

HOLMES ROLSTON III

Aesthetic Experience in Forests

I. THE FOREST AS AN ARCHETYPE

Like the sea or the sky, the forest is a kind of archetype of the foundations of the world. The forest represents—more literally it re-presents, presents again to those who enter it—the elemental forces of nature. Such experience serves well as instance and prototype of the aesthetic appreciation of nature.

Forests bear the signature of time and eternity. Forests take one back through the centuries; or, put another way, they bring the historic and prehistoric past forward for present encounter. This is grander time than most persons usually realize, but that ancient past is subliminally there; confronting forest giants we realize that trees live on radically different scales of time than do we. Trees have no sense of duration, experienced time; they nevertheless endure.

Forests take time by the decades and centuries, compared to the way humans take time by the days and years. The scale is at once of incremental and vast time; in a forest there is seldom any front-page news—perhaps a fire or a storm—but most of life goes on over larger time frames. Trees do not grow overnight; the big oaks in New England were there at the founding of the Republic. The towering Douglas firs in the Pacific Northwest were seedlings when Columbus sailed; sequoias can predate the launching of Christianity.

This becomes deep time. Paleontologically, forests go back three to four hundred million years. Land plants first appeared in the Silurian Period and remained close to the ground, like mosses and liverworts, until the Devonian Period, when we earliest date fossil wood. Considerable evolutionary achievement was required to organize cells, the earliest unit of life, into organisms as rigid and massive as trees. Large, erect plants need the strength of cellulose and

also vascular columns up which they can pump water and nutrients.

Dry seasons and winters have to be reckoned with. The cross-fertilization in earlier forms of life had been accomplished in the water. In the tree ferns and in the cycads, which remain yet in Australian and African forests, fertilization still took place in water droplets; only in later conifers do trees work out ways, with insects and wind, to pollinate in the open air. These problems are solved and forests have been persistently present since Middle Devonian times. They have been continuously in place in tropical climates, provided that the landscapes have remained well watered. In temperate and boreal climates forests have tracked ice sheets as they advanced and retreated, the forests returning millennia after millennia.

This deeper sense of time presents an aesthetic challenge. In ways radically unlike the aesthetic appreciation of crafted art objects—whether recently made or surviving from classical centuries—aesthetic interpretation has to reckon with antiquity that is hundreds of orders of magnitude greater. Even where the beholder's knowledge of the details of forest history is rather limited (as is true, more or less, for us all), one knows that this past is there in the shadows—first on the order of centuries, recorded in tree rings and fire scars; and behind that on the order of millennia, recorded in landforms, glacial moraines, successional patterns; and on paleontological scales, as one discovers from fossils and pollen analyses. A forest always comes with an aura of ancient and lost origins.

There is dynamic change in the midst of this antiquity. Seasons pass; the snow melts, birch catkins lengthen, warblers return, the days grow longer, and loons begin to call. Where the sea-

son is wet and dry, as in the Amazon, the rains return and the varzea floor floods. These cycles are superimposed on longer range dynamisms not so evident because of their greater scale. Here is vast but passing time; and now one also confronts in nature an element of historical evolution that is, again, radically different from any aesthetic challenge faced with art objects and their cultural history.

Art is sometimes celebrated for its timeless dimensions, despite the fact that art objects themselves age and are reinterpreted from age to age. Sculptors carve forms into stone, and even paint on canvas can persist over centuries. But neither statues nor paintings evolve as do forests. Perhaps there are analogues of classical forms that are enduring in the sweep of the hills or in the symmetries of the conifers. Yet whatever is timelessly recurring is also instantiated in recurrent change.

The forest—we must first think—is prehistoric and perennial, especially in contrast with ephemeral civilizations, their histories, politics, and arts. The perceptive forest visitor realizes also the centuries-long forest successions, proceeding toward climax, yet ever interrupted and reset by fire and storm. One confronts the evolutionary histories of forests tracking climatic changes. One sees erosional, orogenic, and geomorphic processes in rock strata, canyon walls, glacial valleys. The Carboniferous Forests were giant club mosses and horsetails; the Jurassic Forests were gymnosperms—conifers, cycads, ginkgoes, seed ferns. A forest today is yesterday being transformed into tomorrow. A pristine forest is an historical museum that, unlike cultural museums, continues to be what it was, a living landscape. This dynamism couples with antiquity to demand an order of aesthetic interpretation that one is unlikely to find in the criticism of art and its artifacts. Art too is sometimes dynamic, of course, as in music or the dance; but every art form is ephemeral on these scales of time.

In the Petrified Forest in Arizona, tens of thousands of rock logs are strewn across the desert, relics of trees living when the region was tropical forest 225 million years ago. The dominant genus in these great forests was *Araucarioxylon*; the remnant logs are enormous. A living relative is the Norfolk Island pine, *Araucaria heterophylla*, another relative is the monkey

puzzle tree, *Araucaria araucana* from South America. Both are tall conifers with a monopodial crown and radial branches, which, because of their beauty of form, are widely planted in subtropical climates today. The genus, with its characteristic form, has persisted through changes. The Petrified Forest is not far from the Grand Canyon, and comparisons give perspective. The Canyon rocks are old, the older the further down one descends; but the Canyon itself was cut in the last five or six million years. So the ancient pines were living long enough ago for the Grand Canyon to be cut and re-cut again some forty-five times over! Their descendants continue today.

John Muir spent most of his life in the California forests, where sequoia trees reach an age of several thousand years: "The forests of America," he exclaimed, "must have been a great delight to God; for they were the best he ever planted."¹ In later life, the aging Muir became interested in the Petrified Forest; through his efforts the forest was declared a National Monument in 1906. Dealing now in millions rather than thousands of years, the sense of antiquity overwhelmed him. "I sit silent and alone from morn till eve in the deeper silence of the enchanted old old forests. ... The hours go on neither long nor short, glorious for imagination ... but tough for the old paleontological body nearing seventy."² Nature has been planting forests a long time.

The sense of time passes over into an archetypal experience of pervasive and perennial natural kind. In the prehuman past, about sixty percent of Earth's land surface was forested, and much of it still is. There is a vast taiga, or boreal forest, in Canada, Siberia, and northern Europe; temperate forest was the historic cover over much of the United States, Europe, and China. There are tropical rainforests, tropical deciduous forests, thorn forests, gallery forests. Australian forests may contain hardly a single species found elsewhere in the world, but still there are the forests, of *Eucalyptus* or *Allocasuarina* rather than oak or spruce. The phenomenon of forests is so widespread, persistent, and diverse, spontaneously appearing almost wherever moisture and climatic conditions permit it, that forests cannot be accidents or anomalies but rather must be a characteristic expression of the creative process.

There is also the steppe and the veldt, the tundra and the sea, and these too have their power to arouse a sense of antiquity and of ongoing life. The desert after a rain is a joy to behold in the momentary flourishing of the flora. But forests have more evident and perennial exuberance. The forest is where the "roots" go deep, where life rises high from the ground. Forests convey a sense of life flourishing in more massive and enduring proportions; the vertical contrasts with the horizontal. The biomass is greater than on the grasslands; living things command more space, from canopy through understories down to the underground. The fiber is more solid; the vegetation on the forest floor includes annuals and biennials, but the dominants are perennials on scales of decades and centuries. The tropical rainforest is the most complex and diverse ecological community on Earth, with up to 300 different species of trees in a single hectare.

A characteristic element in the aesthetic experience of nature moves us with how the central goods of the biosphere—hydrologic cycles, photosynthesis, soil fertility, food chains, genetic codes, speciation, reproduction, succession—were in place long before humans arrived. Aesthetics is something, as we shall be saying, that goes on in experiences of the human mind, but the dynamics and structures organizing forest biomes do not come out of the mind. Immersed in a nonhuman frame of reference, one knows the elements primordial. Subjective though aesthetic experience may be, here we make contact with the natural certainties. Forests and sky, rivers and earth, the everlasting hills, the cycling seasons, wildflowers and wildlife—these are superficially pleasant scenes in which to recreate. At more depth, they are the timeless natural givens that support everything else.

On these scales humans are a late-coming novelty, and that awareness too is aesthetically demanding. Humans evolved out of the forests, although with early *Homo sapiens* that often meant the savanna, the tree-studded but still relatively open-to-view landscape. Our ancestors had descended from the trees and gained upright posture; they needed hands for civilization, spaces through which to hunt, and room for their camps and villages. The gallery forests of Africa are as much forests as Douglas fir in the American Northwest; they too exemplify the forest archetype.

Nor did humans escape their association with forests. There is evidence that we are still genetically disposed to prefer partially forested landscapes.³ Most of the lands that humans have inhabited, especially as they moved from tropical to temperate climates, were, at the time of human entry, forested; and many of them have remained heavily forested until comparatively recent times. Civilization, especially in Europe and America, created space for itself in the midst of forests, opening these up, making our residential areas more like savannas. Though we felt more comfortable clearing the forest for a pasture, for the farm and the village, we kept the trees throughout the countryside, and along streets and in parks even in our urban environments.

In the back of our minds, we know that all such trees, wherever incorporated into the economics or aesthetics of civilization, are out of the legacy of the forest. We are reminded by them that forests are always there on the horizon of Western culture, part of our life support system, part of our origins. This location—trees amongst us and forests on the horizon of culture—keeps forests there in their wildness as a perennial symbol of an archetypal realm out of which we once came. The forest is where one touches the primordial elements raw and pure. "I went to the woods," remarked Thoreau, "because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived."⁴

No one can live in bare woods alone; civilization too is, for humans, one of the essential facts of life. The town, however, is not so aboriginally archetypal, and that element in life is what is experienced in forests. Were civilization to collapse, the forests would return. The earth would revert to wilderness, because this is the foundational ground. Such aesthetic power of nature stands in strong contrast to classical aesthetic experience of art forms. The creations of sculptors, painters, musicians, and craftsmen always betoken civilization, the critical beholder enjoying the fruits of the labor and leisure of culture. But in the forest the elements are savage; one is not dealing with art or artifact, nor even of artist, but one has penetrated to the archetypes.

There are inanimate natural kinds that nature generates and regenerates over the epochs: moun-

tains, canyons, rivers, estuaries. But the miracle of Earth is that nature decorates this geomorphology with life. Trees evoke this genesis and biological power: Eden with its tree of life, or the shoot growing out of the stump of Jesse, or the cedars of Lebanon—again and again there is life's transient beauty sustained over chaos, life persisting in the midst of its perpetual perishing. A visit to a forest contributes to the human sense of place in space and time, of duration, antiquity, continuity. There one encounters "the types and symbols of Eternity" (Wordsworth).⁵

II, SCIENTIFIC APPRECIATION OF FORESTS

En route to such appreciation, one needs the knowledge that scientific forestry can provide. True, one can enjoy forests for their form and color, oblivious to the taxonomic names of the species (*Picea pungens* or *Quercus alba*), much less knowledge of the forest type (montane transition zone to the subalpine, or an oak-hickory forest). The autumn leaves require only an eye for color, with perhaps also a sense of passing seasons, which adds to an ephemeral touch of sadness. This is a lovely Indian summer day, and winter on the way. The hues of spring green, bursting forth upon leafing out, replacing the wintry grays of the trunks and limbs, still set against the darker conifers—one does not need science to appreciate these features. Much less still does one always need paleontological knowledge (that gymnosperms anciently were largely replaced by angiosperms), or ecological explanations (gymnosperms nevertheless dominate in high elevation or latitude climatic regimes).

Still, one cannot adequately enjoy a forest more or less as though it were found art, with admirable form and color. A forest is not art at all; there is no artist. To see the forest landscape as art object is to misunderstand it. Nor is it just some potential materials for our aesthetic composition. If we make the forest over into an object of our aesthetic fancy, as we might find a piece of driftwood and display it for its form and curve, then we project onto it our craft and criteria, yet fail to see what is there. Aesthetic experience of nature always demands our realizing that nature itself is a nonartistic object, not designed by any artist for our admiration, not framed or put on a pedestal—all this is much of the secret of nature's aesthetic power, construct

though we may the aesthetic categories through which such nature is experienced.

One has to appreciate what is not evident, and here science helps. Marvelous things are going on in dead wood, or underground, or in the dark, or microscopically, or slowly, over time; these processes are not scenic, but an appreciation of them can be aesthetic. The stellate pubescence on the underside of a *Shepherdia* leaf, seen with a hand lens, is quite striking. The weird green luminescence of *Panus stypticus*, a mushroom, discovered on a moonless night, is never forgotten. One experiences how things fit together in the intricate patterns of life. The good of a tree is only half over at its death; an old snag provides nesting cavities, perches, insect larvae, food for birds.

One can enjoy trees, as did Kilmer: "I think that I shall never see, a poem as lovely as a tree."⁶ If one knows, however, that that is a conifer, and those are the pistillate cones and these the staminate cones, and that maples and ashes have opposite leaves, or that willows have only one bud scale, one sees more than poetic beauty in trees. Science requires a closer look at flowers and fruits, their structure and symmetry. There is careful observation to underwrite and support what can otherwise be too impressionistic.

True, those who can count the needle fascicles and get the species right, if they never experience goose pimples when the wind whips through the pines, fail as much as do the poets in their naive romanticism. Nevertheless, only when moving through science to the deeper aesthetic experiences that are enriched by science can the forest be most adequately known. Aestheticians are often not comfortable with this; they want to insist on human capacities to confront nature in relative independence of science.⁷ One must be moved, but one needs to be moved in the right direction, where "right" means with appropriate appreciation of what is actually going on.

Trees push toward the sky, and this sense of pressing upward is vital in forest appreciation. There is, of course, a ready scientific explanation for such loft. Given photosynthesis, there is competition for sunlight, and plants that can place their leaves higher are the winners in the struggle for survival. The tree has both to invest in structural materials, cellulose, to maintain the heights needed, and also to lift needed nutrients

and ground water to such elevations; hence the structure of trunks and limbs. Another of the ecological archetypes is grassland, found extensively where water is too limiting a resource for forests; also there are alpine and tundra ecosystems where the wind and the cold are too limiting.

These survival techniques are the causes of forests, but what is one to make of appreciating the results achieved? This introduces another element in aesthetic challenge that is without precedent in classical art criticism. One seldom requires an appropriate scientific appreciation of an art object for its proper enjoyment. Forests have to be, in a certain measure, disenchanted to be properly enjoyed, although, as we shall insist, forest science need not eliminate the element of the sublime, or even of the sacred. Indigenous and premodern peoples typically enchanted their forests. After science, we no longer see forests as haunted by fairies, nymphs, or gnomes. Forests are biotic communities; we have naturalized them.

Perhaps one can enjoy the riot of autumn colors or the subtle spring hues by lingering over the scene before one's eyes. But a forest cannot be understood simply by looking long and hard at it—whether the understanding sought is scientific or aesthetic. A campfire, for example, built for warmth on an autumn evening, can be enjoyed aesthetically, and perhaps one does not need to know about the oxidation and reduction of carbon to enjoy its flickering light in the twilight, or to welcome its warmth against the cool of the night. But fire cannot really be understood by however careful an observation, trying to see what is taking place. The naturalist Jean Baptiste Lamarck tried that and failed; he thought the aggressive fire was stripping away chromatic layers to find the basic black beneath. Antoine-Laurent Lavoisier gave us the understanding we need with experiments weighing the products of combustion, experiments with animals showing that they could not breathe in combusted air. He realized that oxygen is there, that combustion is the oxidation of carbon, with similarities to breathing, the energy driving life.

To understand a forest, one needs concepts, such as carbon bonding, oxidation, oxygen balance, photosynthesis, and knowledge of glucose, cellulose, or nutrients such as nitrogen and phosphorous. Science takes away the colors, if you insist; apart from beholders, there is no au-

tumn splendor or spring green. But science gives us the trees solidly there, photosynthesizing without us, energetically vital to the system of life of which we are also a part. Forestry is usually thought to be an applied science, but it can also, when it gains the perspective of a pure science, help us to appreciate what the forest is in itself. There are trees rising toward the sky, birds on the wing and beasts on the run, age after age, impelled by a genetic language almost two billion years old. There is struggle and adaptive fitness, energy and evolution inventing fertility and prowess. There is succession and speciation, muscle and fat, smell and appetite, law and form, structure and process. There is light and dark, life and death, the mystery of existence. These figure in aesthetic experience, but there must be science beneath.

HI. AESTHETIC ENGAGEMENT IN FORESTS

Science, however necessary, is never sufficient. Forests must be encountered. Forests are constructed by nature, and science teaches us how that is so. Yet forests by nature contain no aesthetic experience; that has to be constructed as we humans arrive. Knowledge of the forest as an objective community does not guarantee the full round of aesthetic experience, not until one moves into that community oneself.

In nature unvisited by humans we incline to think there is no aesthetic experience at all, certainly not in the trees, and hardly in the birds or the foxes. After all, the trees are not even green, much less beautiful, except as we humans are perceiving them. If a tree falls in the forest, and there is no perceiver, there is no sound. The secondary qualities are observer-introduced. *A fortiori*, forests cannot be beautiful on their own. The primary qualities, or the biological functions, or the ecological relationships are there without us. But only when we humans arrive to color things up, to take an interest, is there any experience of beauty; aesthetic experience of forests is an interaction phenomenon during which the forest beauty is constituted.

In the forest itself, there is no scenery, for example; we compose the landscape vista. Subjective experience and objective forests, beauty and trees—this conjoins and juxtaposes opposites: forests undergo no aesthetic experience; trees enjoy no beauty. The beauty is in the eye of

the beholder, constituted with our phenomenal experience, whatever forest properties may arouse such sense of beauty. Meanwhile, it is difficult to escape the experience of gratuitous beauty—with autumn leaves, or montane peaks, or with trilliums unexpected along a woodland path.

The aesthetic challenge is to complement the forest dynamics, which have been ongoing over the centuries and millennia, with this novel emergent that does come into being when I arrive. Appropriate aesthetic experience ought to be "up to" the forest, that is, adequate to its form, integrity, antiquity, value; but whether this happens is "up to" me, that is, unless I see that it happens, it does not happen. Aesthetic appreciation would fail if humans, scientists, were to visit and gain nothing but facts about trees.

This demand for adequate response to nature is different from the demand with art. Much more is up to me. Confronting an art object, we realize that there was once an artist, and we may think it significant to recover something of the aesthetic experience of the artist. When we are enjoying a symphony, the musicians are enjoying it too. Aesthetic intent constitutes the art, and the beholder comes to share, perhaps also to enrich, this intent. But in the forest, surrounded by trees, we alone are the loci of aesthetic life. The challenge is to encounter nonaesthetic trees, mountains, rivers, and awaken to the experience of beauty. It is unlikely that the categories formulated for the human arts will serve for the demands of forest experience.

Aesthetic appreciation of nature, at the level of forests and landscapes, requires embodied participation, immersion, and struggle. We initially may think of forests as scenery to be looked upon. That is a mistake. A forest is entered, not viewed. It is doubtful that one can experience a forest from a roadside pullover, any more than on television. A deer in a zoo is not the experience of wild deer. The cage prevents the reality. Experiencing a forest through a car window differs mostly in that the beholder now is in the cage, which again prevents the reality. You do not really engage a forest until you are well within it.⁸

The forest attacks all our senses—sight, hearing, smell, feeling, even taste. Visual experience is critical. But no forest is adequately experienced without the odor of the pines or of the wild roses; and one catches how much animal

senses of smell can exceed our own. The elk I heard, but did not see; they caught my scent. The wind is against me. What is a forest without the wind heard and felt, against which one draws his jacket tighter? Wait, wasn't that a kinglet that called—the first I have heard this season. Art is seldom so multisensory.

Most of all, there is the kinesthetic sense of bodily presence, being incarnate in place. One seeks shelter for lunch, to discover, cooling down after the brisk walk, that there is too much shade, and one moves to the sun, and enjoys the warmth. Hiking in, there are hours of footprints behind me, I have rounded a bend and there before me is the rolling expanse of more forest than that through which I have already come. Where is the next water likely to be? How much more of the trail can I safely do today?

This surrounding and engagement, spontaneity and participatory eventfulness, differs from art, which is typically located and looked upon, as with a framed picture or a statue atop a pedestal. In a forest I have to choose what to consider—how much to integrate, the level of focus—in a place present all around me. A person is immersed in some art, as in a splendid building or a garden. These too have their boundaries: one can see the building from a distance, or circumscribe the garden boundaries. A forest must eventually have boundaries too, but the boundaries are often zones of transition, where one aesthetic challenge passes into another. The boundaries are ample enough that one gets so far in that any discrete borders are gone, especially in large forests. That is, more or less, the test of a forest against a woodlot, or a serious forest against a timber tract: whether one can get at such distance from the boundaries that they disappear from constant consciousness. Such boundaries in art seldom disappear. We need the framing to separate out the artifact and to confine the experience.

There is something amiss about the idea that aesthetics requires disinterest and distance, in contrast to more utilitarian pursuits. This is only half true even for art objects. All art invites participation; the aesthetic experience must have some bite to it. Nevertheless, one walks away from the painting or statue, and gets lunch elsewhere. If the forest is only scenery through a car window, one can plan lunch in town. Deep in the forest one is embodied, surrounded by the ele-

ments, and the total sensory, vital participation is more urgent.

True, one can experience the beauty of a forest only if one's more basic needs for food and shelter have been satisfied. One separates out the beauty of the snowflakes, seen at a glance on one's dark jacket sleeve, from the fact that the gathering storm is dangerous, and a few more inches of snow on the winter's snowpack, filling in one's tracks, will obscure the route out. Still, the bodily participation in the forest, the competence demanded and enjoyed there amidst its opportunities and threats, the struggle for location in and against the primordial world—this engagement enriches the aesthetic experience. I am undeniably here, and the forest, for all its aesthetic stimulation, is indifferent to my needs. I am five miles from the trailhead; I am quite on my own. The storm is coming up, the spruce are bending with the wind, supper is not cooked, and it is getting dark.

Gaston Bachelard writes: "We do not have to be long in the woods to experience the always rather anxious impression of 'going deeper and deeper' into a limitless world. Soon, if we do not know where we are going, we no longer know where we are. ... This limitless world ... is a primary attribute of the forest."⁹ It is easier to get lost there than in a more open savanna or grassland. Trails give a sense of security. Forests can be dense; they veil space with their trunks and leaves, and one has to take care against disorientation. But that is again to realize our limits, to sense vulnerable embodiment, and to risk engagement with the sublime.

IV, THE FOREST AND THE SUBLIME

In the primeval forest humans know the most authentic of wilderness emotions, the sense of the sublime. By contrast, few persons get goose pimples indoors, in art museums, in fashionable shopping centers, or at the city park. The sublime invokes a category that was, in centuries past, important in aesthetics but is thought to have lapsed in our more modern outlook. Never mind whether the category is currently fashionable. The sublime is perennial in encounter with nature because wherever people step to the edge of the familiar, everyday world, they risk encounter with grander, more provocative forces that touch heights and depths beyond normal ex-

perience, forces that transcend us and which both attract and threaten. Forests are never very modern or postmodern, or even classical or pre-modern. They explode such categories and move outside culture into fundamental nature.

Almost by definition, the sublime runs off scale. There is vertigo before vastness, magnitude, antiquity, power, elemental forces austere and fierce, enormously more beyond our limits. At an overlook in the mountains, with trees all around, the ground runs right up to your feet and disappears over the horizon, often, in the as-yet-unexplored forest, with a suggestion of space prolonged indefinitely. The forest's roots, that is, its radical origins, plunge down to depths one knows not where. The trees point upward along the mountain slope, which rises to join the sky, and the scene soars off to heights unknown. The aesthetic situation has gotten out of control because the limits have vanished. The frames and pedestals familiar to cultured aesthetic experience are gone. There are no theatrical stages with actors about to appear, no musical instruments in players' hands, no garden walls or gardeners planting the oncoming season's flowers. One encounters what was aboriginally there in its present incarnation.

But few forests are primeval—the more prosaic aestheticians will protest. Rare is the forest that has not been reshaped by human agency—by cutting up trees with chain saws, by cutting up forests with roads, by fencing forests around and running cattle through them, by intentionally planting more desirable species. There are also the unintended changes, like the chestnut blight, or the understory invaded with honeysuckle.

Still, the forest, shaped by management and mismanagement though it may be, proves more able than the field or pasture to retain the natural element. Nature takes back over and does its thing, if not its pristine activity, then still something relatively wild. Unless the forest, so-called, is only a plantation, impressive wildness remains even in silviculture. Hopefully, the wildlife is there; something of the native biodiversity remains. A National Forest may be a working forest, not a wilderness. Still, a day's hike through it, even if along an old timber road, is more likely to produce the sense of the sublime than is a stroll through the pasture.

In other realms of nature—as we stand awestruck before the midnight sky perhaps, or

watching a sunset over arctic ice, or deep in the Vishnu schist of the Grand Canyon—beauty and power are yet lifeless. In a forest the sublime and the beautiful are bound up with the struggle for life. Think, for instance, of wind-swept bristlecone pines along a ridge in the Sierras. Or of the stunted birch toward the treeline in the Norwegian mountains. The biological element in the sublime is the beauty of life coupled with struggle. The aesthetic challenge is conflict and resolution presented on these awesome scales,

Like clouds, seashores, and mountains, forests are never ugly, they are only more or less beautiful; the scale runs from zero upward with no negative domain. Destroyed forests can be ugly—a burned, windthrown, diseased, or clear-cut forest. But even the ruined forest, regenerating itself, still has positive aesthetic properties. Trees rise to fill the empty place against the sky. A forest is filled with organisms that are marred and ragged—oaks with broken limbs, a crushed violet, the carcass of an elk. The gnarled bristlecone at the edge of the tundra is not really ugly, not unless endurance and strength are ugly. It is the presence and symbol of life forever renewed before the winds that blast it.

Forests are full of shadows, and this is metaphorically as well as literally true. The darkness shadowing life is as much the source of beauty as is light or life. The word "forest" (a grander word than "trees" in the plural) forces retrospect and prospect; it invites holistic categories of interpretation as yesterday's flora and fauna pass into tomorrow. Yes, there are fire scars at the bases of these ponderosas, but see how they have healed over. And we were just walking through the lodgepole forest regenerated after that fire two decades back; the stand is already thinning itself and the taller trees overtopping our heads.

Think about it. There is enough power in a handful of these cones to regenerate the forest henceforth for millennia. Yes, giants have fallen, and rotting logs fill the forest floor. And see, here is the humus from which the present forest rises—"the immeasurable height of woods decaying, never to be decayed" (Wordsworth).¹⁰ This softens the ugliness and sets it in somber beauty. When one reaches a high point where the forest dominates the landscape in every direction, and remembers this regeneration of new

life out of old on a scale of centuries and millennia, one knows the sense of the sublime.

V. THE FOREST AND THE SACRED

When beauty transforms into the sublime, manifest in the perennial vitality of an ancient forest, the aesthetic is elevated into the numinous. "Break forth into singing, O mountains, O forest, and every tree in it!" (Isaiah 44.23). "The trees of the Lord are watered abundantly; the cedars of Lebanon which he planted" (Psalms 104.16). "The groves were God's first temples" (William Cullen Bryant).¹ The forest is a kind of church. Trees pierce the sky, like cathedral spires. Light filters down, as through stained glass. The forest canopy is lofty, far above our heads. There is something about being deep in the woods, with the ground under one's feet and no roof over one's head, that generates religious experience.

Again, just as aestheticians earlier resisted being too indebted to science, now aestheticians may protest that their experiences need not be religious.¹² Nevertheless, the line between aesthetic respect and reverence for nature is often crossed unawares, somewhere in the region of the sublime. In common with churches, forests, like sea and sky, invite transcending the human world and experiencing a comprehensive, embracing realm. Forests can serve as a more provocative, perennial sign of this than many of the traditional, often outworn, symbols devised by the churches. Mountaintop experiences, the wind in the pines, a howling storm, a quiet snowfall in wintry woods, solitude in a grove of towering spruce, an overflight of honking geese—these generate "a sense sublime of something far more deeply interfused ... a motion and spirit that impells ... and rolls through all things. Therefore I am still a lover of the meadows and the woods, and mountains" (Wordsworth).¹³ Muir exclaimed, "The clearest way into the Universe is through a forest wilderness."¹⁴

Were we saying that science has secularized the forest? Yes, if that means that the forest is no longer enchanted. But the forest is strangely resistant to being secularized in the etymological sense of that term, being reduced to "this present age" (Latin *saeculum*), or in any reductionist or profane senses either. Forests do not mechanize well; they are not machines. There is too much

that is organic, or, better, too much that is vital, or, better still, too much that is valuable. The spirit of place returns.

Science leaves us puzzled whether the values in the woods are intrinsic or instrumental, and if intrinsic whether they are anthropogenic and projected onto the trees or autonomously intrinsic and found by the forest beholder, whose aesthetic experience tunes him or her in to what is going on. The forest is there, but so also is the person here, trying to figure it all out. The answers seem to lie in terms of what is discovered in the forests, not merely in terms of what preferences we adopt toward it. But when value is discovered there, the forest as archetype, as spontaneously self-organizing, as generator of life, not merely as resource, but as Source of being, the forest starts to become a sacrament of something beyond, something ultimate in, with, and under these cathedral groves.

The forest has a way of spontaneously re-enchanting itself. Forests are not haunted, but that does not mean that there is nothing haunting about forests. Perhaps the supernatural is gone, but here the natural can be supercharged with mystery. Science removes the little mysteries (how acorns make oaks which make acorns) to replace them with bigger ones (how the acorn-oak-acorn loop got established in the first place). Thanks to the biochemists, molecular biologists, geneticists, botanists, ecologists, forest scientists, we know how this green world works. But is this an account that demystifies what is going on?

Photons of light flow from the sun. Some impact leaves and are captured by antenna molecules in the chloroplasts (a half million of them per square millimeter of leaf), relayed to a reaction center molecule where, in Photosystem II, the energy of the photons is used to move electrons up to a high energy perch (at the PS 680 chlorophyll molecule). The electrons then move down a transport chain, cocking an ADP molecule up to its ATP high-energy form, and are passed to the reaction center of Photosystem I. There, with more photons absorbed, the electrons are moved back up to a second high-energy perch (at the PS 700 molecule). They descend another electron transport chain, this time producing a high-energy NADPH molecule.

The two high energy molecules (ATP and NADPH) are then used, in the Calvin cycle, to

synthesize sugar. This is a complex series of over a dozen reactions that takes carbon dioxide from the atmosphere and shuttles it around in numerous steps to make, first, three-carbon intermediates and then the six-carbon sugar glucose, as well as other products. That sugar can be stored in the plant as starch, as well as sugar. This is the energy that powers essentially all of life, the fuel for natural history. Or the glucose can be made into another polymer, cellulose, to form the tough and persistent structures of plant and forest life.

Moses thought that the burning bush, not consumed, was quite a miracle. We hardly believe any more in that sort of supernatural miracle; science has made such stories incredible. What has it left instead? A self-organizing photosynthesis driving a life synthesis that has burned for millennia, life as a strange fire that outlasts the sticks that feed it. This is, one could say, rather spirited behavior on the part of secular matter, "spirited" in the animated sense, in the root sense of a "breath" or "wind" that energizes this mysterious, vital metabolism. These bushes in the Sinai desert, these cedars of Lebanon, these forests across America, the best God ever planted—all such woody flora are hardly phenomena less marvelous even if we no longer want to say that this is miraculous.

Indeed, in the original sense of "miracle"—a wondrous event, without regard to the question whether natural or supernatural—the phenomenon of photosynthesis with the continuing floral life it supports is the secular equivalent of the burning bush. The bush that Moses watched was an individual in a species line that had perpetuated itself for millennia, coping by the coding in its DNA, fueled by the sun, using cytochrome *c* molecules several billion years old, and surviving without being consumed. Remember the magnificent *Araucarioxylon* 225 million years ago in the now petrified Arizona forest, surviving yet in the *Araucaria* of Africa and Australia. To go back to the miracle that Moses saw, a bush that burned briefly without being consumed, would be to return to something several orders of magnitude less spectacular.

The account we have is, if you like, a naturalistic account, but this nature is quite spectacular stuff. Science traces out some causes, which disappear rearward in deep time, and carry on a continuing genesis, and leave us stuttering for

meanings. The forest remains a kind of wonderland, a land that provokes wonder. It is not so much that some ultimate or Absolute noumenon eludes us as that the empirical phenomena about which there is absolutely no doubt need more explanation than the secular categories seem able to give. We may doubt that God exists, but here without doubt is this existing forest, and nature lies in, with, and under it. If God is gone, then Nature needs to be spelled with a capital N.

Loren Eiseley, surveying evolutionary history, exclaims, "Nature itself is one vast miracle transcending the reality of night and nothingness."¹⁵ Ernst Mayr, one of the most celebrated living biologists, impressed by the creativity in natural history, says, "Virtually all biologists are religious, in the deeper sense of this word, even though it may be a religion without revelation. ... The unknown and maybe unknowable instills in us a sense of humility and awe."¹⁶ The sublime is never really far from the religious, since the sublime takes us to the limits of our understanding, and we wonder at what is mysteriously beyond.

Being among the archetypes, the forest is about as near to ultimacy as we can come in phenomenal experience. It presents us with natural history: a vast scene of sprouting, budding, leafing out, flowering, fruiting, passing away, passing life on. I become astonished that the forest should be there, spontaneously generated. There are no forests on Mars or Saturn; none elsewhere in our solar system, perhaps none in our galaxy. But Earth's forests are indisputably here. There is more operational organization, more genetic history in a handful of forest humus than in the rest of the universe, so far as we know. How so? Why? A forest wilderness elicits cosmic questions, differently from art and artifacts. If anything at all on Earth is sacred, it must be this enthralling creativity that characterizes our home planet. Forests are sacraments of life rising up on Earth. Here an appropriate aesthetics becomes spiritually demanding.

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2. John Muir, quoted in Robert A. Long and Rose Houk, *Dawn of the Dinosaurs: The Triassic in the Petrified Forest* (Petrified Forest, AZ: Petrified Forest Museum Association, 1988), p. 10.
3. Gordon H. Orians and Judith H. Heerwagen, "Evolved Responses to Landscapes," in *The Adapted Mind*, eds. Jerome H. Barkow, Leda Cosmides, and John Tooby (New York: Oxford University Press, 1992), pp. 555-579.
4. Henry David Thoreau, *Walden in Walden and Civil Disobedience*, ed. Owen Thomas (New York: W. W. Norton, 1966), p. 61.
5. William Wordsworth, *The Prelude*, Book VI, line 639.
6. Joyce Kilmer, "Trees" (1913), in *Joyce Kilmer: Poems, Essays and Letters* (New York: George H. Doran Co., 1918), vol. 1, p. 186.
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8. Arnold Berleant, *The Aesthetics of Environment* (Temple University Press, 1992).
9. Gaston Bachelard, *The Poetics of Space* (1958), trans. Maria Jolas (Boston: Beacon Press, 1994), p. 185.
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11. William Cullen Bryant, *A Forest Hymn*. 1825. See also James George Frazer, "The Worship of Trees," in *The Golden Bough*, a new abridgement (Oxford: Oxford University Press, 1994), pp. 82-97.
12. Noel Carroll, "On Being Moved by Nature"; T. J. Diffey, "Natural Beauty without Metaphysics," in Kemal and Gaskell, eds, *Landscape, Natural Beauty and the Arts*, pp. 43-64.
13. William Wordsworth, *Lines Composed a Few Miles above Tintern Abbey* (1798).
14. John Muir, *John of the Mountains: The Unpublished Journals of John Muir*, ed. Linnie Marsh Wolfe (Boston: Houghton Mifflin, 1938), p. 313.
15. Loren Eiseley, *The Firmament of Time* (New York: Atheneum, 1960), p. 171.
16. Ernst Mayr, *The Growth of Biological Thought* (Harvard University Press, Belknap Press, 1982), p. 81.