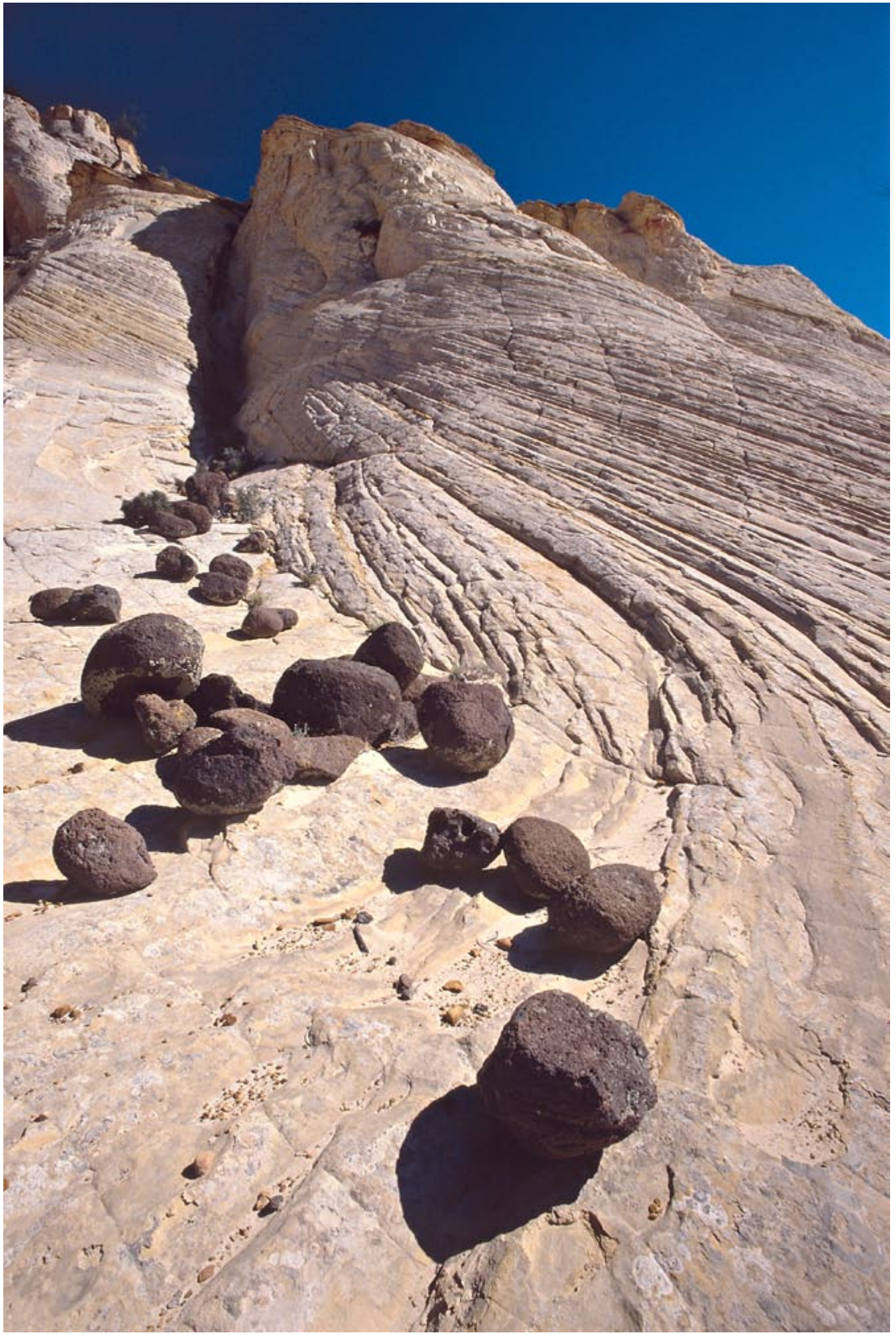
Painted Desert

Navajo County Park,

Arizona

Yellow Rock above Lower Hackberry Canyon, Paria River country,

Utah



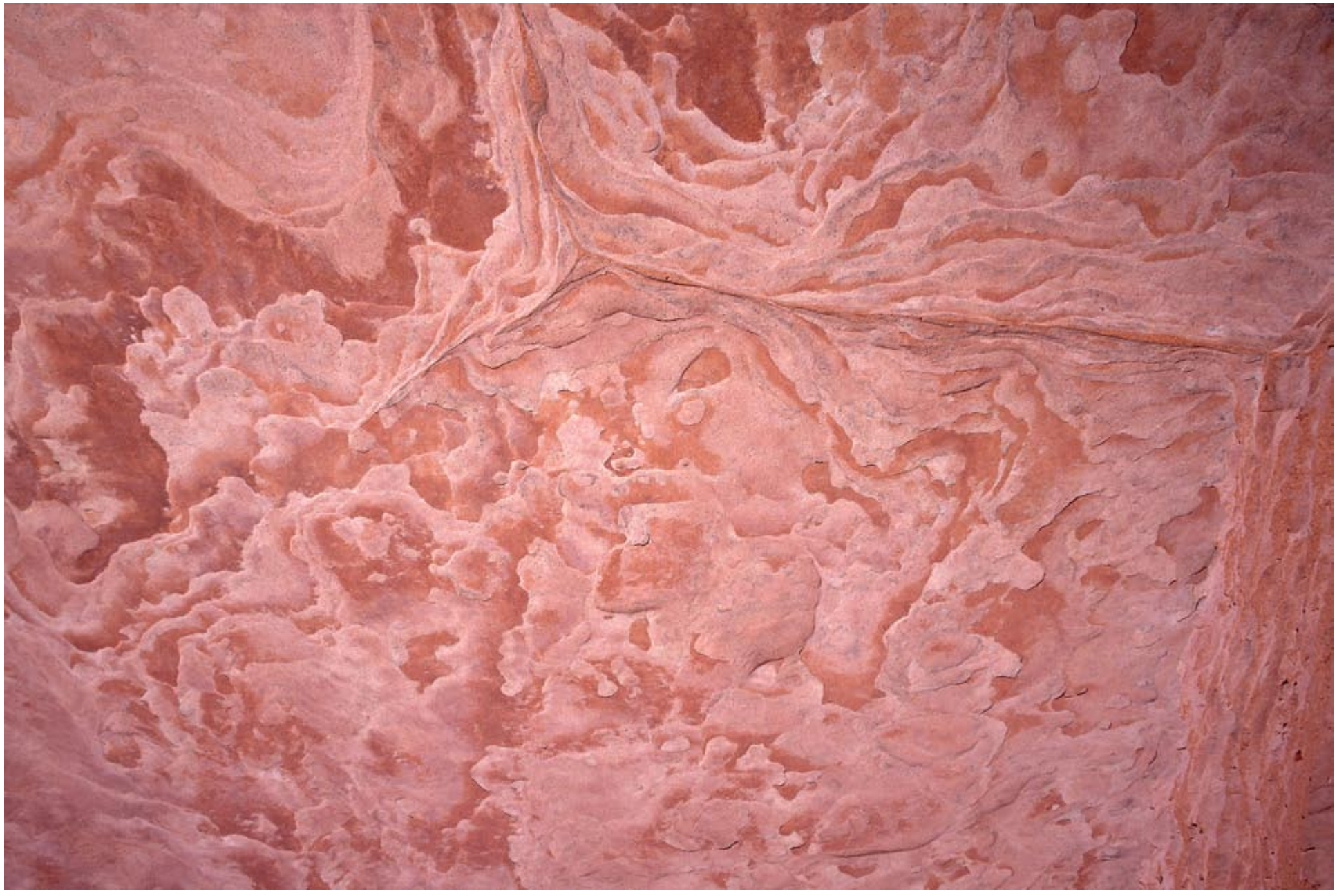
black on white,

basalt boulders

near Boulder,

Utah

lichen clouds on sandstone



sandstone faux marbre

CANYONS & MOUNTAINS

In the desert fictions eventually fail and fall away,
and flat featureless desert is mostly a fiction.
Our southwest is a land of high relief, deep places,
as full of mountains as the Rockies are of canyons.
This landscape too tells tales of mountain building:
slow orogenies revealed in red rock,
old sea beds lifted onto high table-top mesas,
intrusive volcanic buttes blossoming out of the earth,
—desert mountains.
"High desert" is more than just a catchy phrase.
Yet it's "deep desert" that catches your throat.

The real western landscape is a tug-of-war
between gravity and clouds, earth and sky.
When the upward pull wins we're among mountains.
But west of the Rockies the pull changes direction.
The sum of change, the direction, the push of process,
all point down into the earth, steering our thoughts
toward density, depth, darkness and shadows.

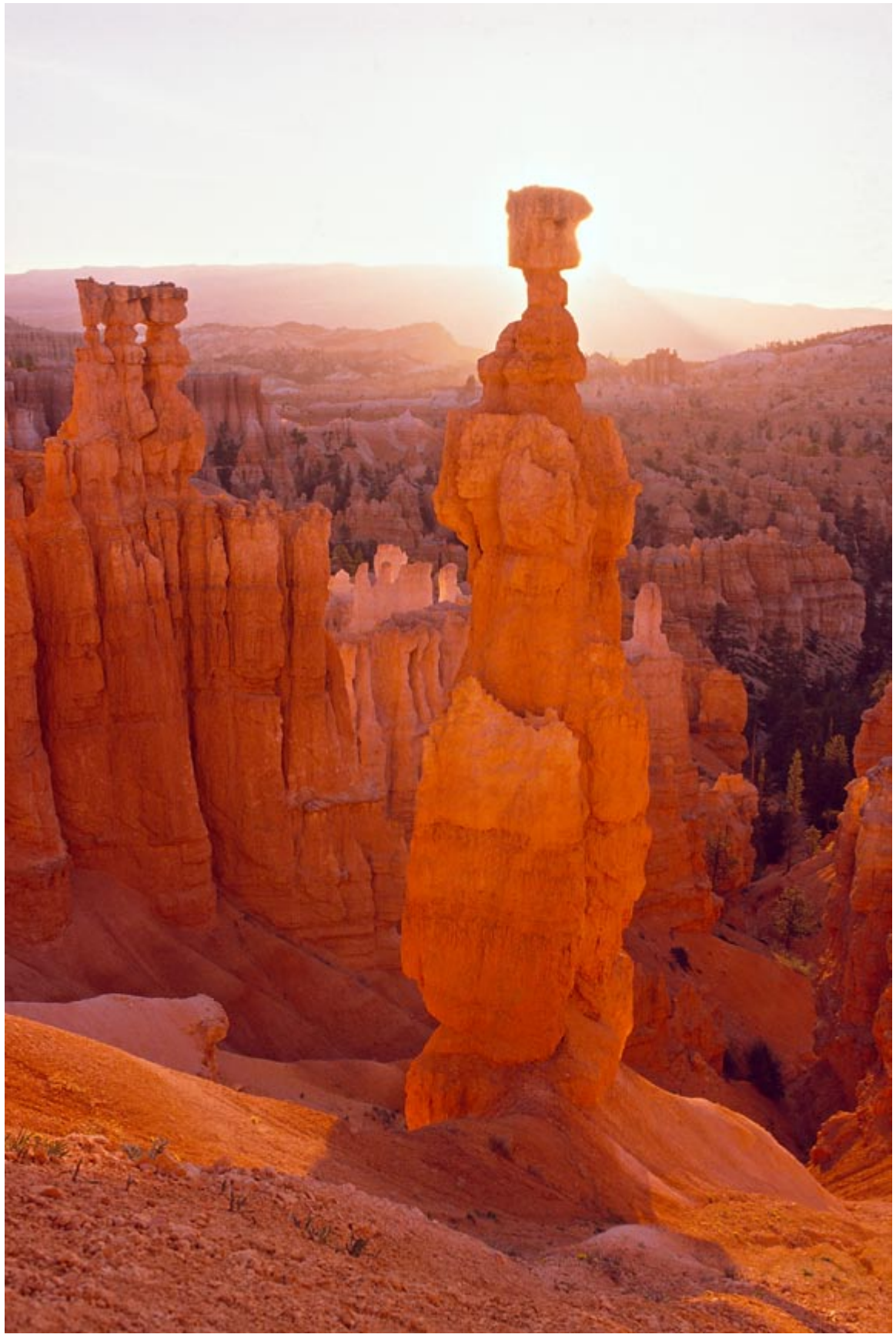
Mountains and canyons,
mirror opposites in the vertical plane—
Canyon bottoms can seem as cool as summits.
They are collectors, drawing everything down and in:
flash floods, gravel and mud, rain and rainbows,
refugee cottonwoods and stubborn willows,
rattlesnakes and coyotes,
people and their fantasies:
cliff houses and national parks.
Walk across the West and you wind up
walking uphill or downhill, often climbing.
Strike off across level sagebrush flats
and you stumble down into ravines, climb back out.
Three sunburned dimensions, two passive, one active.
A land as deep and high as it is wide.

This up-and-down west is full of simple symmetries:
air on both sides of every peak,
rock on both sides of every canyon.
Canyons are the essential Taoist landscapes
defined by what isn't there— space not stuff.
Are canyon walls the canyon?
Or just the canyon's container?
Do canyons know how we define them?
Of course not.
Or how we name, rank, use, abuse, or protect them?
These upsidedown, insideout, mountains in the earth—
Canyonlands, Bryce, Zion, Cataract, Escalante—
Glen Canyon gone, for now,
Grand Canyon saved, for now.

Canyons: grand, grander, grandest.
Love them, let them be.

in the Needles Disrict, Canyonlands National Park,

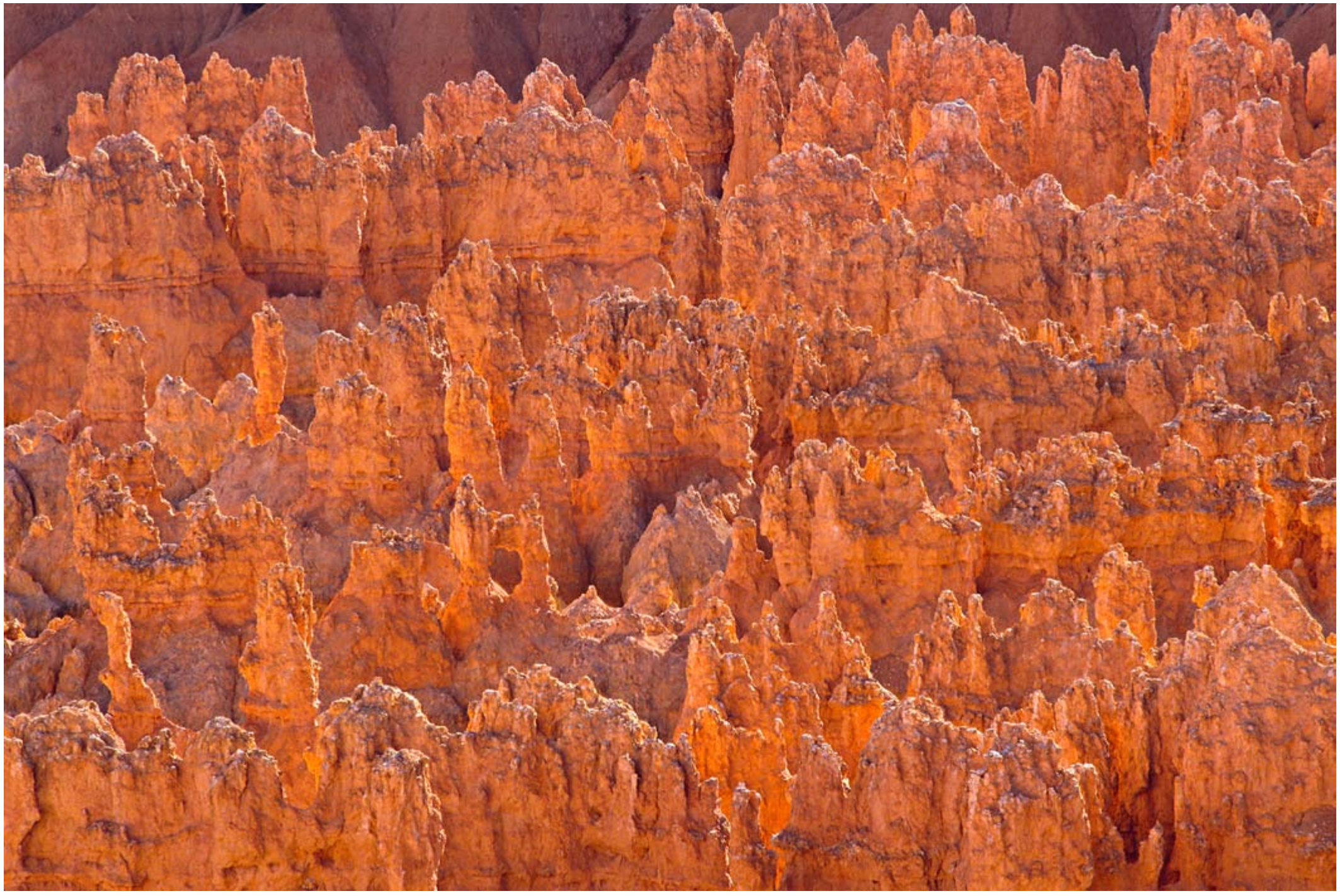
Utah



Thor's Hammer,

Bryce Canyon National Park,

Utah



Silent City, a forest of spires below Sunset point, Bryce Canyon National Park,

Utah

looking north from Sunrise Point, Bryce Canyon National Park,

Utah

the White Rim above the Green River, from Island in the Sky, Canyonlands National Park, Utah

looking east from Island in the Sky toward the La Sal Mountains, Canyonlands National Park, Utah

San Francisco Peaks from the North Rim, Grand Canyon National Park,

Arizona

dawn from Cape Royal,

North Rim,

Grand Canyon National Park,

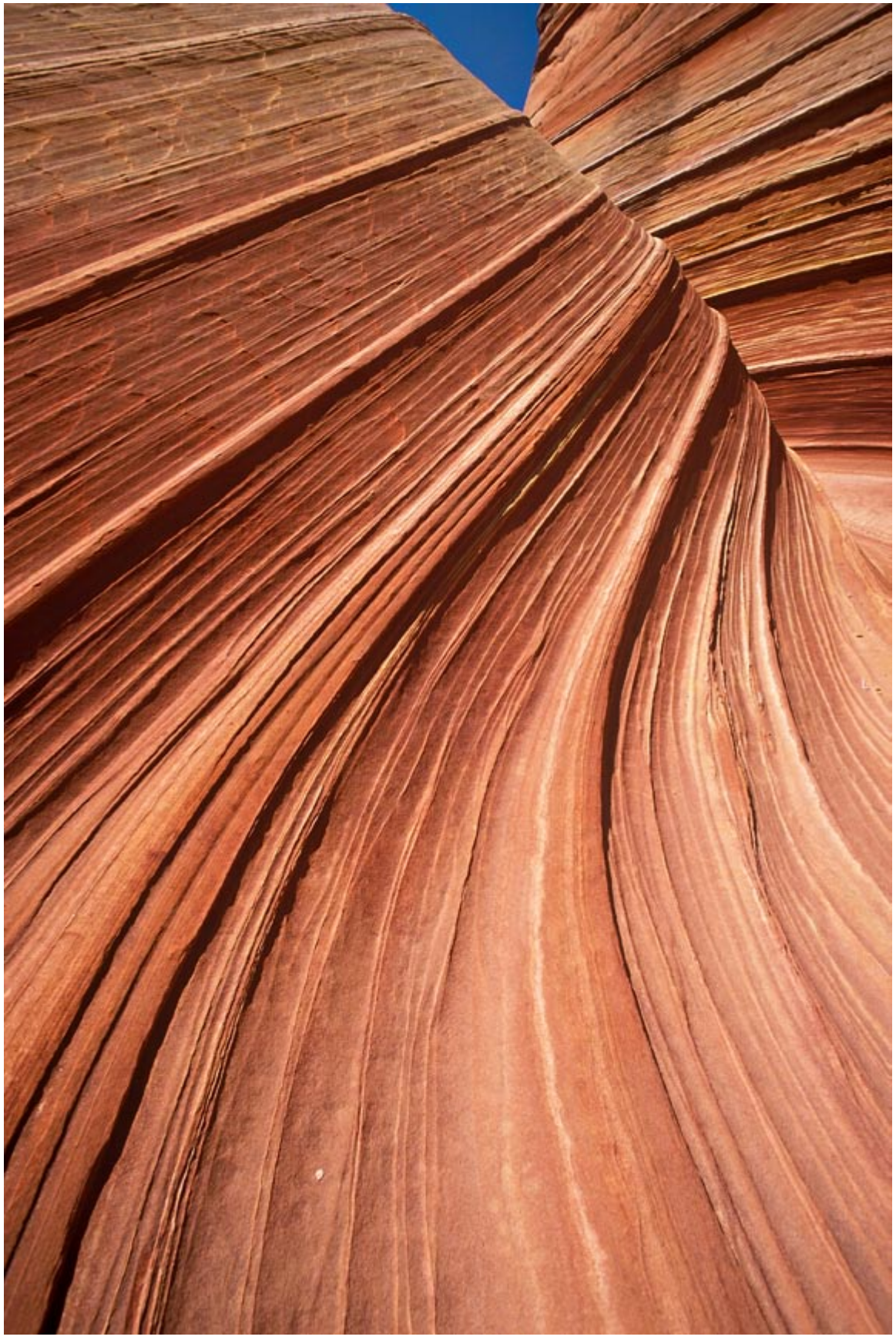
Arizona

GEOPOETRY

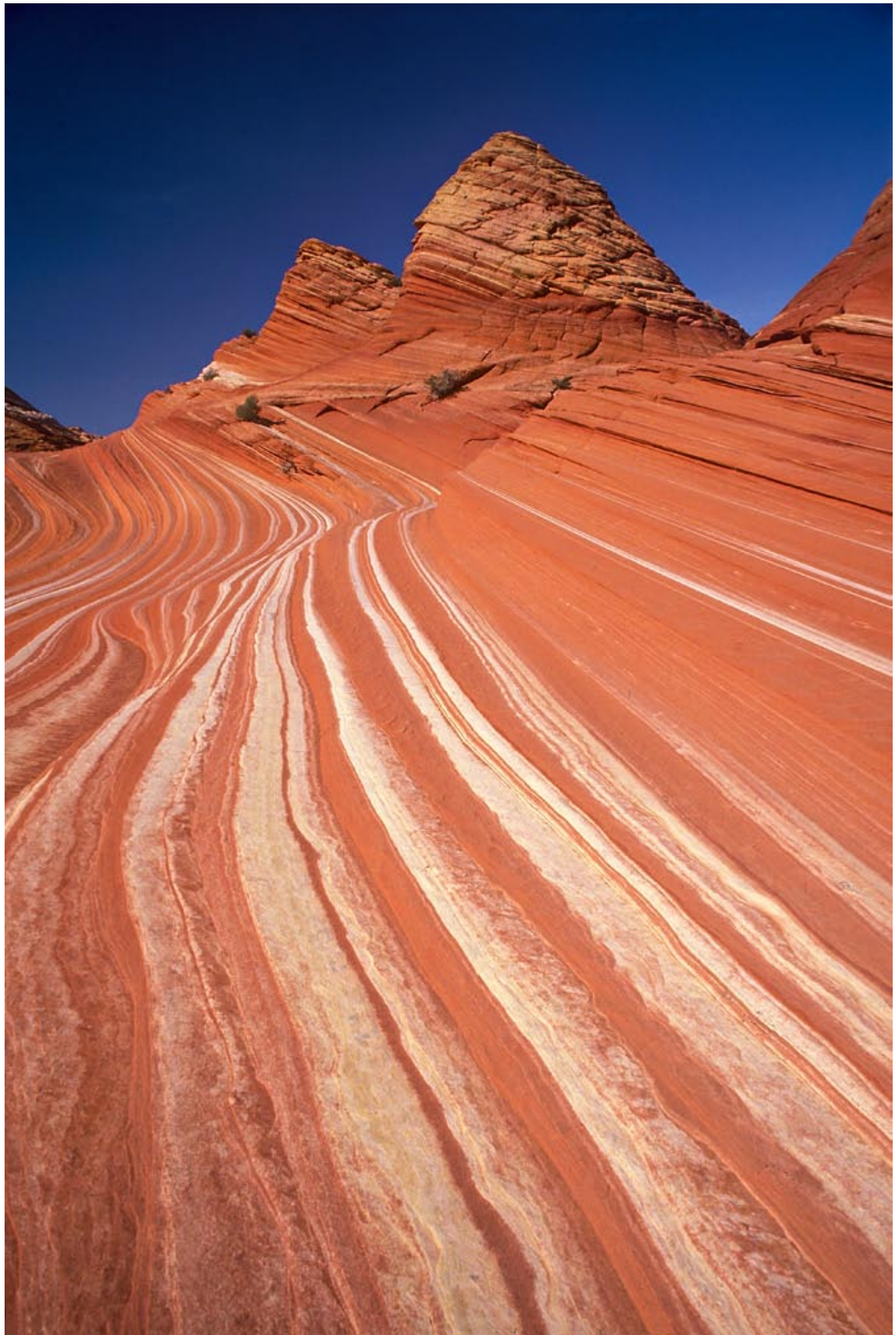
With enough stfudy, enough patience,
specialists can read the geological record of the West
the way musicians read a symphonic score.
They know that the Kayenta formation
always overlays Wingate sandstone,
and that the Chinle always lies below it
that sandstone, mudstone and siltstone in one order
can tell a perfect story, but in another sequence
form an unresolved chord full of puzzling questions.
After a while words like Cretaceous, Jurassic and Triassic
stop jumping around in your mind, stay put,
fall into the right order every time.

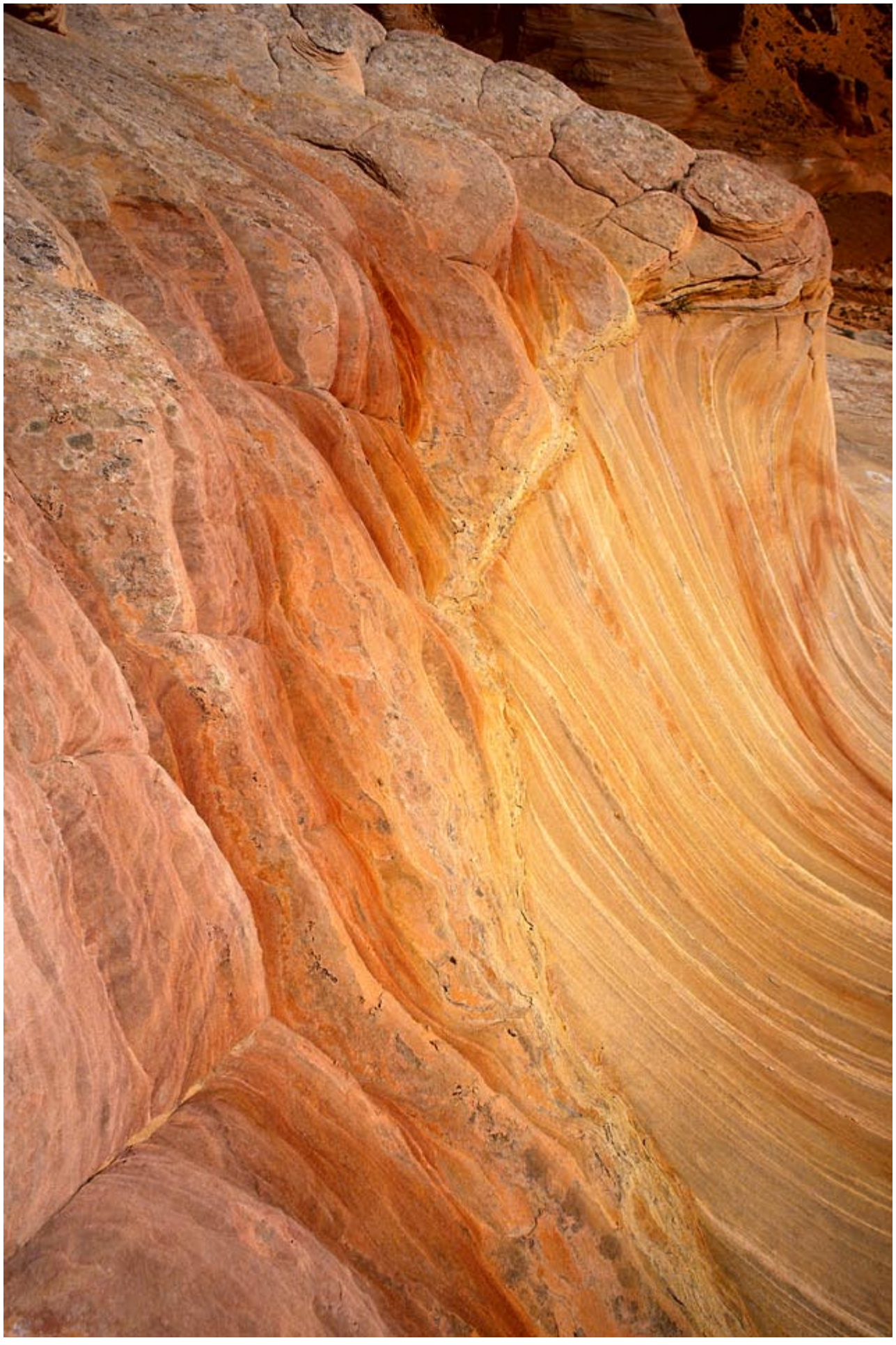
But a score is not a performance.
The poetry of the plateau lives in the details:
the curve of this particular slab that is like no other,
the color of this one petrified beach that appears to be
the color of a particular sunset that flared and flamed and died
at six in the evening one lost, long-ago autumn evening
before there were people on this continent to see it,
or clocks that assigned numbers like six
to the hours of the spinning day,
or numbers at all, or hours...

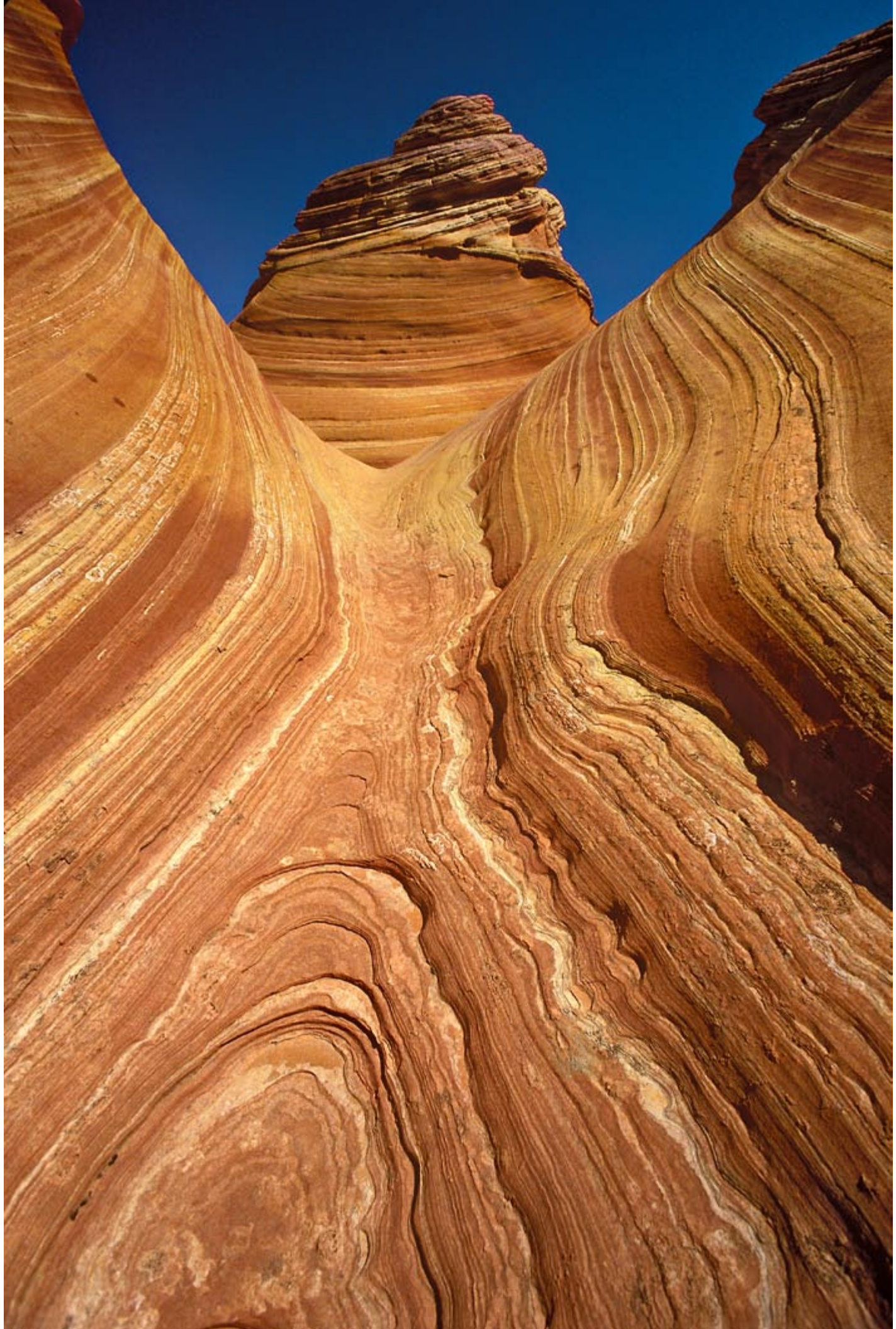
We walk into these hidden canyons
and stumble over the original suchness of things:
things as they always have been,
as we wish they could always remain,
changing at a pace slower than perception.
We listen to the geopoetry of the plateau
with all our attention,
with all our senses.

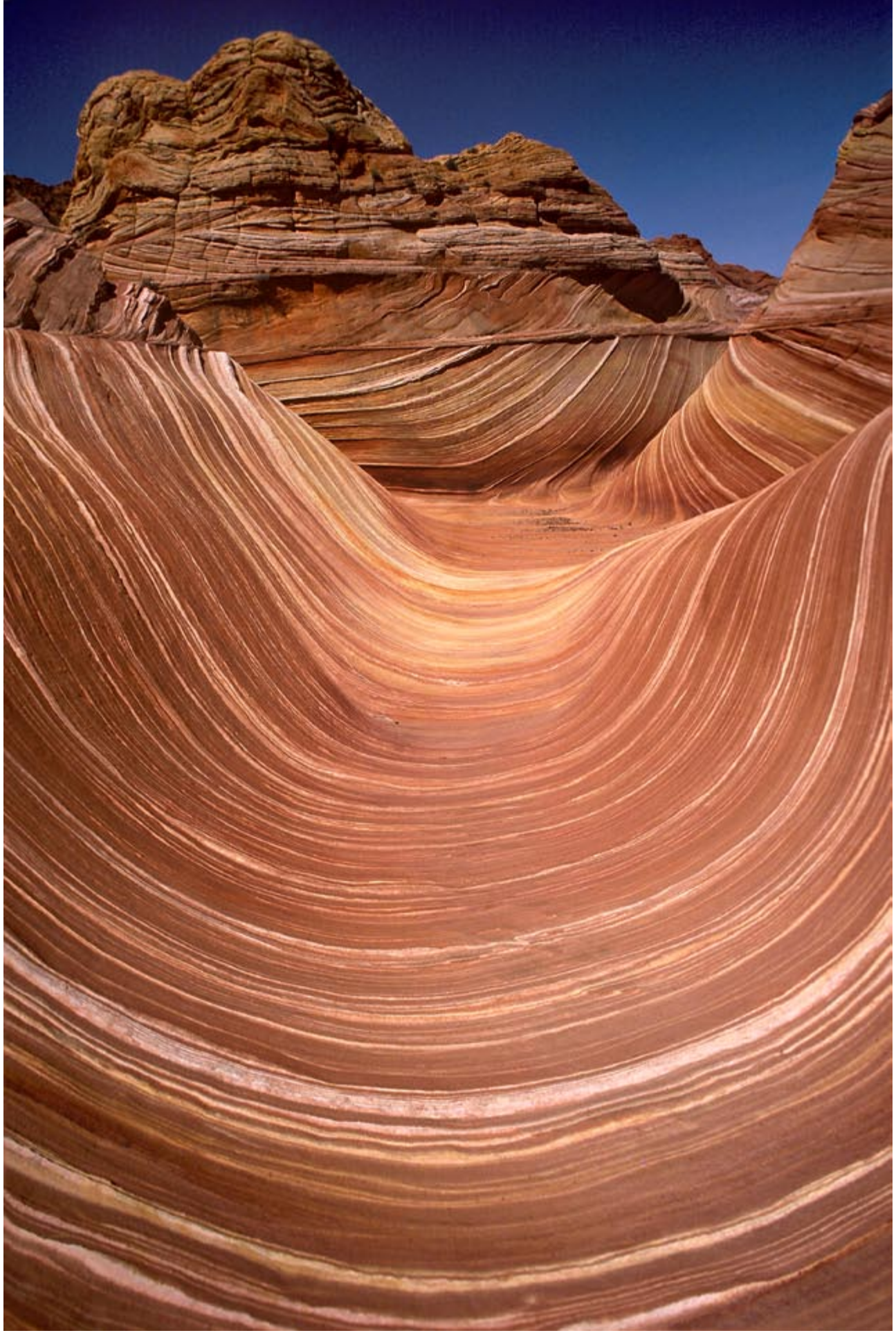


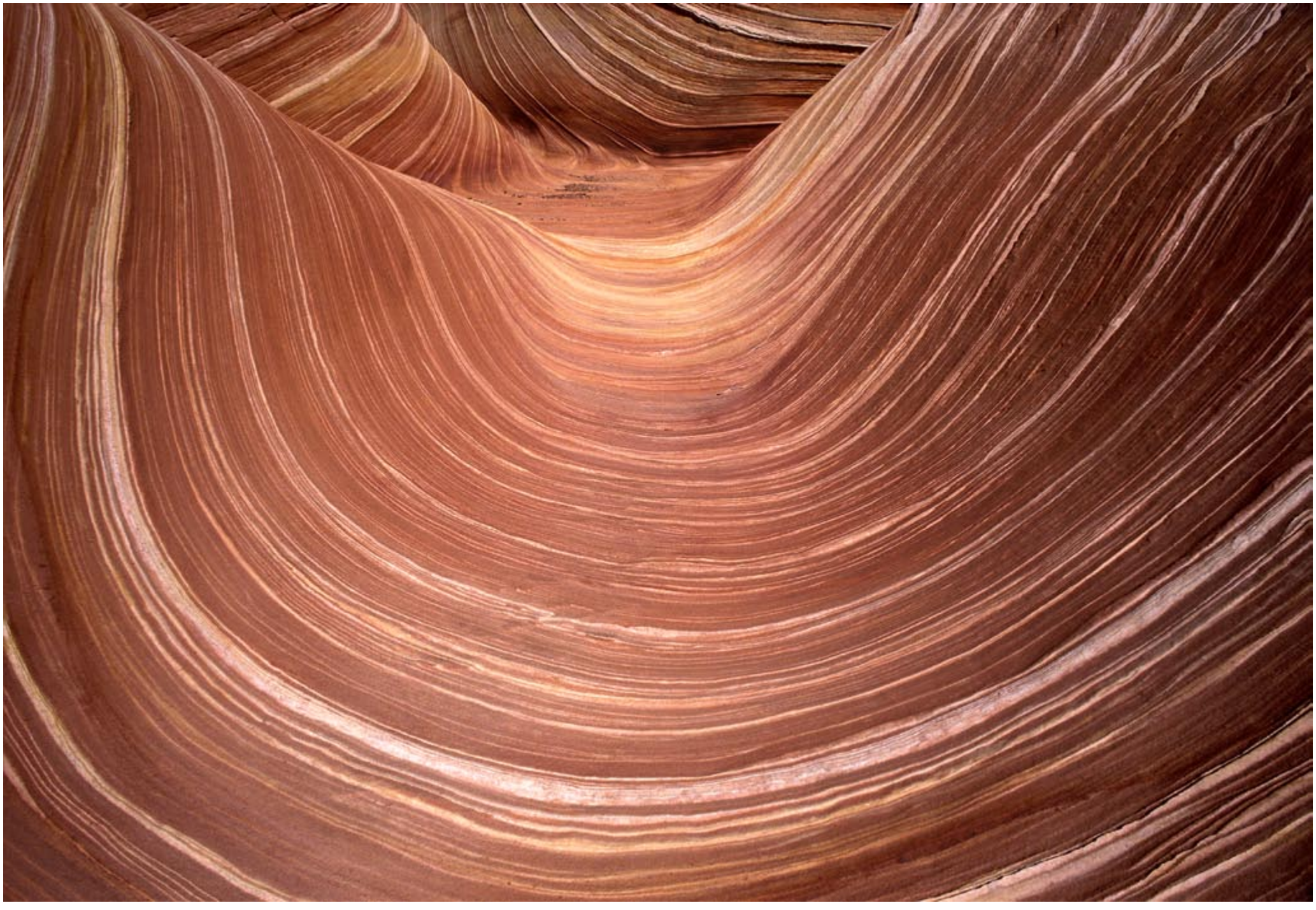
sculpture gardens of Navajo Sandstone, Colorado Plateau, pages 78 – 89











FRAGILE BEAUTY

The old timers and early explorers were right:
this is a useless, good-for-nothing landscape—
no water, no soil, not enough flat land
to build a house, even a stone house.
The only possible function of such a landscape
is to astonish, to delight.
The only thing such land offers us is beauty.
And that, seemingly, in reckless abundance.

But unexploitable doesn't mean indestructible.
Much of this plateau landscape—
and certainly all the really magic spots,
the special places,
the enchanted sandstone sculpture gardens—
is delicate beyond belief.
This is the most fragile landscape I've ever seen.
One careless teenager, two big playful dogs,
three tired hikers scuffing along exfoliated slabs—
and the destruction would be immense.
Ten minutes of reckless stomping
through some of these delicate draws
would wipe out 10,000 years of artful weathering.
Destruction would be swift, near total.

If you find one of these magic spots,
don't tell your friends!
Take them there instead, in person,
then swear them too to the same sort of silence.
This is not selfishness but caring,
and it might just work.

Many of the obvious treasures of the southwest—
the big landscapes, the macroscapes—
are already safe behind the boundaries of national parks.
A good thing too.
But it's not possible, maybe not even desirable,
to protect every gem, every secret rincon,
every hidden canyon in the southwest
inside a national park.
The smaller, infinitely more fragile spots
need protection not just from graffiti and litter,
not just from out of control four-wheelers,
but also from being loved to death.
Perhaps there are other ways to do this?
not just by mandate and management,
not just with rules and rangers?
Is it naively optimistic
to hope that some of the most mysterious
landscapes in the southwest
can exist safely a while longer
under a protective cover of silence?
Naive to suggest that some places
should always remain lonely and desolate,
wind swept and cloud scrubbed?…

SAND DUNE, SAND STONE

RMMAGING THROUGH THE JURASSIC

MICHAEL COLLIER

Sandstone. Sand storms. Sand verbenas. Sand bars, sand banks, and sand dunes. Northern Arizona and southern Utah are the heart of a sandbox hundreds of miles across and thousands of feet high: hundreds of cubic miles of sand.

Sandwich. I polish off lunch and look for a place to drop into this canyon. One can step across to the other side without much effort, even though the bottom is seventy feet below. A small crack a few feet back from the canyon is oriented so that I can jam in two chocks that ought to hold my weight. I tie my rope to the chocks and heave it over the edge; for a while there is only the whistling of its fall, then a muffled thud as the last ten feet hit the sandy canyon floor. I clip into the rope and hop into another world.

Above: a flat hot plain. Below: a narrow ribbon of blue sky framed by cool swirling walls. Here the walls are twelve inches apart, there they swell into a womb ten feet across. Light glows from within the rock, light that is orange and gold and red. I think of young Everett Ruess who disappeared into this country fifty years earlier—"Once more I am roaring drunk with the lust of life and adventure and unbearable beauty." Ruess was swallowed alive by this country, never seen after descending into the sandstone canyons just north of here. Will I return? Will the chocks hold?

Water carved these walls. Summer thunderstorms take the country by surprise, dropping inches of rain in an hour over a single drainage. The resulting floods crash through these canyons, choking them with wild brown water that sculpts the walls into shapes that will someday be well described not with words but with music.

Navajo Sandstone. Two hundred million years ago, this was a dune-filled desert stretching hundreds of miles in all directions. I walk with my hands brushing the walls, fingertips soon worn smooth by the sandstone. The bedding is chaotic, tipping first this way, then that. Crossbedding, it is called: a child of the wind. I trace out the slip faces of old sand dunes, feel the ripples climbing the backs of the dunes. After a while I sense that the dunes generally swept southward, that the wind blew out of the north. Do I hear the wind whistling down out of the 200 million year past? No—even Ruess wasn't that crazy. I climb back up my rope to the present, to the real world.

In 1975, geologists from the Flagstaff branch of the US Geological Survey and from Northern Arizona University realized that they knew precious little about the mechanics of wind as an agent of erosion, transportation, and deposition of sand. How were they to understand the thousands of feet of wind-borne sedimentary rocks that bury the Colorado Plateau? The present, in this case, proved to be a lousy key to the past.

Cam McCauley and Carol Breed set up weather stations above the Little Colorado River on Moenkopi Plateau, measuring wind velocity and direction, temperature, humidity, and precipitation.

But the wind blew so hard that their anemometer cups regularly broke away, and sand clogged their recording paper. Eventually, better equipment with direct satellite linkage began to provide a picture of a dry wind blowing out of the west; during thirteen percent of any given year, the wind exceeded fifteen miles per hour.

The Little Colorado is one of Arizona's major rivers; it is bone dry six months out of twelve. The wind that blows across its bed onto the Moenkopi Plateau scoops up considerable amounts of sand, carrying the grains into dune fields to the east and northeast. George Billingsley has chased after this sand for the past ten years. He has found that the dunes assume many shapes and sizes—old longitudinal dunes that once streamed back from the mesa tops like windblown hair, beautiful sickle-shaped barchan dunes that migrate downwind, and sheets of sand climbing two hundred feet up the Red Rock Cliffs.

Billingsley has documented a Sisyphus-like sand cycle. Grains are lifted by the wind from the Little Colorado, carried toward the Red Rock and Adeii Eechii Cliffs, only to be recaptured by washes that flow back to the Little Colorado and then on out to the Sea of Cortez. When asked about a potential trail over the Red Rock Cliffs, he remembered a particular ramp of wind-blown sand, but then reconsidered. That ramp, he said, had blown away last year. This may be the hot stinking desert, but stagnant it is not.

Not long ago I crossed the Little Colorado River at Black Falls, trying to keep up with the fifty-mile-an-hour dust plume that was Scott Thybony. The improved road was washboard dirt; we turned north past Baah Lokaa Ridge, across Haada Is Taani Di and Tohachi Wash, on roads defined only as "somebody was there once before." Scott's truck came to a thoughtful momentary standstill in front of a cutbank. Not to worry: we tiptoed our trucks around and down and over, and turned north up a flatbottomed sand wash that led a mile back into the Red Rock Cliffs. We camped at the 210-million-year-old boundary between the Triassic Chinle Formation and the overlying Wingate Sandstone. All around lay pieces, indeed, entire trees of petrified wood eroding out of the Chinle. In the morning, Scott showed us bones turned to stone, littering the ground just below the Wingate. Dinosaur bones? When you touch them to your tongue, they stick; rocks don't. We set them back exactly where we had found them. I walked away backwards to make sure those old bones didn't get up and dance a jig.

The Wingate straddles the boundary between the Triassic and Jurassic periods; along with the later Cretaceous, these two periods make up the Mesozoic Era—the time of "middle life"—the undisputed age of the dinosaurs. The Jurassic, spanning the 64 million years from 208 until 144 million years ago, was a time of sand on the Colorado Plateau. This period left a remarkable sandstone legacy: the Wingate, Moenave, Kayenta, Navajo, Temple Cap, Carmel, Page, Entrada, Curtis, Summerville, and Morrison formations. One of the most extensive, and certainly now the best exposed, piles of sand in the world.

Geologists, like all scientists, are fond of a good squabble. They spent the last century arguing about the exact placement of the Triassic/Jurassic boundary. Ned Colbert, dean of the dinosaurs, identified a Kayenta Formation dinosaur fossil as Triassic; but Kevin Padian recently revised this Scelidosaurus' age upward into the Jurassic. Fred Peterson found pollen samples within the Lukachukai Member of the Wingate Sandstone that are likely Jurassic. The consensus these days is that the Triassic/Jurassic boundary falls within the Wingate, probably between its lower Rock Point Member and the overlying Lukachukai Member.

During the early Jurassic, Arizona was much closer to the equator than it is today; by various estimates, Flagstaff lay somewhere between latitudes 8° North and 17° North. California was getting ready to invent the granites that would in time become the Sierra Nevada. A low string of volcanoes spluttered throughout northern Sonora, southwestern Arizona, and southeastern California. They had spewed ash that had already been incorporated into the clays of the Triassic Chinle Formation.

Sluggish streams flowed north toward what is now the Colorado Plateau; in the early Jurassic, this land was alternately just above and occasionally below sea level. An inland sea stretched down from Montana, Idaho, and Utah, lapping at these lowlands. The air was balmy, hot. Winds that blew south off the sea would not have been much of a comfort. Ferns grew here and there; angiosperms, the flowering plants that now dominate most botanical niches, had not yet made their explosive Cretaceous appearance. Dinosaurs cruised the beaches, checking things out. Small mammals scurried underfoot. Otherwise, the neighborhood was quiet: a beach backed by miles and miles of desert dunes.

Ron Blakey, a sedimentologist at Northern Arizona University, has identified five conditions required for large-scale, wind-born sand deposition: abundant sand, strong winds, flat plains, sparse vegetation, and the absence of water that would otherwise erase the dunes. During the Jurassic, the Colorado Plateau had them all. Blakey describes deposition of the upper Wingate Sandstone on what is now the Navajo Reservation. He traces the form of oblique dunes, with 'bottomset,' 'toeset,' and 'foreset' stratification. He dissects out the existence of early summer winds blowing from the northwest, and late summer monsoon winds from the southwest. Laterally interfingering with the Wingate were the river-borne sand and silt of the Moenave Formation and the overlying Kayenta Formations.

Above the Wingate, Moenave, and Kayenta lies the Navajo Sandstone. In many ways, the Navajo is the canyon country. Its beautiful white sand walls soar two thousand feet. Slot canyons slice with surgical precision cleanly to its heart. Rain runs across the bare Navajo slickrock, dissolving out tinajas, life-giving waterpockets that fill with cool green waters. Cottonwoods and sycamores dot the bottoms of creeks carved into the Navajo.

Along with its correlatives, the Aztec Sandstone to the west and Nugget Sandstone to the north, the wind-blown dunes of the Navajo formed an immense desert throughout what is now Nevada, Utah, northern Arizona, as well as parts of New Mexico, Colorado, and Wyoming. The grains are distinctive: almost purely quartz, always frosted from their transportation by the wind. By Fred Peterson's best guess, all of this sand blew down from areas around the ancient Milk River Uplift in Montana. Dry and shifting, the Jurassic Navajo desert rarely preserved even a few traces of the life that may once have traversed its surface.

Above the Navajo: more sand—the Temple Cap and the Page Sandstones, once considered units within the Navajo. Even today, a careful geologist can confuse these formations with the more widely recognized Navajo. Careful stratigraphic sleuthing in the 1970s by Peterson and G.N. Pipiringos established a set of breaks in deposition, called unconformities, that everywhere isolate the Temple Cap and Page sandstones from the underlying Navajo. They found that the Page Sandstone interfingers with yet another formation, the Carmel, thus marking a migrating boundary between the dunes of the Page and the shallow salty sea that formed the siltstone and gypsum of the Carmel Formation.

Higher still: the alternating dunes and dry lake beds of the Entrada Sandstone. The exquisite walls of Coal Mine Canyon in northern Arizona are hewn from the Entrada: bands of red and white, soft

shales interleaved between harder sandstone. In some areas of the Colorado Plateau, especially in Utah, the Entrada is overlain by at least two more middle Jurassic formations, the Curtis and Summerville: gray-green glauconitic shale and candy-striped redbeds.

Finally, we come to the sandstones and shales of the widespread Morrison Formation, thick with fossils of the late Jurassic: dinosaurs by the boxcar-load, logs petrified with enough uranium to send an ordinary geiger counter ticking away into outer space. This formation for the most part was laid down by water, beneath slow streams and mudflats. It marks the top of the Jurassic—or used to. In 1984 Kowallis and Heaton stumbled across zircons in ash beds of the Brushy Basin Member of the Morrison that are dated as Early Cretaceous. Arguments above, arguments below: science marches on.

Exploration is always blessed with discovery, if one is patient enough to keep looking. Driving across northern Arizona one afternoon, I decided to take a break and hike up a nameless canyon near Kayenta. I didn't know what I would find, but I knew that I would discover something if I searched carefully. Hopping up-canyon from one rock to the next, I examined the patterns of crossbedding within sandstone, tiptoed behind coyote tracks, traced my fingers across the swirls of juniper bark, wondering each time if this was my discovery for the day. But I needn't have fretted. The day's discovery left room for no doubt.

The canyon was cut from the Navajo Sandstone; its walls were endless repetitions of crossbedded sand. Coming around a corner, I saw that the tan crossbeds were locally displaced by a lens of white evenly-bedded limey sandstone, perhaps seventy feet from edge to edge. The lens spanned the canyon, and had been partially eroded. Even the driest Jurassic desert, I recalled, had occasionally received heavy rains that collected as small ephemeral lakes called sabhkas, after their contemporary North African analog. Sand entering these lakes would have been laid down in beds that reflected a watery deposition, rather than air-borne deposition. And water would have attracted life.

By then I was on my hands and knees, roaming the outcrop. I knew the Navajo Sandstone is normally barren of recognizable fossils. Then I came face to face with the ends of two bones eroding out of the sandstone. A tibia and fibula, I guessed. Radius and ulna? I am certainly no paleontologist. The longest preserved dimension was less than six inches; at the joint surface, the bones were a bit more than an inch in diameter, tapering to half an inch along the shaft. I could easily make out the cortex and inner trabeculae of each bone. A vertebrate, most likely reptilian. The Jurassic snapped into sharp focus: a small animal scampering over dunes to water, 200 million years ago. I rocked back on my heels and let out a long slow breath of air.

Michael Collier *is as close to a Rennaisance Man as anyone I have ever met. He is a photographer and pilot (and gracefully combines both passions), a geologist, a medical doctor, and a most gifted writer. I have known Michael and admired his work for years and was flattered when he agreed to write this essay for the original ink-on-paper version of* ***Red Rock, Blue Sky****. The two of us created a two-photographer photo exhibit about the Colorado Plateau that toured a number of German cities. And I especially want to recommend Michael Collier's two large-format illustrated books,* ***Over the Mountains****, and* ***Over the Rivers****, from Mikaya Press, perfect blends of geological insight and stunning aerial photography.*

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All the photographs in RED ROCK, BLUE SKY are available as archival fine-art prints. Detailed information on Linde Waidhofer's prints and their prices is available on her web site,

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