



Life on the Rocks: The Galápagos

I

FIRST THERE WAS NOTHING, and although you know with your reason that nothing is nothing, it is easier to visualize it as a limitless slosh of sea—say, the Pacific. Then energy contracted into matter, and although you know that even an invisible gas is matter, it is easier to visualize it as a massive squeeze of volcanic lava spattered inchoate from the secret pit of the ocean and hardening mute and intractable on nothing's lapping shore—like a series of islands, an archipelago. Like: the Galápagos. Then a softer strain of matter began to twitch. It was a kind of shaped water; it flowed, hardening here and there at its tips.

There were blue-green algae; there were tortoises.

The ice rolled up, the ice rolled back, and I knelt on a plain of lava boulders in the islands called Galápagos, stroking a giant tortoise's neck. The tortoise closed its eyes and stretched its neck to its greatest height and vulnerability. I rubbed that neck, and when I pulled away my hand, my palm was green with a slick of single-celled algae. I stared at the algae, and at the tortoise, the way you stare at any life on a lava flow, and thought: Well—here we all are.

Being here is being here on the rocks. These Galapogian rocks, one of them seventy-five miles long, have dried under the equatorial sun between five and six hundred miles west of the South American continent; they lie at the latitude of the Republic of Ecuador, to which they belong.

There is a way a small island rises from the ocean affronting all reason. It is a chunk of chaos pounded into visibility *ex nihilo*: here rough, here smooth, shaped just so by a matrix of physical necessities too weird to contemplate, here instead of there, here instead of not at all. It is a fantastic utterance, as though I were to open my mouth and emit a French horn, or a vase, or a knob of tellurium. It smacks of folly, of first causes.

I think of the island called Daphnecita, little Daphne, on which I never set foot. It's in half of my few photographs, though, because it obsessed me: a dome of gray lava like a pitted loaf, the size of the Plaza Hotel, glazed with guano and crawling with red-orange crabs. Sometimes I attributed to this island's cliff face a surly, infantile consciousness, as though it were sulking in the silent

moment after it had just shouted, to the sea and the sky, "I didn't ask to be born." Or sometimes it aged to a raging adolescent, a kid who's just learned that the game is fixed, demanding, "What did you have me for, if you're just going to push me around?" Daphnecita: again, a wise old island, mute, leading the life of pure creaturehood open to any antelope or saint. After you've blown the ocean sky-high, what's there to say? What if we the people had the sense or grace to live as cooled islands in an archipelago live, with dignity, passion, and no comment?

It is worth flying to Guayaquil, Ecuador, and then to Baltra in the Galápagos just to see the rocks. But these rocks are animal gardens. They are home to a Hieronymus Bosch assortment of windblown, stowaway, castaway, flotsam, and shipwrecked creatures. Most exist nowhere else on earth. These reptiles and insects, small mammals and birds, evolved unmolested on the various islands on which they were cast into unique species adapted to the boulder-wrecked shores, the cactus deserts of the lowlands, or the elevated jungles of the large islands' interiors. You come for the animals. You come to see the curious shapes soft proteins can take, to impress yourself with their reality, and to greet them.

You walk among clattering four-foot marine iguanas heaped on the shore lava, and on each other, like slag. You swim with penguins; you watch flightless cormorants dance beside you, ignoring you, waving the black nubs of their useless wings. Here are nesting blue-footed boobies, real birds with real feathers, whose legs and feet are nevertheless patently fake, manufactured by Mattel.

The tortoises are big as stoves. The enormous land iguanas at your feet change color in the sunlight, from gold to blotchy red as you watch.

There is always some creature going about its beautiful business. I missed the boat back to my ship, and was left behind momentarily on uninhabited South Plaza island, because I was watching the Audubon's shearwaters. These dark pelagic birds flick along pleated seas in stitching flocks, flailing their wings rapidly—because if they don't, they'll stall. A shearwater must fly fast, or not at all. Consequently it has evolved two nice behaviors which serve to bring it into its nest alive. The nest is a shearwater-sized hole in the lava cliff. The shearwater circles over the water, ranging out from the nest a quarter of a mile, and veers gradually toward the cliff, making passes at its nest. If the flight angle is precisely right, the bird will fold its wings at the hole's entrance and stall directly onto its floor. The angle is perhaps seldom right, however; one shearwater I watched made a dozen suicidal-looking passes before it vanished into a chink. The other behavior is spectacular. It involves choosing the nest hole in a site below a prominent rock with a downward-angled face. The shearwater comes careering in at full tilt, claps its wings, stalls itself into the rock, and the rock, acting as a backboard, banks it home.

The animals are tame. They have not been persecuted, and show no fear of man. You pass among them as though you were wind, spindrift, sunlight, leaves. The songbirds are tame. On Hood Island I sat beside a nesting waved albatross while a mockingbird scratched in my hair, another mockingbird jabbed at my fingernail, and a third

mockingbird made an exquisite progression of pokes at my bare feet up the long series of eyelets in my basketball shoes. The marine iguanas are tame. One settler, Carl Angermeyer, built his house on the site of a marine iguana colony. The gray iguanas, instead of moving out, moved up on the roof, which is corrugated steel. Twice daily on the patio, Angermeyer feeds them a mixture of boiled rice and tuna fish from a plastic basin. Their names are all, unaccountably, Annie. Angermeyer beats on the basin with a long-handled spoon, calling, "Here AnnieAnnie-AnnieAnnie"—and the spiny reptiles, fifty or sixty strong, click along the steel roof, finger their way down the lava boulder and mortar walls, and swarm round his bare legs to elbow into the basin and be elbowed out again smeared with a mash of boiled rice on their bellies and on their protuberant, black, plated lips.

The wild hawk is tame. The Galápagos hawk is related to North America's Swainson's hawk; I have read that if you take pains, you can walk up and pat it. I never tried. We people don't walk up and pat each other; enough is enough. The animals' critical distance and mine tended to coincide, so we could enjoy an easy sociability without threat of violence or unwonted intimacy. The hawk, which is not notably sociable, nevertheless endures even a blundering approach, and is apparently as content to perch on a scrub tree at your shoulder as anyplace else.

In the Galápagos, even the flies are tame. Although most of the land is Ecuadorian national park, and as such rigidly protected, I confess I gave the evolutionary ball an offside shove by dispatching every fly that bit me,

marveling the while at its pristine ignorance, its blithe failure to register a flight trigger at the sweep of my descending hand—an insouciance that was almost, but not quite, disarming. After you kill a fly, you pick it up and feed it to a lava lizard, a bright-throated four-inch lizard that scavenges everywhere in the arid lowlands. And you walk on, passing among the innocent mobs on every rock hillside; or you sit, and they come to you.

We are strangers and sojourners, soft dots on the rocks. You have walked along the strand and seen where birds have landed, walked, and flown; their tracks begin in sand, and go, and suddenly end. Our tracks do that: but we go down. And stay down. While we're here, during the seasons our tents are pitched in the light, we pass among each other crying "greetings" in a thousand tongues, and "welcome," and "good-bye." Inhabitants of uncrowded colonies tend to offer the stranger famously warm hospitality—and such are the Galápagos sea lions. Theirs is the greeting the first creatures must have given Adam—a hero's welcome, a universal and undeserved huzzah. Go, and be greeted by sea lions.

I was sitting with ship's naturalist Soames Summerhays on a sand beach under cliffs on uninhabited Hood Island. The white beach was a havoc of lava boulders black as clinkers, sleek with spray, and lambent as brass in the sinking sun. To our left a dozen sea lions were body-surfing in the long green combers that rose, translucent, half a mile offshore. When the combers broke, the shoreline boulders rolled. I could feel the roar in the rough

rock on which I sat; I could hear the grate inside each long backswEEPing sea, the rumble of a rolled million rocks muffled in splashes and the seethe before the next wave's heave.

To our right, a sea lion slipped from the ocean. It was a young bull; in another few years he would be dangerous, bellowing at intruders and biting off great dirty chunks of the ones he caught. Now this young bull, which weighed maybe 120 pounds, sprawled silhouetted in the late light, slick as a drop of quicksilver, his glistening whiskers radii of gold like any crown. He hauled his packed bulk toward us up the long beach; he flung himself with an enormous surge of fur-clad muscle onto the boulder where I sat. "Soames," I said—very quietly, "he's here because *we're* here, isn't he?" The naturalist nodded. I felt water drip on my elbow behind me, then the fragile scrape of whiskers, and finally the wet warmth and weight of a muzzle, as the creature settled to sleep on my arm. I was catching on to sea lions.

Walk into the water. Instantly sea lions surround you, even if none has been in sight. To say that they come to play with you is not especially anthropomorphic. Animals play. The bull sea lions are off patrolling their territorial shores; these are the cows and young, which range freely. A five-foot sea lion peers intently into your face, then urges her muzzle gently against your underwater mask and searches your eyes without blinking. Next she rolls upside down and slides along the length of your floating body, rolls again, and casts a long glance back at your eyes. You are, I believe, supposed to follow, and think up something clever in return. You can play games with sea lions in the water using shells or bits of leaf,

if you are willing. You can spin on your vertical axis and a sea lion will swim circles around you, keeping her face always six inches from yours, as though she were tethered. You can make a game of touching their back flippers, say, and the sea lions will understand at once; somersaulting conveniently before your clumsy hands, they will give you an excellent field of back flippers.

And when you leave the water, they follow. They don't want you to go. They porpoise to the shore, popping their heads up when they lose you and casting about, then speeding to your side and emitting a choked series of vocal notes. If you won't relent, they disappear, barking; but if you sit on the beach with so much as a foot in the water, two or three will station with you, floating on their backs and saying, Urr.

Few people come to the Galápagos. Buccaneers used to anchor in the bays to avoid pursuit, to rest, and to lighter on fresh water. The world's whaling ships stopped here as well, to glut their holds with fresh meat in the form of giant tortoises. The whalers used to let the tortoises bang around on deck for a few days to empty their guts; then they stacked them below on their backs to live—if you call that living—without food or water for a year. When they wanted fresh meat, they killed one.

Early inhabitants of the islands were a desiccated assortment of grouches, cranks, and ships' deserters. These hardies shot, poisoned, and enslaved each other off, leaving behind a fecund gang of feral goats, cats, dogs, and pigs whose descendants skulk in the sloping jungles and take their tortoise hatchlings neat. Now scientists at the

Charles Darwin Research Station, on the island of Santa Cruz, rear the tortoise hatchlings for several years until their shells are tough enough to resist the crunch; then they release them in the wilds of their respective islands. Today, some few thousand people live on three of the islands; settlers from Ecuador, Norway, Germany, and France make a livestock or pineapple living from the rich volcanic soils. The settlers themselves seem to embody a high degree of courteous and conscious humanity, perhaps because of their relative isolation.

On the island of Santa Cruz, eleven fellow passengers and I climb in an open truck up the Galápagos' longest road; we shift to horses, burros, and mules, and visit the lonely farm of Alf Kastdalen. He came to the islands as a child with his immigrant parents from Norway. Now a broad, blond man in his late forties with children of his own, he lives in an isolated house of finished timbers imported from the mainland, on four hundred acres he claimed from the jungle by hand. He raises cattle. He walks us round part of his farm, smiling expansively and meeting our chatter with a willing, open gaze and kind words. The pasture looks like any pasture—but the rocks under the grass are round lava ankle-breakers, the copses are a tangle of thorny bamboo and bromeliads, and the bordering trees dripping in epiphytes are breadfruit, papaya, avocado, and orange.

Kastdalen's isolated house is heaped with books in three languages. He knows animal husbandry; he also knows botany and zoology. He feeds us soup, chicken worth chewing for, green *naranjilla* juice, noodles, pork

in big chunks, marinated mixed vegetables, rice, and bowl after bowl of bright mixed fruits.

And his isolated Norwegian mother sees us off; our beasts are ready. We will ride down the mud forest track to the truck at the Ecuadorian settlement, down the long road to the boat, and across the bay to the ship. I lean down to catch her words. She is gazing at me with enormous warmth. "Your hair," she says softly. I am blond. *Adiós.*

II

Charles Darwin came to the Galápagos in 1835, on the *Beagle*; he was twenty-six. He threw the marine iguanas as far as he could into the water; he rode the tortoises and sampled their meat. He noticed that the tortoises' carapaces varied wildly from island to island; so also did the forms of various mockingbirds. He made collections. Nine years later he wrote in a letter, "I am almost convinced (quite contrary to the opinion I started with) that species are not (it is like confessing a murder) immutable." In 1859 he published *On the Origin of Species*, and in 1871 *The Descent of Man*. It is fashionable now to disparage Darwin's originality; not even the surliest of his detractors, however, faults his painstaking methods or denies his impact.

Darwinism today is more properly called neo-Darwinism. It is organic evolutionary theory informed by the spate of new data from modern genetics, molecular biology, paleobiology—from the new wave of the biologic revolution which spread after Darwin's announcement

like a tsunami. The data are not all in. Crucial first appearances of major invertebrate groups are missing from the fossil record—but these early forms, sometimes modified larvae, tended to be fragile either by virtue of their actual malleability or by virtue of their scarcity and rapid variation into “hardened,” successful forms. Lack of proof in this direction doesn’t worry scientists. What neo-Darwinism seriously lacks, however, is a description of the actual mechanism of mutation in the chromosomal nucleotides.

In the larger sense, neo-Darwinism also lacks, for many, sheer plausibility. The triplet splendors of random mutation, natural selection, and Mendelian inheritance are neither energies nor gods; the words merely describe a gibbering tumult of materials. Many things are unexplained, many discrepancies unaccounted for. Appending a very modified neo-Lamarckism to Darwinism would solve many problems—and create new ones. Neo-Lamarckism holds, without any proof, that certain useful acquired characteristics may be inherited. Read C. H. Waddington, *The Strategy of the Genes*, and Arthur Koestler, *The Ghost in the Machine*. The Lamarckism/Darwinism issue is not only complex, hinging perhaps on whether DNA can be copied from RNA, but also politically hot. The upshot of it all is that while a form of Lamarckism holds sway in Russia, neo-Darwinism is supreme in the West, and its basic assumptions, though variously modified, are not overthrown.

So much for scientists. The rest of us didn’t hear Darwin as a signal to dive down into the wet nucleus of a cell and surface with handfuls of strange new objects. We were still worried about the book with the unfortu-

nate word in the title: *The Descent of Man*. It was dismaying to imagine great-grandma and great-grandpa effecting a literal, nimble descent from some liana-covered tree to terra firma, scratching themselves, and demanding bananas.

Fundamentalist Christians, of course, still reject Darwinism because it conflicts with the creation account in Genesis. Fundamentalist Christians have a very bad press. Ill feeling surfaces when, from time to time in small towns, they object again to the public schools’ teaching evolutionary theory. Tragically, these people feel they have to make a choice between the Bible and modern science. They live and work in the same world as we, and know the derision they face from people whose areas of ignorance are perhaps different, who dismantled their mangers when they moved to town and threw out the baby with the straw.

Even less appealing in their response to the new evolutionary picture were, and are, the social Darwinists. Social Darwinists seized Herbert Spencer’s phrase, “the survival of the fittest,” applied it to capitalism, and used it to sanction ruthless and corrupt business practices. A social Darwinist is unlikely to identify himself with the term; social Darwinism is, as the saying goes, not a religion but a way of life. A modern social Darwinist wrote the slogan “If you’re so smart, why ain’t you rich?” The notion still obtains, I believe, wherever people seek power: that the race is to the swift, that everybody is *in* the race, with varying and merited degrees of success or failure, and that reward is its own virtue.

Philosophy reacted to Darwin with unaccustomed good cheer. William Paley's fixed and harmonious universe was gone, and with it its meticulous watchmaker god. Nobody mourned. Instead philosophy shrugged and turned its attention from first and final causes to analysis of certain values here in time. "Faith in progress," the man-in-the-street philosophy, collapsed in two world wars. Philosophers were more guarded; pragmatically, they held a very refined "faith in process"—which, it would seem, could hardly lose. Christian thinkers, too, outside of Fundamentalism, examined with fresh eyes the world's burgeoning change. Some Protestants, taking their cue from Whitehead, posited a dynamic god who lives alongside the universe, himself charged and changed by the process of becoming. Catholic Pierre Teilhard de Chardin, a paleontologist, examined the evolution of species itself, and discovered in that flow a surge toward complexity and consciousness, a free ascent capped with man and propelled from within and attracted from without by god, the holy freedom and awareness that is creation's beginning and end. And so forth. Like flatworms, like languages, ideas evolve. And they evolve, as Arthur Koestler suggests, not from hardened final forms, but from the softest plasmic germs in a cell's heart, in the nub of a word's root, in the supple flux of an open mind.

Darwin gave us time. Before Darwin (and Huxley, Wallace, et al) there was in the nineteenth century what must have been a fairly nauseating period: people knew about fossils of extinct species, but did not yet know

about organic evolution. They thought the fossils were litter from a series of past creations. At any rate, for many, this creation, the world as we know it, had begun in 4004 B.C., a date set by Irish Archbishop James Ussher in the seventeenth century. We were all crouched in a small room against the comforting back wall, awaiting the millennium which had been gathering impetus since Adam and Eve. Up there was a universe, and down here would be a small strip of man come and gone, created, taught, redeemed, and gathered up in a bright twinkling, like a sprinkling of confetti torn from colored papers, tossed from windows, and swept from the streets by morning.

The Darwinian revolution knocked out the back wall, revealing eerie lighted landscapes as far back as we can see. Almost at once, Albert Einstein and astronomers with reflector telescopes and radio telescopes knocked out the other walls and the ceiling, leaving us sunlit, exposed, and drifting—leaving us puckers, albeit evolving puckers, on the inbound curve of space-time.

III

It all began in the Galápagos, with these finches. The finches in the Galápagos are called Darwin's finches; they are everywhere in the islands, sparrowlike, and almost identical but for their differing beaks. At first Darwin scarcely noticed their importance. But by 1839, when he revised his *Journal of the Beagle* voyage, he added a key sentence about the finches' beaks: "Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from

an original paucity of birds in this archipelago, one species had been taken and modified for different ends." And so it was.

The finches come when called. I don't know why it works, but it does. Scientists in the Galápagos have passed down the call: you say pssssh pssssh pssssh pssssh pssssh until you run out of breath; then you say it again until the island runs out of birds. You stand on a flat of sand by a shallow lagoon rimmed in mangrove thickets and call the birds right out of the sky. It works anywhere, from island to island.

Once, on the island of James, I was standing propped against a leafless *palo santo* tree on a semiarid inland slope, when the naturalist called the birds.

From other leafless *palo santo* trees flew the yellow warblers, speckling the air with bright bounced sun. Gray mockingbirds came running. And from the green prickly pear cactus, from the thorny acacias, sere grasses, bracken and manzanilla, from the loose black lava, the bare dust, the fern-hung mouths of caverns or the tops of sunlit logs—came the finches. They fell in from every direction like colored bits in a turning kaleidoscope. They circled and homed to a vortex, like a whirlwind of chips, like draining water. The tree on which I leaned was the vortex. A dry series of puffs hit my cheeks. Then a rough pulse from the tree's thin trunk met my palm and rang up my arm—and another, and another. The tree trunk agitated against my hand like a captured cricket: I looked up. The lighting birds were rocking the tree. It was an appearing act: before there were barren branches; now there were birds like leaves.

Darwin's finches are not brightly colored; they are black, gray, brown, or faintly olive. Their names are even duller: the large ground finch, the medium ground finch, the small ground finch; the large insectivorous tree finch; the vegetarian tree finch; the cactus ground finch, and so forth. But the beaks are interesting, and the beaks' origins even more so.

Some finches wield chunky parrot beaks modified for cracking seeds. Some have slender warbler beaks, short for nabbing insects, long for probing plants. One sports the long chisel beak of a woodpecker; it bores wood for insect grubs and often uses a twig or cactus spine as a pickle fork when the grub won't dislodge. They have all evolved, fanwise, from one bird.

The finches evolved in isolation. So did everything else on earth. With the finches, you can see how it happened. The Galápagos islands are near enough to the mainland that some strays could hazard there; they are far enough away that those strays could evolve in isolation from parent species. And the separate islands are near enough to each other for further dispersal, further isolation, and the eventual reassembling of distinct species. (In other words, finches blew to the Galápagos, blew to various islands, evolved into differing species, and blew back together again.) The tree finches and the ground finches, the woodpecker finch and the warbler finch, veered into being on isolated rocks. The witless green sea shaped those beaks as surely as it shaped the beaches. Now on the finches in the *palo santo* tree you see adaptive radiation's results, a fluorescent splay of horn. It is as though an archipelago were an arpeggio, a rapid series of distinct

but related notes. If the Galápagos had been one unified island, there would be one dull note, one super-dull finch.

IV

Now let me carry matters to an imaginary, and impossible, extreme. If the earth were one unified island, a smooth ball, we would all be one species, a tremulous muck. The fact is that when you get down to this business of species formation, you eventually hit some form of reproductive isolation. Cells tend to fuse. Cells tend to engulf each other; primitive creatures tend to move in on each other and on us, to colonize, aggregate, blur. (Within species, individuals have evolved immune reactions, which help preserve individual integrity; you might reject my liver—or someday my brain.) As much of the world's energy seems to be devoted to keeping us apart as was directed to bringing us here in the first place. All sorts of different creatures can mate and produce fertile offspring: two species of snapdragon, for instance, or mallard and pintail ducks. But they don't. They live apart, so they don't mate. When you scratch the varying behaviors and conditions behind reproductive isolation, you find, ultimately, geographical isolation. Once the isolation has occurred, of course, forms harden out, enforcing reproductive isolation, so that snapdragons will never mate with pintail ducks.

Geography is the key, the crucial accident of birth. A piece of protein could be a snail, a sea lion, or a systems analyst, but it had to start somewhere. This is not science;

it is merely metaphor. And the landscape in which the protein "starts" shapes its end as surely as bowls shape water.

We have all, as it were, blown back together like the finches, and it's hard to imagine the isolation from parent species in which we evolved. The frail beginnings of great phyla are lost in the crushed histories of cells. Now we see the embellishments of random chromosomal mutations selected by natural selection and preserved in geographically isolate gene pools as *fais accomplis*, as the differentiated fringe of brittle knobs that is life as we know it. The process is still going on, but there is no turning back; it happened, in the cells. Geographical determination is not the cow-caught-in-a-crevice business I make it seem. I'm dealing in imagery, working toward a picture.

Geography is life's limiting factor. Speciation—life itself—is ultimately a matter of warm and cool currents, rich and bare soils, deserts and forests, fresh and salt waters, deltas and jungles and plains. Species arise in isolation. A plaster cast is as intricate as its mold; life is a gloss on geography. And if you dig your fists into the earth and crumble geography, you strike geology. Climate is the wind of the mineral earth's rondure, tilt, and orbit modified by local geological conditions. The Pacific Ocean, the Negev Desert, and the rain forest in Brazil are local geological conditions. So are the slow carp pools and splashing trout riffles of any backyard creek. It is all, God help us, a matter of rocks.

The rocks shape life like hands around swelling dough. In Virginia, the salamanders vary from mountain ridge

to mountain ridge; so do the fiddle tunes the old men play. All this is because it is hard to move from mountain to mountain. These are not merely anomalous details. This is what life is all about: salamanders, fiddle tunes, you and me and things, the split and burr of it all, the fizz into particulars. No mountains and one salamander, one fiddle tune, would be a lesser world. No continents, no fiddlers. No possum, no sop, no taters. The earth, without form, is void.

The mountains are time's machines; in effect, they roll out protoplasm like printers' rollers pressing out news. But life is already part of the landscape, a limiting factor in space; life too shapes life. Geology's rocks and climate have already become Brazil's rain forest, yielding shocking bright birds. To say that all life is an interconnected membrane, a weft of linkages like chain mail, is truism. But in this case, too, the Galápagos islands afford a clear picture.

On Santa Cruz island, for instance, the saddleback carapaces of tortoises enable them to stretch high and reach the succulent pads of prickly pear cactus. But the prickly pear cactus on that island, and on other tortoise islands, has evolved a treelike habit; those lower pads get harder to come by. Without limiting factors, the two populations could stretch right into the stratosphere.

Ça va. It goes on everywhere, tit for tat, action and reaction, triggers and inhibitors ascending in a spiral like spitting butterflies. Within life, we are pushing each other around. How many animal forms have evolved just so because there are, for instance, trees? We pass the

nitrogen around, and vital gases; we feed and nest, plucking this and that and planting seeds. The protoplasm responds, nudged and nudging, bearing the news.

And the rocks themselves shall be moved. The rocks themselves are not pure necessity, given, like vast, complex molds around which the rest of us swirl. They heave to their own necessities, to stirrings and prickings from within and without.

The mountains are no more fixed than the stars. Granite, for example, contains much oxygen and is relatively light. It "floats." When granite forms under the earth's crust, great chunks of it bob up, I read somewhere, like dumplings. The continents themselves are beautiful pea-green boats. The Galápagos archipelago as a whole is surfing toward Ecuador; South America is sliding toward the Galápagos; North America, too, is sailing westward. We're on floating islands, shaky ground.

So the rocks shape life, and then life shapes life, and the rocks are moving. The completed picture needs one more element: life shapes the rocks.

Life is more than a live green scum on a dead pool, a shimmering scurf like slime mold on rock. Look at the planet. Everywhere freedom twines its way around necessity, inventing new strings of occasions, lassoing time and putting it through its varied and spirited paces. Everywhere live things lash at the rocks. Softness is vulnerable, but it has a will; tube worms bore and coral atolls rise. Lichens in delicate lobes are chewing the granite mountains; forests in serried ranks trammel the hills. Man has more freedom than other live things; anti-entropi-

cally, he batters a bigger dent in the given, damming the rivers, planting the plains, drawing in his mind's eye dotted lines between the stars.

The old ark's a moverin'. Each live thing wags its home waters, rumples the turf, rearranges the air. The rocks press out protoplasm; the protoplasm pummels the rocks. It could be that this is the one world, and that world a bright snarl.

Like boys on dolphins, the continents ride their crustal plates. New lands shoulder up from the waves, and old lands buckle under. The very landscapes heave; change burgeons into change. Gray granite bobs up, red clay compresses; yellow sandstone tilts, surging in forests, incised by streams. The mountains tremble, the ice rasps back and forth, and the protoplasm furls in shock waves, up the rock valleys and down, ramifying possibilities, riddling the mountains. Life and the rocks, like spirit and matter, are a fringed matrix, lapped and lapping, clasping and held. It is like hand washing hand. It is like hand washing hand and the whole tumult hurled. The planet spins, rapt inside its intricate mists. The galaxy is a flung thing, loose in the night, and our solar system is one of many dotted campfires ringed with tossed rocks. What shall we sing?

What shall we sing, while the fire burns down? We can sing only specifics, time's rambling tune, the places we have seen, the faces we have known. I will sing you the Galápagos islands, the sea lions soft on the rocks. It's all still happening there, in real light, the cool currents

upwelling, the finches falling on the wind, the shearwaters looping the waves. I could go back, or I could go on; or I could sit down, like Kubla Khan:

Weave a circle round him thrice,
And close your eyes with holy dread,
For he on honey-dew hath fed,
And drunk the milk of Paradise.