[Note to the reader: *At science conferences, presentations are ad-libbed and built around overheads. At humanities conferences, presentations are written in advance in the King's English and read verbatim. What follows is some sort of hybrid. I apologize that the two print ads I discuss aren't included in this document. Neither is the conceptual diagram I used to organize authors and ideas, a diagram meant to be seductively revealed box by box as I talked (perhaps you'd like to play along at home?) I would love to hear comments from anyone who stumbles on this essay, and would happily scan the ads and send them along, if you're interested, in exchange.*]

Priests, tricksters, and holy wanderers in the practice of natural history

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If environmental science were a religious tradition, what kind of religion would it be? Perhaps this is metaphor; perhaps it is literally true, this idea (which is not new) that the modern scientific tradition, in cultural context, functions like a complex religious tradition in its own right. In either case, one of the more common and compelling answers is that modern science is a centralized religious authority akin to the old high priesthood of Jerusalem. That is, an authority that's linked to political power, that mediates that ultimate truth for the rest of the population, who then either accept that official mythology or rebel against it. You can push this metaphor pretty far. My theme today, though, is that this is a limited idea of science just as it's a limited idea of religion. If we want to understand better what science is, how it functions, its range of cultural meanings, then we should consider what other models the field of the history of religions offers.

In particular, we know that any religious tradition, or even just the religious specialists within a tradition, comprise a center and a periphery, not just a center, and that the center and periphery aren't stable; they feed back on each other; ideas and people move back and forth between them. Furthermore, we know that most theologies or bodies of myth contain, alongside the centralizing, meaning-making ideas, a set of decentralizing, meaning-breaking ideas, like trickster stories, transgressive mysticism, zen koans. We could call these the center-seeking and center-fleeing tendencies, or we can use Jonathan Z. Smith's categories of the locative and the utopian, literally, "in-place" and "no-place." This is a model that Smith develops in his book *Map Is Not Territory*. It's an idea with a very intuitive justification: that myth and theology don't simply construct tidy, organized visions of the world, but rather respond to the world as we experience it by oscillating between order and disorder—between putting things in place and shaking them up. This is a model of great traditions as essentially plural and capable of internal incongruity, as opposed to monolithic.

Now what does this have to do with science? I'm going speak fairly generally about the theory and practice of modern ecology, but I want to start with a more specific motivation. Here's an ad from the Council for Biotechnology Information that appeared in the *New Yorker* a few weeks ago, part of a series that's been appearing there. "Advancements in plant biotechnology mean that we can now grow crops that are protected from insect pests"—in other words, these plants grow powerful, common pesticides within themselves—"which means less spraying across our country's farmland." As you might be guessing, the Council for Biotechnology Information advertises the interests of biotech corporations like Monsanto and Archer-Daniels Midland. But on the face of it, it's a very gentle story: "good ideas are growing." And our future looks sunny.

In Hawaii, as you see in this second ad, the same folks are saving communities from disaster, enhancing crops, feeding an ever-increasing world population. So the population is growing, the papayas are growing, good ideas are growing, and—this is the real point—science is growing. This is the familiar story of science, what you could call the official story: the story of constant "advancements," the voyage of discovery.

Environmental groups have some standard and pretty good rejoinders to this promotion, which I won't go into. The odd thing about this story that I want to point out is more systematic: this spraying, which the ad is taking for granted as a very bad thing, was actually the hero of the last chapter of the same story. Pesticides and chemical fertilizers were going to feed the world; this spraying was not that long ago being touted itself as "advancements is plant biotechnology."

In other words there are two stories of science here: there's the confident, sunny, voyage-of-discovery story that the ad means to tell, but in the interstices is a story about doubt, about the failed promise of science, about the meaninglessness of scientific certainty. The crucial thing is that this intersticial story isn't a rejection of the scientific tradition; you can come to it through just the kind of thorough skepticism that is the stock-in-trade of the everyday practice of science. An institutional history of bioscience, though, the history written by the priesthood, by the Council for Biotechnology Information, omits that skepticism for obvious reasons of self-interest.

So what does the ethnographer or cultural historian do with this? I'm suggesting that we approach it on Smith's terms, as an artifact of a perpetual tension between science's in-place, centered ideas and people, and its peripheral, out-of-place ideas and people.

So let's back up to the roots of modern ecology, and talk about Gilbert White. He was an English country pastor of the late 1700's who wrote a book called *The Natural History of Selborne*, which created the genre of the modern nature essay. He was born in the village of Selborne and died there, and seems from his book to have spent the sixty years in between very curious and happy and comfortable. He corresponds with other gentleman naturalists, he wanders the woods around Selborne, he studies how a hedgehog eats a plantain root. He was very much in-place, at-home—at the "locative" end of our spectrum—not only in his daily life but also in his science and his natural theology.

White is important because he articulates what is still our most central and center-seeking ecological myth: that of nature as a Peaceable Kingdom, but more than that, and inseparably, a Reasonable Kingdom. It's a deeply trusting vision, in which the only difference between the pursuit of scientific logic and the pursuit of divine compassion is a matter of emphasis. While watching house-martins one day he observes,

> At first when the young are hatched, and are in a naked and helpless condition, the parent birds, with tender assiduity, carry out what comes away from their young. Was it not for this affectionate cleanliness the nestlings would soon be burnt up, and destroyed in so deep and hollow a nest, by their own caustic excrement.... Yet, as nature is cleanly in all her ways, the young perform this office for themselves in a little time by thrusting their tails out at the aperture of their nest.

He can find evidence of the world's grace and sensibility even in the most unlikely places, because in this locative, in-place, well-settled vision of nature, grace and sensibility are not passing impressions, but axiomatic. "Nature is cleanly in all her ways."

I'd argue that this Rational Peaceable Kingdom idea is the foremost locative tendency in today's ecology as well. It has a new face by now: ecology now relies on industrial metaphors rather than village ones, and so ecologists speak of an ecosystem's "producers" and "consumers," "budgets" for energy and nutrients, but the principle is very similar. In White's age or in ours, the locative vision of ecology tells us that we come home to the natural household through common sense, rationality, mutuality, cooperation, a spirit of stewardship.

This language is everywhere. These are the themes of the interpretive signs you find around national parks or zoos; the same language isn't out of place in a major technical journal like *Science* or *Nature*; this is how the Secretary of the Interior speaks in public when he wants to sound sober but earth-friendly. "Rationality" and

"a spirit of stewardship" are the legitimating claims of the ecological high priesthood of well-connected scientists, managers, and politicians. In fact it's worth noting that Gilbert White himself held if not an exalted then at least a very comfortable position in society. So it seems that the center, the locative aspect, of the ecological tradition in intellectual terms tends to coincide with the center in terms of social power.

In that context, consider these biotech ads again, which certainly emanate from a locus of wealth and power. The implication of them, which is pretty insidious, is that the more thoroughly we reconstruct nature as factory, the closer we move to the Gilbert White ideal, in which everyone is well cared for, and the economy of nature is rational and sustaining.

But of course that was also the logic that allowed the aggressive promotion of pesticides and chemical fertilizers in previous decades to be named "the Green Revolution." The point is that within this eco-mythology, the innocence and pastorality, the greenness, of Gilbert White-style nature may not be an antidote to dehumanized, industrial-style nature. In fact the optimism of the Rational Peaceable Kingdom vision—that promise of an easy harmony between the human and natural worlds, that promise of a world of green—often turns out to be industrial optimism in disguise. What links these things, fundamentally, is the faith that human values and human reason stand at the axis of the world.

So let's examine a parallel strand of natural history, which has stood for a century and a half as a challenge to that confidence. This is the Late Romantic experience of nature: nature not green but "red in tooth and claw."

The fundamental piece of mythology here is Darwin in the Galapagos and the birth of the theory of natural selection. The first thing to note is that the Darwinian revolution grew out of an experience of nature completely contrary to Gilbert White's. Darwin was raised as a young gentleman in that same pastoral, green English countryside, and then found himself in the volcanic Galapagos, very far from home in every sense. The Galapagos are among the least pastoral landscapes on earth. On Chatham Island he writes,

> Nothing could be less inviting than the first appearance. A broken field of black basaltic lava, thrown into the most rugged waves, and crossed by great fissures, is everywhere covered by stunted, sun-burnt brushwood, which shows little signs of life. The dry and parched surface, being heated by the noon-day sun, gave to the air a close and sultry feeling, like that from a stove: we fancied even that the bushes smelt unpleasantly.... The entire surface of this part of the island seems to have been permeated, like a sieve, by the subterranean vapours....From the regular form of the

> many craters, they gave to the country an artificial appearance, which vividly reminded me of those parts of Staffordshire, where the great iron-foundries are most numerous.

Now, this was the landscape that provided Darwin with the crucial ecological puzzles that led to his great theory: puzzles like the fact that on the Galapagos enormous tortoises and iguanas did the work that deer were supposed to do. Note that Darwin was experiencing it as a kind of hell, as a broken landscape. He goes on,

> As I was walking along I met two large tortoises, each of which must have weighed at least two hundred pounds: one was eating a piece of cactus, and as I approached, it stared at me and slowly walked away; the other gave a deep hiss, and drew in its head.... The few dull-coloured birds cared no more for me than they did for the great tortoises.

Thus these islands broke both the contract of rationality and the contract of peaceability. In White's England the animal world made rational sense to the patient investigator, and was suffused with love and common-feeling; in the Galapagos Darwin found no common-feeling, and the animals made no sense.

This kind of dis-location was in fact the defining experience of nature in the Romantic era. As Donald Worster writes in *Nature's Economy*, Tennyson's "nature red in tooth and claw" was practically a cliche before he uttered it.

It's no surprise, then, that in Darwin's great revelation the comfortable, static village order of Gilbert White's nature is replaced by something constantly shifting, with far less feeling for the individual. You could call this a trickster tale, in which everything orderly is upended and replaced with black comedy, like the quiet deer of England replaced by hissing tortoises. Or you could say this moment was like Siddartha's discovery of suffering, that sudden confrontation with disease, old age, and death that picked him up out of his ease and set him on the path toward insight. In each case, there is a transgressive assertion by the world—the vision of a broken body or a broken landscape—and this elicits a transgressive response, a radical and unstable work of theodicy. The key is that this kind of dis-location, the breaking of secure meanings, can be intensely creative.

Even today the meaning of the Darwinian theodicy is still up for grabs, as befits a trickster tale, even though you wouldn't know it from the settled histories that periodically issue from the priesthood, like Ernst Mayr's new book whose title is "What Evolution Is." Or maybe we should take a title like that as a sure sign that the meaning of evolution is unsettled.

Consider what a contemporary writer like Annie Dillard does with Darwin. Dillard is a very science-minded nature writer, what you could call a lay specialist in the scientific tradition. In an essay called "Life on the Rocks" she goes back to the Galapagos and comes back with a story about Darwin's story:

> I knelt on a plain of lava boulders in the islands called Galapagos, 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.

Dillard goes on through the rest of the essay to emphasize not how wild the landscape is, but how tame all the animals are, how the seals come right up to you. A far cry from Darwin's dyspeptic meeting with that other tortoise. But also a far cry from Gilbert White's untroubled declarations of universal love and nature's cleanliness. If Dillard comes to a point of rest at all, it's at a point of tension between what you could call the pastoral and the volcanic visions of nature. And so this is just the sort of oscillation that Smith postulates between the in-place and the out-of-place, between comfort and meaninglessness.

This sort of cognitive delicacy is not just a project of humanists like Dillard working at the fringes of science. My experience as an earth scientist (and my colleagues, in an informal survey, say they agree with me) is that the real work of science (in contrast to its more public face) embraces violations of order as much as order itself. This is a simple reflection of the natural world that science addresses. The Galapagos are one canonical example. A quieter example, that I especially like, comes from the naturalist Edwin Way Teale, in his book *Near Horizons*. He writes that katydids always lay their eggs on low branches under cover of night; except that once he saw one lay her eggs forty feet up a tree, at noon. He writes about the perfection with which katydids blend in color into the green leaves they live in, and then notes that once he saw a katydid that was nevertheless a "waxy coral pink."

Really this is a very Darwinian story: the green katydids stand for the way that natural selection and adaptation converge smoothly onto what a human mind would regard as good design, and then the pink katydid, the trickster katydid, reminds us that natural selection relies on mutation, on variation, on mechanisms of disorder. So what does the evolutionist conclude about katydids? That their coloration is predictable or that it isn't? Both.

On a more fundamental level too, evolution functions in ecological discourse as a kind of all-purpose contrary or corrective. When natural history begins to look

completely arbitrary, when we begin to act as if we were completely out-of-place in nature, or nature out-of-place in our own schemes, then evolution becomes a language of reconnection, of re-ordering. It teaches that we have close relatives and distant relatives among the animals; it teaches that violence is not a universal law but rather that many systems tend in directions that minimize it, that re-establish Peaceability.

That's half the story. At the same time, when our sense of place in nature is over-secure, then Darwinism becomes an argument against hierarchy and firm laws. This is the theme of most of what Stephen Jay Gould has written about evolution. Gould in his essays is smitten with historical accident, the great sweeps of disaster and innovation in the fossil record, variation, cross-fertilization, the nonlinearity of history. (It's in a similar mode that natural selection is usually invoked in the debate over biotechnology: as a admonition that nature tends to foil our plans.) Thus evolutionary history has multiple meanings, and keeps them in perpetual motion. It suggests clear patterns, like the line from algae to tortoises to humans, and at the same time negates them and relativizes them, as Dillard does.

It's really unfortunate then, and rather manipulative, that the public presentation of science is biased so strongly toward order. The science that the priesthood offers the public in high school textbooks, or on PBS specials, is finished, sanitized, harmonized. Meanwhile, the science that anyone sufficiently independent engages in, whether professionally or just while walking through the woods, is riddled with incongruity. It conveys the chaos of the world as surely as its order, the limitations of theorizing alongside the power of theorizing—and significantly, this style of science mocks the idea of intelligent human stewardship as much as it instructs us in how to steward. (If only the architects of public policy read more Edwin Way Teale.)

I suggested before that the center-seeking in ecological thought tends to coincide with the center in terms of social power. Before I conclude I want to point out that the same may be true for the out-of-place and dislocated in ecological thought. Even in very ordinary stories of naturalists at work, there is a striking element of the liminal, of asceticism, of world-renunciation—in particular the kind of world-renunciation whose purpose is to allow one to work "for the sake of the world." Donald Swearer has written that renunciation of the world for the sake of the world is a framework that unites medieval Christian monasticism with Theravada Buddhist monasticism, and probably others, and I'd suggest that it unites these things with a certain style of science as well.

In naturalists' personal accounts there is often a sense of leaving home and family to seek a new, more rarefied home and family elsewhere. There's a tinge of this in Gilbert White, who says he means to write a "parochial history" but neglects his human parishioners in favor of the house-martins and hedgehogs almost entirely. There's quite a lot of this feeling in John Muir roaming the Sierras, or in the countless other stories of lone biologists patiently waiting, uncommonly receptive, half-frozen in the woods. As these stories accumulate they start to read like the lives of the saints.

The most ascetic of all of them was the great entomologist Henri Fabre, who helped prove to the Victorians that when you study animals, even insects, in situ rather than in a laboratory cage they turn out to be far subtler and more complex than a lower creature is supposed to be. Fabre pursued his work on a scrap of red earth in his French village, a scrap only there for him at all because it was good for nothing else. He lived as a pauper nearby, followed his insects through their daily trials, while he suffered under the scorn of the villagers, who had no place in their cosmology for a grown man squatting in the dirt poking at insects.

Compare this life with Gilbert White's, in which the practice of natural history leads him perpetually back into the human family, into a reaffirmation of the relationships and values of the village in which sat his beautiful house. In contrast Fabre lived like a monk or poet-saint in a world forgetting what monks and poet-saints are for. His writings suggest that what he found in his work was what you might call the essential lesson of asceticism: that we may have to choose between our daily comfort and the pursuit of an enduring truth. That what the larger world values may not coincide with our own material priorities.

Again, this scientific lesson is very different from the institutional story. It's almost an exact negation of the Rational Peaceable Kingdom model, or the seductive promise of this series of biotechnology ads. But it isn't a negation of the scientific ideal.

So finally I think the value of this interpretive exercise—trying to confront these out-of-place elements of science in the manner of a historian of religion—lies not in a critique of science in favor of something else, but rather in allowing us more points of entry into the scientific tradition. This style points past textbook stories toward the lived practice of science, which means that it presents more openings to those in the scientific laity who want to move deeper into the enterprise, or move closer to that semi-transcendent object that science mediates for us. Above all, I think it helps make science more democratic, as everyone, on and off the temple mount, seems to wish it would be.