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THE LAUCKS FOUNDATION

from time to time calls attention to published material that might contribute toward clarification or understanding of issues affecting world peace. The accompanying reprints constitute Reprint Mailing No. 108.

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August 20, 1990

This issue of the Reprint Mailing, and the next few issues, will be devoted to transcripts of the presentations made at the symposium ECOLOGY: IN SEARCH OF A NEW ETHOS, that was sponsored by Laucks Foundation on October 30, 1989, at the University of California, Santa Barbara, California.

The reprint in this issue is "The Ecologist as Storyteller" by Wes Jackson, President of the Land Institute, Salina, Kansas.

The transcript of "How Ecological is Planetary Management?" by Wolfgang Sachs, of Wissenschafts-zentrum NRW, Essen, Germany, will be reprinted in the October issue.

THE ECOLOGIST AS STORYTELLER

by

Wes Jackson

Sometime ago there was a book review which appeared in the *New York Times* by Louis Hyde, an English professor at Harvard. Hyde told of a time in which he was driving in rural Pennsylvania and came upon an Amish auction, an auction that was like no other auction he had ever seen. A length of sisal rope was stretched around the farmyard. A little sign explained that it was a private auction, that only members of the Amish community were allowed to bid. Though the goods were to change hands, none were to leave the community. Hyde pointed out that, sold on the open market, an old Amish quilt might be too expensive for a young Amish couple to sleep under. But inside that simple fence, that quilt would hold its value on a winter night.

Louis Hyde then states that we are so confused about how to manage the boundaries of our economy that there may come a day when we suddenly realize that we have unwittingly sold off the very things we need most. He asks us to imagine that the Amish sold, not only their quilts to passing strangers, but that their farmers sold an inch of top soil every year to buy themselves fancy tractors and gasoline. That would soon be the end of the Amish, of course. Because of the way we farm, we lose to erosion one to five bushels of soil for every bushel of grain we harvest in Iowa. And in the wheat lands of Eastern Washington, the figure is twenty bushels of soil per bushel of grain.

Professor Hyde then explains that we are squandering these inheritances because we fail to honor what Wendell Berry has called "the greater economy"—"a system made not just of money and markets, but of the subtle links between wilderness and abundance, plant diversity and human diversity, housewares and belief, present needs and the well-being of our children's children. It is only by ignoring this larger web of values that we can pretend to externalize the true cost of industrialized agriculture. If we were able to figure the price of the top soil, the water and the rural communities we have wasted in the pursuit of productivity, we might not feel so rich in bread and beef. We've been trading top soil for imported oil. We have been stealing wealth from the future as if it were a colony whose inhabitants we were willing to starve."

It is important for us to rethink our place inside that great economy. We need to imagine how our culture might take on, in Professor Hyde's words, "some of the liveliness and longevity that is the mark of nature in most industrialized farm communities." We ought always to ask how the American prairie held its soil and fertility for millennia. How has the forest? How have Europeans farmed for centuries without destroying their land? Why do no Amish farms go bankrupt, even though they are among the smallest in the nation? Such questions cannot be answered, of course, without moving quickly into broader inquiries about the way we live, the way we farm, the way we think about the world. Wendell Berry has said, "Nature is not only our source, but also our limit and measure."

The world that Francis Bacon and Rene Descartes proposed in the

early 1600's, and the world that our ancestors adopted, we now see leads to destruction. Descartes, in his discourse on method, said, "It seemed to me that the effort to instruct myself had no effect other than the increasing discovery of my own ignorance." Commenting on this in a recent letter, Wendell Berry said, "Rather than regard this as an apt description of the human condition and a very proper result of an education, the culture at large, including conventional agriculturists, tend to agree with Descartes that ignorance is correctable." But there are an increasing number of us who believe that our ignorance is not and never will be sufficiently correctable to run the world, believing instead that since we are basically ignorant about eventual outcomes, it is more prudent to be students of the way the world has worked. Atrozine, spread all over the midwest, nitrate pollution, and other problems associated with agriculture, have come out of a knowledge-based culture. That is the assumption that our knowledge is adequate to take care of the problems. That's why we at the Land Institute have turned back to nature as our standard, nature as our measure, repenting for our ecological sins and instead asking, "What was here? What will nature require of us here? And what will nature help us do here?" Wendell wrote somewhere, "As we came across this continent cutting the forests and plowing the prairies, we've never known what we were doing, because we've never known what we were undoing."

I've begun in this manner, because I want to illustrate that Bacon and Descartes must be dealt with if we are to consider a reordering of our priorities. Read Bacon's *New Atlantis* again. There is in Solomon's house, the modern scientific laboratory in which the scientist makes the political decisions. Bacon assumes that the scientist knows the most. Elsewhere, Bacon said that we must bend nature to our will. And Descartes said the way that you do that is to "place priority on the parts of things over the whole." Richard Lewontin and Richard Levins at Harvard have published a book entitled *The Dialectical Biologist.* They discuss how this Cartesian world view, this placement of priority on part over whole, has been destructive. They contend that the modern scientist believes that the world is like that method, and they propose as an alternative a kind of dialectical view, which seems to me too brittle and ought to be modified to what Wendell Berry calls, "a conversation with nature," rather than the strict dialectical approach.

I now want to tell you three ecological stories. As I tell them, think of Bacon and Descartes, and consider why you find them satisfying—if, indeed, you do. The first story was told by Amory Lovins. I call it "The Cat Drop Story." Some years ago, the Dayak people in Borneo were affected with malaria. The World Health Organization had a solution. They sprayed large amounts of DDT to kill the mosquitoes which carried typhus. This killed the wasps. Without the wasps, the caterpillars proliferated and the roofs fell down. The World Health Organization had an even more serious problem, though. The DDT-poisoned insects were eaten by geckoes, which were eaten by cats. The cats started to die, the rats flourished and the people were threatened by an outbreak of sylvatic plague and typhus. To cope with the problem which it had itself created, the World Health Organization was obliged to parachute live cats into Borneo.

End of the first story.

The second story I have called "The Splash-Borne Fungus Story." I included it in a letter that we at the Land Institute sent out to our

constituency during our fundraising drive. In that letter I said that in our experimental plots that summer, we noticed that Illinois Bundle Flower (which is one of our perennial grains that fixes nitrogen), when grown in rows, as in a typical farm field, was infected by a splash-borne fungus from the bottom up. Raindrops, which peppered the soil, bounced the spores to the underneath sides of the leaves where the waxy cuticle is thin. Plants lost their leaves in the order infected, from the bottom up. The scientist in us wants to leap into a long-term breeding program for resistance to this pathogen. We can be clever and heroic at once, at least in the short run. But our researchers walk over to the wild prairie (at the Land, we have about 100 acres of native prairie that's never been plowed) and we see that the same species is not sick there. Apparently—now pay attention to the use of that word because we'll come back to it—apparently, the grassy prairie mat absorbs the shock of the bombarding raindrops—no splash, no fungal infection. By the way, that same grassy mat is a sponge that also retains moisture. Since prairie-mimicking agriculture is our goal, we mixed several species in a field to build a domestic prairie. We'll have a prairie mat, not bare soil. We don't have to breed for fungus resistance, which unwittingly narrows the genetic variation and makes the plant vulnerable in other ways. We don't want to create more problems as we solve for one. Instead, we solve for pattern.

End of the second story.

I call Story Three "The Tamed-Down Eastern Gamma Grass Story" or "Loving Your Enemy Has Value." This was taken from one of my speeches as recently as a year ago. A final example of this soft approach to sustainable agriculture research, I'll now relate. in thinking about our large polyculture experiment we intend to plant out in 1991, we, of course, think about the species components that we will intend to introduce, and begin to speculate on the plant diversity of each species, the ratios and so forth. I should back up. What we do is take transects out there on the native prairie, and we sort the species, we clip the above-ground matter, and we sort according to grassness, to legume familiness, to sunflower familiness, to other. And we say, "If this is what the ratio has been since the end of the Pleistocene, this is our best bet for what to do as we put our particular species in." In other words, we want to have about the same ratio of warm and cool season grasses, legumes, and members of the sunflower family. So, as we contemplate the polyculture we're going to plant out in 1991, we're concerned that one of our species, Eastern Gamma Grass, a relative of corn, might be too aggressive in its vegetative growth for the others. Our plant pathologist, Dr. Mary Hanley, has been evaluating the pathogen resistance in 77 families of this species and found varying degrees of genetic resistance. It is our current belief that we will have to introduce a line, one of our inbred lines, that is somewhat susceptible to pathogens, in order to keep the plants tamed down enough so that they won't overrun the others. In other words, we would not introduce our star line for resistance. And then I went ahead to say, "This approach may sound counter-intuitive, but it is also ecological." In other words, we would use the pathogen to control the plant, using a traditional enemy to control it and keep it from overrunning the plot.

Those are the three stories. Now, for the rest of the story. The cat-drop story is not true. The story that Amory told is not true, and I confronted him on it saying, "Amory, that story is too air-tight,

it's a linear story." He insisted that it was true and pulled out a report from the World Health Organization, a big thick thing, and sure enough, their account is much more complex than the linear, Baconian-Cartesian story he told. I'm not out to vilify Amory and quickly want to move on to the two stories I told.

The splash-borne fungus story is not true either. It, too, is a nice story. Our initial assumption was that the fungus *Sarcospra* based on the description found in the key, was the responsible organism. *Sarcospra* spores are spread by wind and water and do need water to germinate. We hypothesized that over-wintering debris contained spores which splashed up to the lower leaves and caused defoliation. However, we have never been able to identify a single pathogen causing the leaf-spot defoliation problem. Also, observed in Woodward, Oklahoma, *Sarcospra*, the fungus we thought was the candidate, does not cause defoliation or leaf symptoms. Dr. Mary Hanley checked it out down there in some of our plots. Third, we observed defoliation in one plot at the end of the season in an extremely dry summer. Therefore, it seems much more likely that Illinois Bundle Flower responds to stress (all stress we're not sure) by developing this non-specific spotting and defoliation. It seems much more likely, (well, we are fairly confident) that splash-borne is almost certainly incorrect.

Now for the third one, the taming-down-Eastern-Gamma-Grass-with disease story. That one, too, is not true. The idea, remember, was to use disease susceptibility on the part of Eastern Gamma Grass to help keep the plants from dominating a mixed planting. But we now have good data. The basal circumference of the plant's stem in the infected plots was smaller on the average, from 7 to 12 percent, than the uninfected. Unfortunately, yield was reduced 20 to 25 percent on the average. In other words, in the plants that were infected, the seed part took a greater hit than the vegetative part, so why would we want to introduce a plant that was susceptible and have a greater downturn in yield than in vegetative aggressiveness? The flowering tillers are more susceptible than the vegetative tillers, so you would expect the yield to be even more reduced.

These three stories are all lovely candidates to be ecological stories, but unfortunately, they are too good, too Cartesian. Now, hear this story: When a farmer is hauling manure, he is not only fertilizing his field and cleaning out the barn but also saving the cost of purchased fertilizer, adding organic matter to the soil, controlling erosion, exercising the horses, training a new colt, making the cows comfortable and their milk pure, and keeping his eye on the life of the farm. I have noticed that farmers who do not have manure to haul in slack times, tend to spend the hours in cafes complaining about how poor farming is these days. Now, this was written by Gene Laudston about an Amish farmer, and this is a non-Cartesian story. And the reason is that this last story does not require experts to verify, and it is not linear. The other stories all were Baconian-Cartesian stories, requiring the expert to verify, and were linear. This one is a story in which all the things he's talking about happened at once and were readily observable by the non-expert.

So, science as a series of stories may be an appropriate way to think of some parts of the picture. Ecological agricultural science,

though, has been trying to do science as the complex inter-related components of a thousand-page novel. This is not science as a short story, or science as a children's story—that's the Cartesian problem. The Cartesians want a main character, at most two minor characters, a quick plot and a sunset to ride off into. Stories that are comprehensible in a linear manner, and tidy, accommodate the politics of modern science. Accommodate the politics of modern science. So, what? you say. I've got to put all that on the back burner and pull you away and try eventually to connect it.

The Gaia hypothesis has become very popular in the modern culture. And the idea is that the earth is a self-correcting organism. In 1951, a man by the name of Fibleman wrote what were called "the twelve laws of integrative levels". Fibleman started with atoms, and then molecules, and then cells, and then tissues, and then organs, and then organ systems, and then organisms. And, he said, associated with this hierarchy of structure from atoms to molecules to cells to tissues and so on, there are certain laws. Then the question became, what comes after organisms? And some said, "species". Some said, "populations". But the candidates that were being proposed as to what comes next after organisms did not fit the twelve laws that were associated with the other categories in the hierarchy of structure. Stan Roe, a Saskatchewan ecologist said, "Well, what do those other categories have in common?" He said, "Well, what they have in common is volume." He gave us the volumetric criteria for thinghood and so, with that in mind, what came next after organism was ecosystem, and the twelve laws satisfied ecosystem. The question then becomes: after ecosystem, what next? Well, you say, it's earth, and then we have to ask: what is the earth? And this, of course, is what the Gaia hypothesis is out to explore—what the earth is.

None of the categories in the hierarchy of structure, whether we're talking about atoms or molecules or cells, could be known by observing only one. We had to look at billions of atoms before we knew what an atom was. The variation is tremendous. Hydrogen has one proton in the nucleus and an atomic weight of one unit. Helium, the atomic weight of four units. But Unnilennium has an atomic number of 109 and an atomic weight of 266—a tremendous variation. What about molecules? Cellulose is the largest molecule. It has a molecular weight of around a million. Consider how complicated a protein molecule can be. And cells? Imagine two cells, an ostrich egg and the nerve cell of a whale. Both are cells, but observing only one would not do. And when Schleiden and Schwann came up with the cell theory, they had looked at a great deal of cellular diversity, and many times they must have been quite perplexed. But had we only one organism to look at, we would be bewildered. Consider the difference between a blue-green alga and an osprey. Both are organisms. With only one, we would have no frame of reference. The same, if there was only one ecosystem—tall grass prairie, for instance.

Do you see where this logic is headed? We have <u>seen</u> only one earth. It is legitimate, when comparing planets, to include earth in discussing planethood, but because we have <u>life</u> on earth and no <u>life</u> verified on the other planets, the comparison has, as yet, limited value. Is it possible that Lovelock, and others, calling the earth an organism, do so because we are organisms? An atom is an atom. A molecule is a molecule. A cell is a cell, and so on. If we were

molecules within a cell, looking all the way to the organism, of which we were a part, we might say the organism is a molecule. To say that the earth is an organism must remain in the realm of poetry, and it may even turn out to be bad poetry.

The point is, we still don't know what the earth is, beyond saying that it is a planet, with oceans and land and life, driven by the sun. It is our source, probably, and our nurturer, certainly, but that is about where it stops. Organisms create something more or less like themselves, baby organisms. The earth has been a creator but has never created little earths. Thinking of the earth as an organism may create a kind of myopia. (And, by the way, I think this space colony nonsense comes out of that Baconian-Cartesian world that has been the problem. It distracts us from thinking about erosion and the loss of family farms and any number of problems).

Let's return to Descartes and his discourse on method; and his effort to instruct himself that had no effect other than increasing the discovery of his own ignorance. Our culture, including conventional ecologists, tends to agree with Descartes that it is correctable. A few of us believe, however, that we are basically ignorant about eventual outcomes, and that it's best to be students of the way the world has worked. Calling the earth an organism plants the flag of science into the biosphere category and cheapens it. The colonizing mentality prevents us from discovery. We know a lot about the earth, but we still don't know what it is. Applying the Baconian-Cartesian world view to a bad situation in Borneo, as well as in our experimental plots at the Land, is serious business. Stories have power. That's why the tidy ones are attractive to the Baconian mind. It doesn't matter whether it is a "splash-borne fungus story" or "the earth is an organism story". The intrigue of the story satisfies us, and we stop there, and then the story becomes capital for those who attend conferences and tell it.

With that in mind, I want to conclude with a little story myself. This comes from a letter Wendell Berry wrote me in 1982. He uses it as a lead off in his book *Home Economics*:

> Dear Wes,
>
> I want to try to complete the thought about "randomness" that I was working on when we talked the other day. The Hans Jenny paragraph that started me off is the last on Page 21 of his book *The Soil Resource* [Quoting Hans Jenny at Berkeley]:
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> "Raindrops that pass in random fashion through an imaginary plane above the forest canopy are intercepted by leaves and twigs and channelled into distinctive vert space patterns of through-drip, crown-drip and stem flow. The soil surface, as receiver, transmits the 'rain message' downward, but as the subsoils lack a power source to mold a flow design, the water tends to leave the ecosystem as it entered it, in randomized fashion."

My question is: Does "random" in this (or any) context describe a verifiable condition or a limit of perception?

My answer is: It describes a limit of perception. This is, of course, not a scientist's answer but it may be that *anybody's* answer would be unscientific. My answer is based on the belief that pattern is verifiable by limited information, whereas the information required to verify randomness is unlimited. As I think you said when we talked, what is perceived as random within a given limit may be seen as part of a pattern within a wider limit.

If this is so, then Dr. Jenny, for accuracy's sake, should have said that rainwater moves from mystery through pattern back into mystery.

If "mystery" is a necessary (that is, honest) term in such a description, then the modern scientific program has not altered the ancient perception of the human condition a jot. If, in using the word "random", scientists only mean "random so far as we can tell", then we are back at about the Book of Job. Some truth meets the eye; some does not. We are up against mystery. To call this mystery "randomness" or "chance" or a "fluke" is to take charge of it on behalf of those who do not respect pattern. To call the unknown "random" is to plant the flag by which to colonize and exploit the known... To call the unknown by its right name "mystery", is to suggest that we had better respect the possibility of a larger, unseen pattern that can be damaged or destroyed, and, with it, the smaller patterns.

This respecting of mystery obviously has something or other to do with religion, and we moderns have defended ourselves against it by turning it over to religion specialists, who take advantage of our indifference by claiming to know a lot about it.

What impresses me about it, however, is the insistent practicality implicit in it. If we are up against mystery, then we dare act only on the most modest assumptions. The modern scientific program has held that we must act on the basis of knowledge, which, because its effects are so manifestly large, we have assumed to be ample. But if we are up against mystery, then knowledge is relatively small, and the ancient program is the right one: Act on the basis of ignorance. Acting on the basis of ignorance, paradoxically, requires one to know things, remember things—for instance, that failure is possible, that error is possible, that second chances are desirable (so don't risk everything on the first chance), and so on. What I

think you and I and a few others are working on is a definition of agriculture as up against mystery and ignorance-based. I think we think that this is its *necessary* definition, just as I think we think that several kinds of ruin are the *necessary* result of an agriculture defined as knowledge-based and up against randomness. Such an agriculture conforms exactly to what the ancient program, or programs, understood as evil or hubris. Both the Greeks and the Hebrews told us to watch out for humans who assume that *they* make all the patterns.

Well, that's a real letter. The point is that we are still at a very early stage in trying to understand sustainability. We come out of a Baconian-Cartesian culture, and the nature of our language, and therefore the nature of our understanding is yet Baconian. The nature of our stories that we're using as our metaphors keep our minds from changing. And I think that that's one of the reasons that our problems continue to get worse, even though we throw a lot of money and energy and time into solving them. Ultimately, we'll have to repudiate the Baconian-Cartesian world view as the dominant paradigm.

From the essay "The Fourth R: Resources" by Paul B. Sears (First written 1945). (Reproduced in THE LAND, edited by Nancy P. Pittman, Island Press, Wash.D.C. p. 432):

"No important food or drug plant—unless it be the microscopic mold Penicillium—has been discovered since the beginning of history, let alone the beginning of modern science. Our modern science is simply an outgrowth of the ancient need to understand the natural world more directly and more accurately...

"If the imagined visitor from another world came to inspect our present civilization, he would be forced to admit that, with the important exception of medicine, we have been using science chiefly for two ends—profit and war. The one results in making things that will pay well, without regard to the effect on resources or men. The other results in enormous destruction of resources."

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