The Land Report

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Wheat Breeding, Illustrated

Marrying Grain and Pasture

Learning from Plants and Chickens

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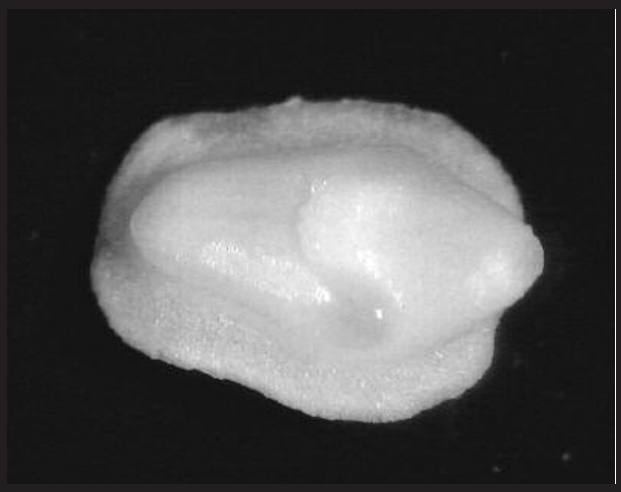

Our Mission Statement

When people, land and community are as one, all three members prosper; when they relate not as members but as competing interests, all three are exploited. By consulting nature as the source and measure of that membership, The Land Institute seeks to develop an agriculture that will save soil from being lost or poisoned while promoting a community life at once prosperous and enduring.

Cover: Scott Bontz. Land Institute scientist David Van Tassel plucks anthers from hybrid wheat so its seed heads can be fertilized only by pollen from another plant. This emasculation is a step in the breeding into wheat soil-saving perenniality. An illustrated story of the process begins on page 8.

Above: Lee DeHaan. Breeding of genetically disparate species requires the rescue of embryos for developing seed. This wheat embryo has a clearly formed tiny root, at right, called the radicle. The radicle gives the embryo, which can be smaller than the head of a pin, a shape that helps us find it for rescue in the young seed.

Back cover: Solomon D. Butcher, Nebraska State Historical Society. Sod house in Goose Creek, Cherry County, Nebraska, 1900.

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Through Strange Fellow Creatures, the Plants, Appreciation of Ourselves

Laura Jackson

From a talk given at a Unitarian Universalist flower communion, where each participant brings a flower to a common vessel, then receives from it another.

The Unitarian who began the flower communion, Norbert Capek, said each member takes a blossom "just as it comes, without making any distinction where it came from and whom it represents, to confess that we accept each other as brothers and sisters without regard to class, race, or other distinction, acknowledging everybody as our friend who is human and wants to be good."

I want to tell how close study of the plants deepens and expands this symbolism.

Showy petals and scents that we humans enjoy in our gardens have evolved to attract insects. In exchange for nectar, insects move pollen from one plant to another and fertilize their flowers.

Not every flower is pretty, however. The genus *Stapelia* has pale brown, fleshy petals with a thick coat of long, reddish-brown hairs, and it smells like rotting meat. It is pollinated by flies. And many plants, such as maple trees and all grasses, produce tiny, inconspicuous flowers because they rely on the wind for pollination. The wind does not need to be attracted or rewarded. But we human beings are more like insects than the wind. We usually select insect-pollinated species for our gardens, for our ceremonies, and for our metaphors.

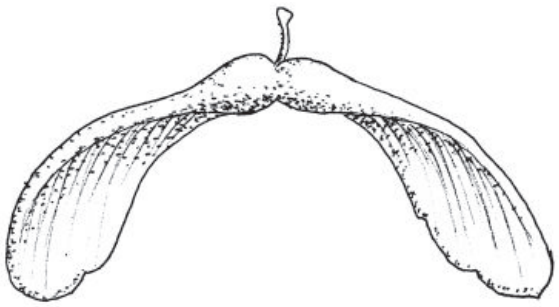
Now that I have ruined your appreciation for flowers, let's turn to plants themselves.

Fans of *Star Trek*, or of science fiction in general, are familiar with weird alien characters. None of these can hold a phaser to the ultimate alien-ness of a flowering plant. Plants are shape-shifters, large, leafy and immobile as adults, and tiny, hard and brown as seeds, capable of traveling hundreds or thousands of miles. Like Persephone, plants live in two worlds: leaves and stem in a light and gaseous medium, roots in a dark, semisolid matrix. Plants "feed" directly on solar radiation. And—I dare *Star Trek* writers to top this one—a few billion years ago plants literally took over the world, oxygenating the Earth's atmosphere for the first time and poisoning many early life forms.

Plants challenge our notion of what it means to be an individual. What looks like a single plant is really a complex community extending far beyond what you see. Fungi take up residence in the root cells, grow out through the soil and into the cells of unrelated plants, and create a plant-to-plant, cross-species pipeline for nutrients and sharing energy.

Plants have developed a kind of eternal life, through cloning. A grove of aspens in the Rocky Mountains, covering an area bigger than an Iowa farm, could be an individual who has cloned itself for 10,000 years. That is, its particular combination of genes could be that old, its living tissues only a hundred years old or so. The grasses and flowers on a tallgrass prairie could be just as aged. Could Ray Bradbury have conceived of that?

With plant in hand, have a good look at this fellow creature. Take in its details. In good science fiction, an encounter with an alien causes us to examine who we



David Van Tassel. Some plants migrate by hitching rides for their seeds on and in animals. Others sail on the wind, including the milkweed, above, and the maple, left.

are, to expand our definition of what it means to be a human being and, ultimately, a neighbor. Despite the alien nature of a plant—a mysterious silence, no eyes to gaze into, no voluntary movement—we come to recognize that they are organisms too, just like cats and dogs and bears and ants and human beings. They also are the ultimate source of food energy for virtually all other life on earth. Their lives are forfeited every day so that we may live. Behold the Lamb of God.

Scientific insight only enhances symbolic value of the flower communion. The discipline of botany requires that we take note of their exact shapes, colors and behaviors, their history and context, their habits and haunts, their relationships and ways of life, their evolutionary beginnings and probable extinction. With growing appreciation of plants' struggles, and of our utter dependence on them, we appreciate their outward appearances no matter how showy or plain.

So, in our celebration of diversity, let's respectfully observe details, like a good botanist. The close study of plants—and by extension people—leads to a more profound sense of differences, of other-ness, and only then to a profound sense of our common bonds.

Georgia O'Keefe said, "Nobody sees a flower, really, it is so small. We haven't time—and to see takes time like to have a friend takes time."

Above: David Van Tassel. An individual combination of genes can persist for thousands of years. For example, this grass spreads with underground stems called rhizomes. The actively growing clump in the center originated from a now-dying clump on the left, and in turn, is sending out rhizomes to colonize new territory to the right.

On the Importance of Owning Chickens

Lessons in Nature, Community and Transformation

Mark S. Cladis

Recently I obtained some chickens. I am not a farmer, if a farmer is one who makes a living working with soil and animals. I am, I admit, an academic—a college professor. As a professor, I have the opportunity—the privilege, really—to spend many hours learning from books, students and colleagues. Books and people have often inspired me, sometimes even transformed me. Lately, however, inspiration and change have come from an unexpected source: my three bantam hens.

You might think I am writing metaphorically or symbolically. I am not. I write as a literalist, about particular creatures that inhabit a specific place in Poughkeepsie, New York, that eat my table scraps, that provide manure for my garden and eggs for my consumption. Grace is always particular, or at least is experienced in the particular. So is suffering. And both usually show up close to home.

My chickens have helped me confront a powerful illusion: the belief or attitude that I am at the center of nature, and that I have the power to command it. This is no mean lesson. Few can learn it from words alone. Hence the importance of owning chickens.

My chickens obey their nature perfectly, and for our association to proceed smoothly, I, too, must respect their nature. If I fail to provide fresh water, or if I am remiss in feeding them, they might survive, but they will not produce eggs. If I neglect to open their coop in the mornings, they will eventually die of coccidiosis. If I forget to close the coop in the evening, the fox is sure to get them.

I want my chickens to stay safe and secure in their run, a plot surrounded by a 4-foot-high, 50-foot-long fence, in which they spend much time scratching and pecking the soil for weed seed, worms, and other nourishment. Inside the run I want them to remain, yet they often do not. Lorenza mostly, but sometimes Anna, insists on flying out in search of promising, new feeding grounds. I can put netting over the top of the run; that would probably keep them in.

But my bantam chickens are good fliers, especially Lorenza, and part of me, I confess, wants to let them fly—right out of the run. I enjoy the sight of my chickens exploring my back yard. Besides, if a fox does manage to get in the run, my chickens can, in theory, escape by flying up into a tree. Netting would trap them. But outside on the ground a fox or a dog could ambush them. The best plan is not clear to me. Yet I know this: Whatever I do, my chickens and the fox remain largely outside my power. I only deceive myself and cause harm when I think or act otherwise.

Sometimes, my chickens come up on the deck and watch me read and write, and encourage me to provide them with table scraps. Often I accommodate them. I worry, however, about why I enjoy them on the deck. What is the nature, and the consequences, of my desire for them to enter the world of my deck, my morning routine, my daily reading and writing? I like my chickens, and I enjoy their showing some signs of liking me. I pretend that they come to my deck because they want to greet me, spend time with me. Often when I feed them, I hold out my arm and encourage each chicken to alight on it and eat from my hand.

Such intimacy I enjoy. Yet what is the cost? Lorenza, the wildest of these bantam hens, is the most independent, the best flier, and the least willing to eat from my hand. She is also the one that has consistently flown into high trees every time a fox has approached the run. Luisa and Anna, in contrast, simply looked at the fox last time it appeared, as Lorenza flew to safety.

So, we can enter nature, engage with nature, even change nature. And we always, ineluctably, do and must interact with nature. This recognition is important, for it recommends that we exercise caution when we interact with nature.

Many environmentalists of good will dedicate their lives to protecting what they understand as nature, namely vast, pristine wilderness areas, from human activity. The attempt to separate ourselves from nature is the opposite of placing ourselves at its center. Yet this is an equally dangerous illusion. We must count ourselves in. As long as we maintain a vision that separates humans from nature, we will fail to live peaceably and responsibly as natural creatures with other creatures in nature's vast and intricate weave.

When I survey my back yard, I delight in the beauty of the clearing and the woods, the blossoms that float downward like snow, the lingering raindrops on new leaves that glimmer as clouds part, and the wet, dark tree trunks that partition, perfectly, the pale green growth of early spring. I see also the old stone wall that separates the clearing from the woods—evidence of humans. The yard has been cleared of trees, and my woods are second-generation growth. Humans have shaped their existence, even as they have shaped human existence and continue to. My back yard informs much of who I am.

So do my chickens. There they are—practicing their dance, holding their heads high while their feet scratch the soil. Suddenly, skillfully, gracefully they take two steps back and plunge their beaks into the earth, feeding themselves and combing the soil. There they are—Luisa and Anna inside the run, behind the fence, and Lorenza outside, foraging. Is Lorenza in nature, while Luisa and Anna are fenced out of it? Has my naming Lorenza taken even her out of nature? We name mountains and stars—a sign of hubris, or of our longing to be at home in a world and universe larger than ourselves?

The first lesson my chickens have helped me to grasp is the illusion that we are at the center of nature and that we can radically control it. The second, as I am beginning to understand it, is the illusion that we can exist outside nature. Together, they suggest this: Nature is an interdependence of diverse habitats and autonomous creatures, including humans. We share a home, the earth, even if we use it differently. With this, perhaps we can grasp anew the expression "It's a small world," and begin to concede and respect the reality of other habitats, far away.

"The most important part of education—to teach the meaning of to know (in the scientific sense)." This is the last sentence Simone Weil wrote, two days before her death. What can it mean? Why was a religious philosopher and social activist, on her deathbed, thinking about to know, in the scientific sense? Perhaps because such knowledge requires giving attention to something outside oneself. And when you struggle with some slice of science, you confront how much there is to learn, and you gain an opportunity to become acutely aware of your limitations. "Know how to be ignorant," Rousseau advised. If we acknowledge our inexperience or lack of knowledge in the face of a particular problem or quandary, we begin to formulate genuine questions and seek assistance. We can also escape some pride.

Lessons in paying attention, waiting and humility can be gained by owning chickens. Knowing in the scientific sense need not be confined to the work of the professional scientist. We can all be scientists, if science is the art of careful observation. I spend much time observing my chickens. I have become familiar with their habits, their likes and dislikes, and their individual temperaments. They have no interest in my coffee grounds, little in orange peels or potatoes, and much in all the other table scraps. In the early morning they usually stay in the run. By mid-morning they have escaped the run and are scratching near the house. In the afternoon they wander deep into the woods. In the evening, if they are not fed, they are on the deck, eager to remind me of their second and last daily feeding.

There is another feature of the process of knowing, in the scientific sense: It is deeply satisfying. To watch and study my chickens is pleasant, even salutary. In part, the satisfaction springs from observing autonomous creatures. I am less likely to study my chickens closely when we are interacting, when I am feeding them or when they are perched on my arms. Perhaps there is not enough distance. But when they are on their own, say, in the woods, I watch them closely, and I enjoy seeing them perform in the wild flawlessly and autonomously. Learning and admiration come together, in observation. And remarkably, seeing them do their job well encourages me to do mine well, with skill and attention.

My chickens encourage self-transformation. This is extraordinary. Humans often seem immutable. Chickens, however, can assist the self to change—and hence I suppose that most anything or anyone, if given proper attention, can effect such change.

I write "self-transformation" because the self is the object of change as well as the agent of change. Yet the self does not change itself by itself alone. We change as we encounter and respond to something outside ourselves: neighbors, books, family, pepper plants, community groups or chickens. Transformation requires attentiveness, on the part of the self, and grace, something outside the self. My chickens, I suggest, are an instrument of grace. They offer opportunities for change.

This occurs variously. One way is in diverting unhelpful self-regard. When I find myself consumed with engrossing self-interest, the chickens can bring perspective. When this happens, I do not lose myself in sight of my chickens; rather, I see myself and my problems differently. Some problems disappear, like water vapor absorbed by a wide, dry sky. Other problems remain, but are somehow made more clear and manageable. And I am different. My burdens lighten as my soul, if you will, becomes more solid, more deeply rooted in the ground that I share with the chickens and all other beings.

Having chickens also has enhanced my bonds to human community. This might surprise many, but my chickens have opened my home to friends, neighbors, students, even strangers. There is something innocuous and, apparently, irresistible about an invitation to come anytime and see the chickens. People don't call first; they just come. The greetings all take place outdoors, and the visits usually remain there. They might last from five to 55 minutes, but rarely more than an hour. These casual, low-expectation, no-preparation meetings are something new at my home, and they are deeply satisfying.

The chickens have also led me to deliberate encounters. I now seek out people who have experience with chickens, people who belong to such traditions of knowledge. This path, though intentional, has led me to unforeseen places of human flourishing. Those who talk to me about their chickens have, for example, introduced me to the world of private gardens and locally supported

farms. They have also initiated me to the world of dance—community supported dances, in which old and young join and entertain themselves without the help of Hollywood or cocaine—to name only two common American opiates.

My chickens, then, have helped to transform my relation to nature and to community and have braided them snugly and pleasantly together. All table scraps now go to the chickens, not to the trash bin or garbage disposal. The result: no garbage goes down my sink, and significantly less goes to the curb and into my community's landfill. The chickens consume what I used to consider refuse and convert it into fresh, rich manure. The result: my garden prospers, and I have lovely vegetables for my family and friends. In preparing the vegetables for a meal, I generate scraps, and these go back to the chickens. The result: I witness and experience the connectedness of life. The short thread which connects my food, chickens, garden and community has been easily curled, the ends meeting gracefully. The result: an elegant, closed loop, to which I belong.

As the connections between nature and community grow more vivid, I find myself thinking about how animals are treated by human communities. In particular, I've thought about chickens and their relation to chicken—that yellowish meat wrapped in plastic. My chickens enjoy their daily routines. Can this be said of the hundreds of thousands of chickens shut up all day in crowded, mechanized coops?

To speak of chickens' enjoyment or distress is to sound terribly anthropomorphic, I know. Humans tend to cast everything—even other humans—in their own image. But I have evidence that my chickens enjoy their existence at my home. The chief testimony is negative: They complain bitterly when I thwart them from pursuing their gratifying routines.

As I write this, they are below the front steps of the house taking their daily, mid-morning dust-baths. I suspect they like the fine dirt there, and perhaps the shade. In about five minutes, they will dash to the back of the house and come by the chairs that support me and my books. After a brief greeting—I usually stroke their backs—they will mount the old picnic table under the deck and groom themselves. Afterward, they might leap down and scratch and peck, or head for the nesting box and lay, or clamber up the stairs and collapse as if dead on the deck in the sun.

By providing this brief description of my chickens' activities, I do not mean to suggest that they are self-consciously enjoying themselves, pinching themselves as they hum Armstrong's *It's a Wonderful World*. I suggest that my chickens have fashioned practices that fit their environment, and that because that environment hews closely to their nature, pursuit of these practices is satisfying and fulfilling. By contrast, chickens kept in most industrial chicken farms have little opportunity to tailor and pursue their native practices.

By naming my chickens, by observing and caring for them as individual creatures, I find it difficult to hinder the native habits and tailored routines that bring them fulfillment. Their satisfaction, and mine, requires that I allow some hazard. The risk to myself is that it aches considerably more to lose a named than a nameless chicken, as I did Anna to the fox. Never name a chicken if you do not want to suffer its loss. Never name a chicken if you intend to lock it up all day in the coop.

Once you begin to care about some particular chickens, you find yourself concerned about other chickens and then about farm animals more generally. You also start to think about the controlled, oppressive environment in which many laborers work. Like chickens in mechanized coops, migrant and other workers have little freedom to fashion their practices in ways that bring satisfaction. Their relation to the land, to animals and to work is bent to maximize profits, not human flourishing. Revising Marx, such workers see neither themselves, nor the animals, in their work; with supervisor watching, they see with constricted assembly-line vision a parade of disjointed commodities.

Owning chickens can lead one to ask and wonder about little things, like grubs, but also about big things, like the dark face in the field. The more we wonder, the more we might see and live differently.

Every day I gather eggs. They are small, beige and lovely. Eggs—a mundane miracle that works the hinge between life and death. When I collect the eggs, they are often warm, the recent fruit of the womb. Without a rooster, there is no promise of a chick, but the eggs nourish my life and that of my family and friends. These frail, unbending, replete, beige eggs stem from worms, weed seed and table scraps. The elegant loop, graceful and expectant. A deep sense of gratitude, humility and awe envelops me as I hold one of my chickens' eggs. At that moment I thank them, I know there is greatness in the world, and I am lost, momentarily, in wonderment.

Some say we inhabit a world increasingly dominated by an instrumental reason that imprisons us by a vast system of calculated, rationalized labor—Weber's iron cage. Perhaps. A latch is within reach, however. It might not land us in the promised land, but it does lead to a more promising place. We have some say. We can turn off the television, renounce hectic amusements and discover the re-creation of good work: working well, working with care and patience, working toward excellence and joy. We can own two or three chickens, and learn much from them.

Perhaps I am a farmer. I gather eggs, I harvest crops. If you make space for some tomato plants in your backyard or city apartment, you, too, can farm. And if you have a little spot for chickens, before you awaits opportunity for joy, learning and eggs.

Intermediate wheatgrass | Wheat | Hybrid perennial wheat

Breeding Wheat to Hold Its Own and the Soil

An Illustrated Explanation

Lee DeHaan and Scott Bontz

It is winter, but our greenhouse is thick with grasses, their slender stems topped by spring-plump heads. Each among their thousands bears dozens of seeds, and each of these presents a variation on an encoded theme of traits whose recombination, through breeding, could make plants that reform farming and help end its destruction of land.

Some of the plants are domesticated annuals. Some are wild perennials. The Land Institute aims to meld the high grain yield of annuals with the ability of perennials to cover and knit together soil over years without regular tillage or replanting. We devote winters in the greenhouse to merging annual wheat and rye with wild perennial relatives so summer can be spent evaluating and selecting in the field the best plants for further breeding. To get grains that dependably keep their high yield and perenniality, we must build a large and diverse stock of hybrids to draw on.

Some of our most common crosses are between wheat and intermediate wheatgrass, a wild perennial, and between rye and *Secale montanum*, a perennial wild rye. The wheats are pictured opposite with hybrid offspring whose perenniality is not yet strong enough for Kansas' harsh climate.

Rye is a cross-pollinated species. One plant needs pollen from another. This makes breeding it with wild perennial rye relatively easy. We bind the heads of two plants in one bag, let them pollinate one another, and harvest the resulting seed.

Wheat is self-pollinated. To cross it with another wheat plant, let alone another species, is not so easy. The pages following illustrate our method.

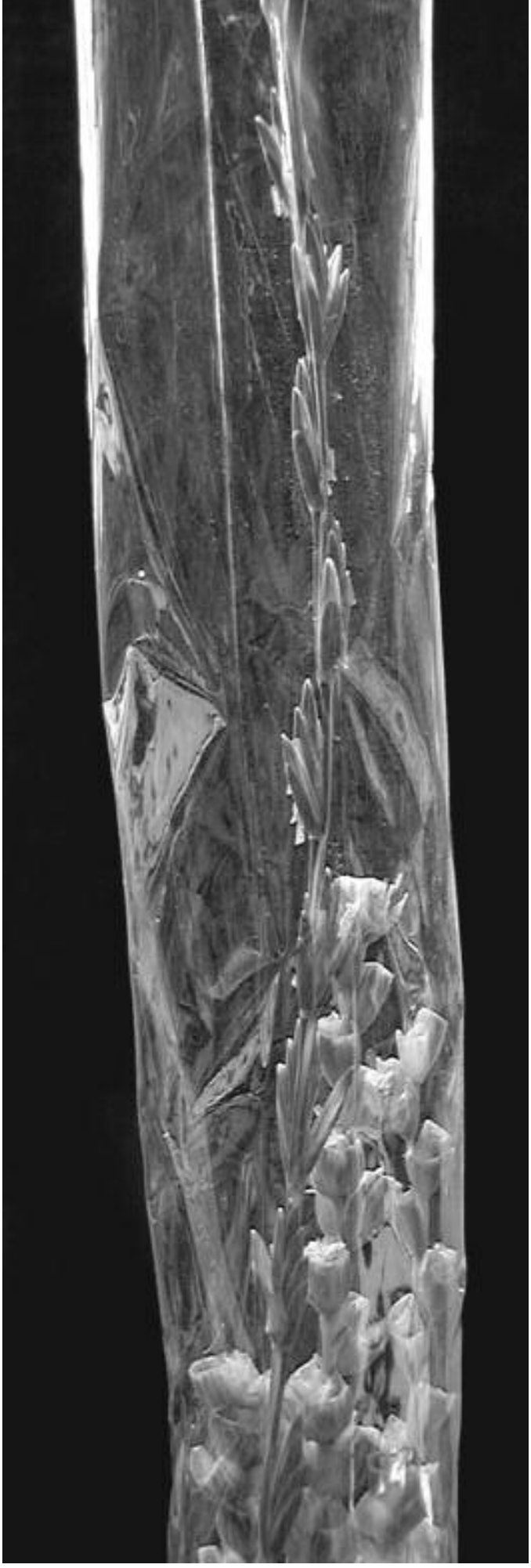
We have a variety of wheats to draw on for breeding. Among them is *Triticum carthlicum*, a wheat that sometimes has black awns, the bristle-like parts of the seed head. The species is similar to durum, the type used in pasta, but easier to produce fertile hybrids with.

The annual wheat parents we use are usually winter varieties, which are planted in fall and require a period of cold winter temperatures if they are to flower in the spring. So, we keep seedlings in a walk-in refrigerator at 40 degrees for seven weeks. The fan blowing them is to circulate air for even temperature in the space, not to simulate Kansas wind.

After the cold treatment, the annual wheat parents go to the greenhouse, where we use bright lights to stretch winter days to 16 hours. The plants grow rapidly to form the spikes, or heads, we will use for hybridization. Here Lee DeHaan checks hybrid seed formation.

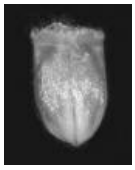
To cross wheat with another plant, we must emasculate the spike of one parent plant, removing all the male parts. This is more easily done with domesticated wheat than with a wild relative, so we make the former our hybrid's mother. A spike has dozens of flowers, each capable of producing a seed and containing three tiny male anthers. With little scissors, we snip the top from each flower, then pluck out the anthers with forceps, as DeHaan does here.

The emasculated heads of domestic wheat retain their female pistils. A wild perennial, producing large amounts of pollen, fulfills the male role. We slide a clear tube of bag-thin plastic over spikes of each type, isolating them from any others. The unemasculated spike is placed higher than the emasculated ones so the pollen falls on those of the head below. We help dispense pollen by flicking the bags several times a day. More than 200 of such crosses have been made here this winter.



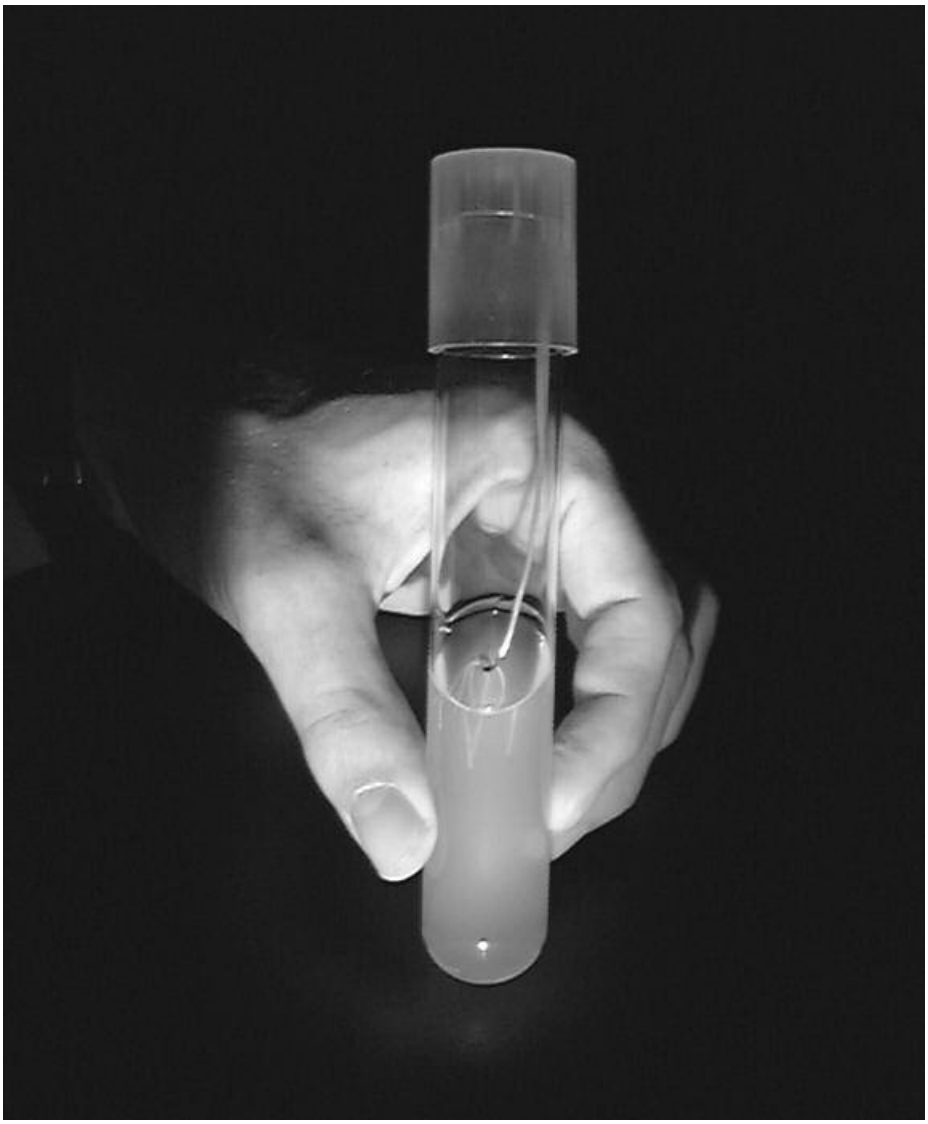
Within 15 days, developing seeds appear through the snipped tops of the female spikelets.

Distantly related plant species, unlike animals, often can be bred, but there is a point where chromosomal stretches stumble. Initial crosses between wheat and most perennial relatives yield a seed with abnormal development, such as this one's flat top. Such a seed often will not fully develop the endosperm needed for sustaining the embryo and initially feeding the plant (and us, as the white stuff of flour). Then the seed dies.



Succeeding with such a wide cross usually requires rescuing the young embryo from the aborting seed. We begin the rescue by picking the seeds from the spikes with forceps and sterilizing them with bleach. Then, under a microscope, we tear the seed open with a probe and remove the tiny embryo, which sometimes is smaller than the head of a pin. Here DeHaan does the job.

In the view through the microscope, see the embryo on the tip of the probe. Although initial hybrid seeds develop abnormally, through generations of breeding them back with original, healthy lines, plants can come to bear robust seed. We have rescued more than 700 embryos, with hundreds more expected before spring.



The embryo now makes its home in a sterile tube filled with a gelatinous medium of nutrients it needs to grow. We label the tubes with the cross that produced the embryos, and place them under a growth light in the laboratory. The embryos continue to grow in the tubes, and germinate several weeks later. They produce a shoot, roots and eventually leaves. This plant is ready to be transferred to a pot in the greenhouse. Every tiny new plant that we find developing in a tube adds to our hope for high-yielding perennial wheat.

Marrying Grain and Pasture

Gene Logsdon

I have this notion—an obsession, I guess—that we can raise all the food we are raising now without any cultivation of the soil. As part of this notion, I am seeding wheat into clover. I'd rather have a perennial wheat than an annual one for this experimentation, but I don't.

It is a fact that permanent pasture farming, as I like to call it, can produce meat, dairy products, eggs, feathers, hides, wool, etc. without soil cultivation. Farmers I visit are doing it on a practical commercial basis. What I can't say for sure is whether domestic small grains could profitably join this system. Nor do I yet know how to work corn into the cultivation-less method—though during the 1950s it was successfully broadcast planted by plane on cultivated seed beds in Minnesota.

I'm trying to see if grains can be sown into an established pasture and harvested as hay, or as pastured grain or as winter grazing, or harvested for human use, all without cultivation. I aim for a system that enables year-round grazing even in northern Ohio, where I live.

I knew that pastures of bluegrass and white clover could be kept permanent indefinitely with proper management, but I was not sure if other plants necessary for year-round, quality grazing could be kept growing without occasional reseeding, or if that reseeding could be done without preparing a nice seed bed. I knew that clovers and grasses could be broadcast on relatively bare, uncultivated ground—bared as by a new wheat field, or by temporarily overgrazing or by the trampling of animal hooves—and even on top of snow, as my father used to do, and get a stand good enough not only for hay or pasture, but to profitably harvest seed from. Red clover and timothy are two that have been traditionally broadcast in winter wheat and machine harvested the second year for seed in Ohio.

Why not reverse the situation and broadcast oats or wheat—or barley or rye or whatever—in clover and grass pastures? The answer was that the pastures were too heavily sodded for the grain plants to catch.

But then I noticed how red clover at the end of its second hay year—alfalfa after about five years—declined from a quite heavy stand to almost no stand. In the fall of the second year, the ground under the declining stand was rather bare. In another year, without clover's shading, weeds would come in to cover that bareness. What if wheat was broadcast in the declining red clover at that time in the fall?

I found it would indeed germinate and grow quite well. The seed lies until fall rains, which always come, sooner or later, in the humid eastern half of this country. The more rain during germination, the better. I worried that birds would eat the seed on top of the ground, but so far, there has not been enough of that to matter.

I learned that the secret to a good stand is to plant four to five bushels of wheat seed per acre, like the airplane seeders do here when broadcasting it into soybeans before bean harvest. Doubling the seeding rate is much cheaper than soil seed bed preparation.Obviously, with a no-till drill, seeding would be more effective, but I do not have one, and don't think one is necessary in a grazing regimen.

The new wheat can be grazed in late fall and then reseeded heavily over winter back to red clover or ladino or alfalfa. In early spring, the greening wheat can be grazed again a little, then allowed to mature its grain for

Gene Logsdon. Broadcast wheat sprouts on the soil surface amid clover.

machine harvesting in summer. I can also cut the wheat when the grain is in the milky stage and make haystacks of it. Sheep love wheat or oats this way, and the few mice attracted to the stacks are of no matter out in the field.

In my experimentation, the wheat will be weedy in some places, and I can't use herbicides because that would kill the new clover. But these weeds are not a problem in a grazing regimen. The livestock eat them right along with the wheat. And I can cut the wheat for hay, which knocks the weeds, before the wheat goes to head or the weeds to seed. A second, but shorter, growth of wheat and weeds regenerates, and I can make hay again. I prefer to turn livestock in to eat the maturing grain along with the stalks of the wheat and the clover. In September the clover regrows into a nice stand without many weeds.

A better way to get a small grain into a cultivation-less regimen is to use Alice big leaf white clover. It reseeds itself and it also spreads out by roots. It apparently will continue indefinitely as a pasture and hay crop, although weeds start coming in about the fourth year. Graze the Alice hard in the fall, and the result is quite a bit of bare ground. Broadcast the winter wheat, or drill it in, as above. I recommend only a very light grazing of the new wheat or the Alice after that. This makes a better winter pasture. In spring the Alice makes a green floor under the wheat. I make hay out of the whole growth or pasture it, but some of it could be combined for grain, keeping the cutter above the Alice, which does not usually grow as tall as red clover, alfalfa or other ladino clovers.

My sheep today, January 7, are grazing the new wheat—I saved it for now—under three inches of snow. At Christmastime they grazed red clover and oats regrowth. When I progress far enough in my experimentation toward year-round grazing, the animals will move from winter wheat, or clover and oats, to maize, needed for grazing in the heavy snows sure to come here in late January and early February. To get corn into the regimen, I still must cultivate, although with a no till drill and herbicides, I would not.

So, in my 12-acre experiment, 12 paddocks averaging an acre each, seven are in a permanent pasture regimen and will never be plowed again—by me anyway. Of the other five, one a year, in rotation, is plowed and planted to corn. The next year, the corn land is disced and broadcast to oats and clover. Thus, one paddock out of a total of 12 is cultivated once every five years. That is getting close to a cultivation-less farm and even closer to year-round grazing in the north.

Supply, Demand and Structure

I am certain we can raise all the animal products that society needs by grazing and haymaking alone, especially where rainfall is at least 35 to 40 inches a year. Graziers are repeatedly proving this. But the market isn't structured for it yet.

Grain is only necessary for quicker, faster animal growth to make a profit in today's agribusiness climate, though even its success there is debatable. It's an economic issue, not an agronomic one. A Kentucky cattleman I talked to recently said grass raised beef doesn't catch on only because the market is structured for corn fattening and because the packers can butcher a 1,500-pound steer more efficiently than it can two 750 pounders fattened on grass and mother's milk.

I can vouch for the taste of one being as good as the other, and the pasture-raised meat and milk is more healthful. But that doesn't mean a thing to a market structure based on corn and factory slaughter labor.

In the permanent pastures, the sheep and the sod control even Canada thistle. When a paddock is in corn, I can cultivate or spray persistent weeds.

My method allows another wonderful option. The oats following corn I cut for hay before it goes to head, and it comes back much stronger than wheat, so I get a second cutting for hay. Or, what I have found better, it makes for good grazing in August: the clover growing in it plus the oats, stalks and maturing grain. Then, in my estimation, something almost miraculous happens. Enough grains fall to the ground as the sheep graze it, or as I cut it for hay, that a moderate third growth of oats comes along from seed to hold up the nice stand of red clover for grazing in snow time.

Grassroots Land Reform in Brazil

Angus Wright

Excerpted from a talk at the 2001 Prairie Festival.

The slogan "Think globally, act locally" is often far more challenging than it might seem. Certainly, many problems can only be addressed meaningfully in terms of their local ramifications and through the actions of local people. The trick is, no one in a globalizing world is going to be allowed to simply act locally: Every local action interacts with large global social and ecological forces.

For the past year I have visited Brazil three times to study a remarkable movement of people acting locally to transform their lives, and, in doing so, transform the politics and culture of their nation. These landless rural people have learned how to use the force of numbers and the somewhat contradictory terms of Brazilian property law to acquire land for themselves. They have built lively communities. These communities now face challenges to their survival from national and international institutions and policies.

Brazil has about twice the arable land per capita, not counting the vast forests of the Amazon basin, as the United States. The great bulk of it and the best of it are held by a tiny minority, many of them absentee landowners or corporations. Much of the land is not used productively, but held as a hedge against inflation, as a base of social and political influence, or for future use. It is largely unavailable to Brazil's 8 million poorest rural people, who, in the desperate struggle for survival, have been driven to chop down great stretches of the world's most diverse forest.

This suits the landowners fine, because they buy the felled timber and move onto the land when its ability to produce subsistence crops has been exhausted but extensive cattle grazing can still yield a profit. The process also brings in and then frees up labor to be used in sawmills and in some of the biggest iron, manganese, aluminum, copper and gold mines on earth. The forest is devastated and only a handful of the poor end up with permanent livelihood.

Bedeviled by the amount of land locked up by powerful owners, legislators have from time to time ruled that land must serve a social purpose, must be productive, to be held as private property. The Brazilian Constitution of 1988 enshrined this principle. This means that much land does not have firm legal title. The rich have preferred vague land law for centuries, for it enables taking from the poor what they have cleared and put to use.

But now, through determination, a method of their own making and the force of numbers, more than 300,000 formerly landless families have acquired places of their own. They move onto land whose title is questionable, claim it and establish an encampment of dozens or hundreds of families. They demand that the government expropriate land for them to make a living on, either where they are camped or somewhere else that it is available.

Hundreds of their leaders were assassinated in this struggle, but they persevered. At the very least, 5 million acres have passed into the hands of those poor people who form the leading organization of landless people. Recently the government claimed that 50 million acres have been expropriated for the poor, though that number is certainly greatly inflated. Many of those who otherwise would be desperately clearing forest now are settled on land that long ago was put to agricultural use. This land had reverted to low-yielding pasture, and was judged to have fallen below the standards of productivity that justify ownership. Much of this land had also been acquired fraudulently by large landholders from small holders.

The government resisted this process, then largely cooperated with it, then began again, as now, to resist it and try to undermine it. Currently the main way is by denial of cheap credit, technical assistance, electrical energy, schools and clinics. These had been promised and for a time partially provided. Now the government has withdrawn support. The primary reason given is that the International Monetary Fund, with U.S. backing, demands that government expenditures be cut in the refinancing of Brazil's foreign debt. Also, it is said, such farm support must be eliminated for free trade agreements.

Over the past year, I talked to many people on the land reform settlements. Almost all report that they are far better off than they were. They are able to feed themselves, often for the first time, and they have hopes for their children that they had not dared to imagine a few years ago. But without credit, without electricity, without schools and clinics, without some technical assistance—without, that is, the fundamentals of healthy and stable communities in the modern world, fundamentals routinely provided by governments—many know they will not be able to stay on the land in anything but the most miserable conditions, returning slowly and painfully to their situation before winning a new life for themselves. They are sick at heart about this, but endure with strength and hope, having learned that by organization and determination

Angus Wright. Jose Placotnik, a former sharecropper and now a local leader of Brazil's movement for agrarian reform, plants sunflowers on his land as part of the movement's agroecological vision in the state of Rio Grande do Sul.

the seemingly impossible can sometimes be accomplished.

Can the requirements of the international market fit with the conditions for healthy and stable rural communities in some harmony with the natural environment? I think the answer is certainly yes. But it cannot be done without determination, sacrifice and intelligent understanding by all of us, for all of us are involved in the modern dilemma of local communities increasingly governed by international forces. It cannot be done in blind devotion to globalization or free trade. Nor can it be done by trying to maintain an impossible isolation, in ignorance of other peoples and nations.

The devil may be in the details, but so is the divine. The precise shapes and colors that attract the pollinator to a flower, Gary Nabhan has reminded us, are essential to our welfare. The details of pesticide toxicology or of the way that the global climate warms in turn may determine whether honeybees can survive. And it may be that the complexities of an international law may be our lifeline to survival.

Bring it home to Kansas. If agriculture continues to be overwhelmingly driven by international market forces, Kansas will almost certainly remain a breadbasket to the world. But wouldn't it be a good idea, as Wes Jackson has proposed, to produce those grains by a way more consistent with the health of prairie soils and prairie life, and wouldn't that better support Kansas communities? Wouldn't it relieve us of vast, uncontrollable and unpredictable international forces if our agriculture were less dependent on the international petroleum markets and OPEC? Wouldn't it be healthier for our communities to have a more diverse agriculture more directed at local and regional markets than one almost utterly dependent on international markets? Wouldn't it be better if we were to keep some of these decisions within the bounds of the American political system rather than, in effect, surrendering them to international trade organizations such as the World Trade Organization insulated from public scrutiny and public pressure?

It is interesting that when the sharecropping farmers of Brazil's southern region of Rio Grande do Sul first got their land through the processes I have described, they did what successful large farms in the region did—they planted corn and soybeans and poured on the chemicals. But they have found this is a game they lose—they don't have the same access to markets, credit and government support that the big farming companies have. So many of them are now determined to diversify production, decrease chemical dependence, institute on-farm processing to capture the value added by their labor and market directly to nearby towns and cities.

My Brazilian friends always ask what the situation is in U.S. agriculture. When I tell them how concentrated the landholdings are—not that different from Brazil—and when I tell them of the exodus from the American farm to the cities, they ask if land reform is an issue in the United States. When I explain that

American farmers are seldom interested in discussing it, they are surprised and suggest that I should do more to talk it up.

But one man, the singer and poet of his settlement in the Amazon, a man with a fifth-grade education, said, "Well, they must think about it in terms of their own conditions. You can't say that land reform is what they need. What they need is to seriously talk among themselves about how to approach the problem in terms of their own possibilities. Only they can figure it out."

His words are an example of the joys of the kind of work I do. For me, it is a great pleasure to listen to the intelligence of people who are scorned. And to link things up, find the missing pieces of a puzzle. To see how the life of a poor farmer in the Amazon is connected to the policies of her government and mine makes some sense of the world. It banishes the idea that the people out there on the landscape are simply victims of some nameless, inevitable historical process. Because I want to tell you, that farmer is no passive victim. She has stood up to gun thugs and police to get what she needs, and she is willing to do far more to secure the life of her children.

It is the transformations in people seen during this work in Brazil that I find so wonderful and astounding. For 35 years, off and on, I have been involved with the lives of Brazilian rural people, and I have been distressed more than anything else by their willingness to bow to authority and by the way they have been victimized by their ignorance and passivity. But they aren't always like that, and when I have been able to see people recently emerging from it by their own determined efforts, there is no greater joy.

Here are two of my favorite stories, which I will try to make stand for many others.

A 21-year-old Afro-Brazilian man named Gudeson introduced me over a few days to the life of his new settlement. He told me how he came to cast his lot with these folks. His father had despaired of Gudeson's life of pretty crime, drunkenness and drug addiction starting at the age of 11. His father had delivered Gudeson at 16 to his godfather's uncle, who happened to be in an encampment of poor people demanding land. They survived the assassination of their two main leaders by gun thugs who went unpunished, an assassination Gudeson witnessed, and they won title to land. This is almost literally in the shadow of the world's largest gold, iron and manganese mines.

Gudeson had told me of all his hopes for the settlement, and his fears. So had the other settlers. But Gudeson didn't feel I had yet thoroughly understood. One night, standing in front of his little wooden house in the full moon—there is no electrical light yet—Gudeson said, "What I can hardly explain to you is the way this has opened up the world to me. The way my head is exploding with new ideas and information. Almost more than I can stand sometimes, my head just feels like it is exploding! For example, how would I, that petty little criminal, have ever heard of 'the dialectic' if I had not come into this movement?"

I replied with a stupidly professorial remark that "the dialectic was a concept that was not surprising to encounter in such a movement."

"But no," Gudeson said, "dialectic is just an example. 'Concept'—you just used the word concept—now I know what you mean, yes, concept. That is a word I would never have understood, and now I do. And the world just keeps unfolding, opening up with ideas and concepts I could never before have been able to think!"

My wife and I were spending a wet, cold Sunday afternoon in a school in Sarandi, the founding settlement of the landless movement. Two little boys—about 8 and 11, children of the family that takes care of the school—had done their chores of feeding livestock and had time on their hands. After discussing various possible ways to amuse themselves, one said, "Hey, let's watch videos!" "OK, I'll go get the tape while you get the VCR ready." My wife and I waited curiously to see if they would be watching *Terminator 2*, *Austin Powers*, a Bruce Lee film, or maybe Donald Duck cartoons.

When they put the video on, they watched it for nearly two hours with close attention and an occasional intelligent comment. The video was called "The Management of Small-Scale Agricultural Systems."

It is very difficult to make local communities flourish in a rapidly changing, complex world, but we must try. The future of those kids in Rio Grande do Sul and of the kids of Kansas will depend on how much they can learn about the "management of small-scale agricultural systems," and about the world that may or may not make it possible to live in small-scale agricultural communities.

Can we solve the dilemma of making the health of local communities consistent with the rules by which the world is run and the means by which we solve our conflicts when the rules fail? What are we doing to increase our understanding of our own communities and the way they relate to a large and complex world? What videos are we watching on a cold Sunday afternoon?

Home is Where They'll Lay Me Down

Coming to Rest on a Given River

Mike Connelly

My great grandfather, Neils Bjerre, was known as "Gussy Boy." He was a poet—the only one in the family that anyone knows about. When he was an old man he did something he had wanted to do for a very long time. He took a boat back to Denmark, the place where he was born. He hadn't been there in 45 years.

During his trip he kept a journal, which he sent back to my great-grandmother in weekly installments. She had decided not to go. Perhaps she understood that this was something he would have to do alone. After all, it was his past that was absent. She was born right where she still lived, on the northern coast of California.

Somehow, after years wandering around, I have ended up in Oregon, east of the Cascades, just north of the California border. We farm near the headwaters of the Klamath River, and as I watch the water pass I think of the place where it meets the sea, down near the home my great-grandparents shared. I imagine a clear day with Gussy Boy and Memo sitting on the bank where the fresh meets the salt, dipping their bare feet into the cold, pushing their toes down into the mud. It's autumn, and there are others around, gathered to watch the salmon pass.

When my mother retired, she went through boxes, found Gussy's journal and brought it to me. Busy, I laid it on a stack of bills. Later that day I sat down to eat. I picked the journal up off the stack and started reading. I finished my lunch at about page five, but I didn't stop reading until the end, fifty pages later. When the phone rang I just let it.

May 16, 1951 (Tues)

Well, we are on our way. The landing bridge was cast off at 12:10, and the ship shook itself and started moving at 12:12 pm. We've had lunch - and a very good one too - and the passengers are stretched out in their deck chairs on the sunny afterdeck. The ship is filled to capacity, mostly with Danes, going home to visit the Fatherland. I have with me in my cabin two Danes and one Swede, all elderly and apparently respectable citizens. Another man I met this afternoon turned out to hail from Holstebro and knew several of my many relatives in that neighborhood. This world is getting too small to hide in. Lucky I don't have to.

My family's farm is part of the U.S. Bureau of Reclamation's Klamath Irrigation Project. A lawsuit filed by a coalition of downstream interests—environmentalists, tribal governments and commercial salmon fishermen—alleges that the operation of the 90-year-old Klamath Project is threatening the coho salmon. A federal judge 500 miles away has determined that the salmon need the water worse than we do, and has informed 1,200 of my neighbors, farming almost a quarter of a million acres, that they will have to find another way to make a living.

Right or wrong, the suffering that has resulted from this decision is real, and we should resist dismissing it as just collateral damage. My wife, who manages a couple of rural health clinics, comes home at night with stories of old men weeping, of the doctors themselves weeping.

We have been told by local environmental advocates that we deserve what has happened, that we brought this on ourselves, and we have been told by Indians and fishermen, "Welcome to the club." Maybe they're right, and maybe this is justice, a simple case of sons punished for the sins of fathers. But whether they're right or not, there is a pressurized rage smoldering in my gut, and I cannot make it go away. I have spent years working to improve conditions on this river, and I have tried to persuade my neighbors that the downstream folks are just like us, their situation just like ours.

But watching my daughter's eyes tear up as we tell her we may end up leaving, I feel like I want to punch someone in the face. I'm not like this. I don't want to be like this. Right now, though, that's how I am. More than anything I feel lost, like the earth itself has disappeared from underneath my feet, like the blue, cloudless sky is a gun pointed straight at my head.

But when I read my grandfather's journal, there was something there that felt solid, and I grabbed at it like flotsam in a freezing sea. Gussy was reaching, too, and he didn't know what for, any more than I did. But I think it was the same thing.

When Gussy claimed the world was small, it sounded to me like wishful thinking, like the whole reason he was on that boat was because he knew otherwise, because he felt lost, too, in a world that had outgrown him, that had drowned out the quiet voices of people he remembered, had overwhelmed the rhythms of a place that really was small—small enough, at least, to call "home."

'The history of this region, the life cycle of our own species, is exactly as dramatic, exactly as heroic, exactly as tragic as that of the salmon.'

But the world itself is not getting small. It's as big as it's always been—bigger in a lot of ways—and we ought not to think of it otherwise. Our claim that the world has grown smaller stems from our reluctance to acknowledge that we humans have just grown much bigger. We have built machines, and by touching these machines we extend our presence quite literally to the ends of the earth. We can float and drive and fly where once we could only walk. We have made ourselves so large that the earth itself seems to have shrunk, shrunk to the point that most of us feel like it is something we can wrap our thoughts around, something we can "get a handle on." We tend to act like it's our job to comprehend it, to manage it, to consume it. We have grown so large that its very salvation is something we feel we're in charge of.

We've forgotten that our plugs can be pulled, our gears jammed, our lines cut, our industrial tentacles amputated, leaving us fragile, mute and alone, the hungry monkeys we have always been, wandering around our tiny homes, forced to learn, once again, how to live within them.

May 25 (Thu)

I sometimes wish I had kept up the diary I started 44 years ago, when I began my journey eastward, a journey which now, at last, completes my "trip around the world." On the other hand, it might be said one should not waste time looking back; world progress is built by men who look ahead, not stopping to lament over past mistakes. So maybe I, too, better keep looking ahead; if I can't build an empire, a world of peace or a society of contentment, perhaps I can build a henhouse for the Madam when I get back home.

Someone claimed recently that "after all our efforts to save the salmon, we may come to see that it is the salmon who are saving us." The life cycle of the salmon is dramatic, mythic; it's metaphorical in a way that fits fairly neatly into the stories we have been telling about ourselves for the last several decades. Their scarcity works like a warning.

But perhaps more critical is the fact that salmon fit into most of our much older stories, as well. Born into the brightness and rush upstream, they stay a while and then head on out toward the deep. They never really know their mothers, their fathers, although their very lives depend on the death and decay of the generation before. They reach the sea, and wander long and far, but always with the mute knowledge that by striking out they are headed home, that by fattening up they are feeding what's coming after.

What they do then has been called "unimaginable." From out in the ocean they find their way back. Among thousands of river mouths they find the right one. Faced with fork after fork, they almost always go the right way. They turn into monsters, red and hooked and humped and fanged, scraping and lunging their way up. They rub their faces raw, digging their nests in the cobble. The water mucks up with flesh and clouds of fertile white. So much of it futility, and yet there is no other way.

It is innocence, exploration, endurance and luck, selfishness and sacrifice—limitlessness, and the gravity of home. These are themes we cling to. We've talked of them for 50,000 years. The history of this region, the life cycle of our own species, is exactly as dramatic, exactly as heroic, exactly as tragic as that of the salmon. Our instinct for home is as mysterious and irrefutable, and the consequences of losing our way just as bloody, final, and, perhaps, necessary.

Our story is their story and theirs is ours, and yet we call it "unimaginable." Our problem is not that a fish's life is so alien that "imagining" it is impossible, it's that we've lost the habit of doing that kind of thinking. That faculty is so atrophied, as busy as we are with other things, that we're no longer up to the task. We are like the boy who hit his head, and could no longer recognize his identical twin.

This is not, as so many seem to think, a permanent flaw in our genetic makeup. It's a basic requirement of the conditions of our lives. Our inability to identify with the natural systems that surround us and sustain us, our reluctance to celebrate or even recognize the mutually creative, mutually destructive bonds between people and nature, is simply the result of having our attention directed elsewhere. Nowadays, trying to keep these things in mind is like trying to read a book on a merry-go-round. Everything's big and bright and loud. The pull is centrifugal, away, outward. No matter how badly we need it, the gravity just won't hold.

May 27 (Sat)

I found myself on a pier, surrounded by hundreds and hundreds of strangers. Then suddenly, while scanning this sea of faces for traces of "my family," I heard a feminine voice cry out; a pair of soft arms encircled my neck and a determined kiss was planted on my cheek. It was a shock, although not, I admit, an altogether unpleasant one. I discovered that my assailant was a very beautiful young lady, who now proceeded to

claim, and prove, legitimate relationship to me, to wit: Her father is a nephew of mine. Nor was she alone. A full dozen of relatives had come to bid me welcome home. I didn't know them. Only one of them had I ever seen before.

The greeting Gussy received at the docks in Denmark is hard for me to explain away. If I think about encountering a distant relative, one that I haven't seen for a half-century, or that I have never seen, I can only imagine a sort of awkward cordiality. Perhaps we would sit and talk a while, if there was time, about the people we have both known, about places we've both been. When our time was up we'd shake hands, wish each other well, and suggest that we stay in touch, knowing full well how unlikely that is. Maybe it's only preconceptions like these that would make such an encounter turn out that way. Maybe it would turn out differently if only I wanted it to, if only I imagined it would.

Maybe. But everywhere Gussy went in Denmark he was met by boisterous crowds of overjoyed strangers, some of whom traveled far to see him, most of whom wept openly when it was time for him to leave again. These encounters feel alien to me, and I suspect I'm not alone in this. Like Gussy, I would no doubt feel "shocked" and "moved" to be treated this way, after so many years, by a bunch of strangers whose only connection is a word, a name, and the place they all call "home."

But maybe that's enough. Maybe Family and Home, if we think about them right, if we put them in the privileged place they deserve, are enough to make folks act this way. What power there must be in these two things: Over all that time, across all that space, a young girl shouts and waves, wraps her arms around, and kisses the face of an old man she has never seen before.

While corporate and environmental and governmental forces lay blame on each other over endangered species and places, the overwhelming majority consider the health of nature to be somebody else's business. People, in general, really do have more pressing concerns than "preserving biodiversity" or keeping the polar ice caps frozen. We are trying to keep the house warm, trying to keep the kids in school, trying to keep the fridge full, the car running, the rent paid, the family together. And we are looking for something like love—a sense of belonging that doesn't feel like submission, a sense of certainty that doesn't feel like stagnation.

It's true that, over the past several decades, people have been persuaded to "appreciate" the natural world, particularly when it was experienced as a clearly defined, state-sanctioned jurisdiction, with adequate modern amenities and hard-surfaced, multilane vehicular access. Most people have come to see these places as a source of joy, escape, recreation. Some have even begun to value them as a source of life, as repositories of "ecosystem services," as the loving arms of our Mother Earth.

And yet species are still disappearing. People are still getting sick. The water is still mucking up. The cities just keep getting bigger, the crowds louder, the appetites more insatiable. Despite the new attitude—and despite all the new legislation—we are still, it seems, hurtling headlong toward ecological ruin.

During his stay in Denmark, Gussy visited at least one grave a day. Early in the trip Gussy's brother, Hans, brought him to the place where his parents were buried.

June 14th (Wed)

I placed an armful of flowers from Kongensgaard's garden at the foot of the stone, as a last greeting from their wandering boy. I cannot think of a more restful spot for mother and father to sleep. The plot is good-sized and brother Jacob and his wife are also buried there. The always faithful Hans sees to it that the place is well taken care of.

We all want the world to be "sacred." But many are noticing that nothing sacred ever avoids the darker, more difficult aspects of our earthly tenure. It's safe to say that efforts to raise consciousness of environmental issues have been "successful," but how much of that success has involved an honest reckoning with that half of nature that is nasty and brutish, and how much is dependent on suppressing or ignoring such things?

It's no accident that we call this movement "green." For the most part, the mythology underlying the environmental movement has always relied upon an undue preoccupation with life and growth, with beauty and leisure. The same has been said, more often than not by environmentalists, of the national mythology that started us gobbling and stomping across this continent so long ago. This is the one thing we haven't changed, and it's looking more and more like it's the only thing that ever really needed changing.

It's beginning to occur to people that it's not enough to think of nature as therapy, as spectacular, as a nurturing mother and source of all life. Our preoccupation with life, with productivity, with joy keeps us from telling the rest of the story. It keeps us from going the rest of the way around. The life we love is born of rot. Decay makes the heat that fires our growing. Pain is the gilt that frames our joy. And if our common goal is to "see to it that the place is well taken care of," then we should take a tip from Gussy's brother Hans. Always faithful, we need to see nature as a grave.

June 24 (Sat)

No sunshine yet but it's mild and there is no rain. Hans and I went to church in Lemvig this morning and nostalgic memories came back to me, as I sat in the old church, where I had come with my parents as a boy. The preacher had chosen for his text the story of the Prodigal Son, and I couldn't help feeling there was a message in it for me. I've come a long way from the beliefs of my childhood, many of the dogmas have gone by the board, but the well-known hymns brought back to me the old feeling of restful peace, and reverence.

The first step to finding real solutions is the accurate characterization of the problem we're trying to solve, and to insist that our problem is merely declining salmon runs is like trying to cure cancer with a box of Kleenex. There are many folks throughout the Northwest who are getting it through their heads that declining salmon runs are just a symptom of a much deeper malady. They are realizing that treating the fish problem by itself—without dealing with the relationship between fish and people—will produce, at best, a temporary fix.

A well-known example is the work of Freeman House and his neighbors on the Mattole River, on the northern coast of California. Faced with the prospect of losing their native salmon runs, they developed a plan to capture wild salmon on their way up to where their spawning beds used to be, and propagate the fish in homemade, small-scale fish hatcheries. As a matter of necessity, this was a do-it-yourself affair, which is why, to my mind, the Mattole effort is so much more important than all the "official" efforts in progress throughout the Northwest. They had to beg and borrow everything they needed, be it hardware, technical expertise, human labor or moral support. They couldn't afford to be picky, to alienate citizens who could lend a hand or landowners who managed so much of the salmon's historical habitat. They reached out to everyone—hippies, ranchers, logging companies, fishermen and anyone else—with respect and humility.

The residents of the Mattole were a little ahead of the curve, but since they began their efforts in the late 1970s, the idea that salmon should thrive has taken hold throughout the Northwest. These collaborative, community-based efforts have produced demonstrable, verifiable results, and participants see these results as evidence that these innovative approaches really do work—if they are allowed to.

Upper basin farmers, who have been core participants in these efforts from the beginning, are feeling like all their efforts have been for nothing, like the shutdown of their farms amounts to a punishment for the pivotal role they have played. Participating environmentalists, too, are feeling betrayed, like a blast of regulatory heat melted their snowball just as it was starting to really get rolling. The only glimmer of hope for these efforts is an evolving consensus that changes need to be made to our most fundamental environmental laws, changes that will allow local communities the time and space to do what coercive legislation has never been able to: Outgrow once and for all the silly notion that there is some categorical difference between human communities and the rest of Creation. This is the wound that has been hemorrhaging throughout this nation's history, and we are finally learning that our little tiny Band-Aids will never get the bleeding stopped.

The effort to restore salmon runs in the Northwest is massive, and there is much frustration at the pace of progress and the level of conflict. But it still feels to me like we're going to pull it off. It feels this way not because of the financial and institutional power behind the effort, but in spite of it. It feels this way because people like Freeman House—people all across this continent—are demonstrating a willingness to have patience and faith without sacrificing passion, a willingness to allow a fresh set of stories to emerge from encounters between all different kinds of people, to allow their minds to be changed, even while they're trying to change the minds of others. There is a gathering together, coming in close around something that can only be found where we live, that only shows itself to those who have stayed long enough to let their senses adjust. It's not a thing but a growing, an iteration, ongoing and ever changing—a conversation between a people and a place that are both, themselves, ongoing and ever changing.

This is a point that is elegantly made in House's book, *Totem Salmon*. And I think he was able to make this point for one very good reason. He was a fisherman. He killed salmon for money and for food. This experience underlies his struggle to figure out how he should relate to these fish—such as when he points out that the Yurok word for salmon means "that which is eaten," and that the Ainu word means "the real thing that we eat." Throughout the Northwest, alliances have been formed between commercial fishermen, Native American tribes and conventional, urban, Euro-American environmental advocates. These alliances have had a distinct effect on the rhetoric of species preservation efforts, particularly within the ranks of conventional advocates. The reason for this is simple: The salmon, while they satisfy the same criteria—beauty, drama, marketability—that made the bald eagle and the spotted owl so useful to advocates, are the first endangered species that most of us love to kill and eat.

A commercial fisherman I met, whose boat had been idled since the early '90s, said of environmental advocates: "I don't think they realize it, but this salmon thing is messing with their heads."

And they are not the only ones. Small farmers and

'Salmon are giving us a way to fill in each other's gaps, and they happen to be ideally suited to making us do it in a very particular way ...'

ranchers have always had the direct, daily experience of the deeply complex, morally ambiguous workings of natural systems—the dependence of life upon death, the inextricable marriage of growth and decay. These have always been part of the everyday lives of rural people. The problem has been that they haven't had any real good way of talking about it, of turning that experience into something that draws the people and the land together, that reminds them daily that their two fates are really only one. Urban people, on the other hand, have come up with some very clever ways of talking about people and nature, but they have had to do it without the benefit of daily engagement, without the daily affirmation that our lives are made possible by the death of what we love.

Salmon are giving us a way to fill in each other's gaps, and they happen to be ideally suited to making us do it in a very particular way—the only way that is both deep and durable enough to outlast all the corporate and bureaucratic hugeness that has thus far kept us from coming together.

Salmon not only force us to confront, accept, even celebrate the role of death in our lives, our own roles as killer and killed, they also force us to do it in particular places, within finite landscapes and communities, at scales compatible with the standard equipment of the human organism. Salmon have sorted themselves out into hundreds, maybe thousands of uniquely adapted populations, hard-wired for the specifics of this or that little crease in the earth. If they survive, if we are going to help ensure their survival, we will have to do almost exactly the same thing.

July 5th (Wed)

My brother Hans and I went for a stroll around town, and once more to the cemetery, this time to see my sister Sidsel's grave. Then toward evening a car came from Kongensgaard to take me elsewhere on a farewell visit. It was now time to say good-bye to Hans. This was not easy. He is 77 years old and not too well. We both realized this was our last meeting, and our eyes were wet when we shook hands.

My wife and I hadn't had a vacation for seven years, so we headed for the coast. We took the road that ran along the Klamath, all the way to the sea.

We were headed down where Gussy had lived. I was going to see his grave. Gussy had made it back safe and sound, and then not long after, he died. Just before he left the docks in Denmark he wrote, "It was wonderful to make this pilgrimage to the Homeland, but it'll be nice to get back home." He put more than one home in that sentence, but it doesn't sound like he noticed. I think a lot of us are like that.

He is in the ground on the north coast of California, and down with him he brought a heartful of stories about that place and the people he loved. He also had stories of a place on the other side of the world. He had people in the ground there—and in the trees and the air and the streams. That knowledge made him go back, and it helped him find his way.

My people are buried all over this world. There is no single place I can go to and find them. I have no family in the little graveyard at home, where the waters of the Klamath first hit the ground. But I know the stone-carved names there. I sit and talk and eat with people who have those names now. Last year, hat on my chest, I stood with neighbors and watched a man lowered into the ground. A man I had known, a man I had worked with, a man who had helped me. Someone once told him he'd better watch out, that "someday they'll run us out of this country." He just looked back to his work and said, quietly, "I'm not going anywhere."

I like to think this is how it starts. That talk, this work, this shared place—they have made a part of his life a part of my own, and there is nothing anyone can do about that. I have stories to tell about this man, and the stories he told, we will tell again. He is planted in the land here, and because of that these stories are rooted here, too. And because of that so are the storytellers. There is nothing anyone can do about that. I wipe my daughter's tears away and tell her, "We're not going anywhere."

My mother and father will be buried here. I will have stories to tell about them, and those stories will hold me to the ground where they rest, and I will see to it that the place is well taken care of. These stories are the part of our dead that lives on, and our dead are down in this ground, coming apart, coming back up, alive and green and reaching for the sun. This green will feed the river, and the river will keep our children fed. Our children, grown, with children of their own, sitting around the table, telling stories about us.

Adapted from a story in the Summer 2001 issue of Orion.

Natural Systems Agriculture

We built a cool-growth chamber to cross-pollinate wheat with lymegrass, a wild perennial from northern latitudes. The progeny of successful crosses will help develop winter-hardy perennial wheat. Our wheat breeding is illustrated beginning on page 8.

David Van Tassel is preparing to make crosses between annual domestic sunflower and its wild perennial relative, Maximilian sunflower. Promising Maximilian plants are growing rapidly in the greenhouse. When they begin to flower, Van Tassel will cross-pollinate domestic annuals with these wild perennials as the first step in developing a higher yielding perennial sunflower.

Lee DeHaan is evaluating several perennial species of chickpea in a greenhouse planting. Perennial chickpea is a potential legume for perennial polycultures in the Northwest and the Great Plains.

Chris Picone is comparing mycorrhizal fungi in agricultural and natural systems, analyzing data on how they are affected by tillage and plant diversity. He is also conducting experiments with the potential for mycorrhizal fungi to control weeds such as bindweed. An article on mycorrhizae is planned for the next issue.

Chickens in a portable pen were put to work scouring plots of sorghum. They scratched the soil for seed, and so should ease identification of growth as coming from perennials' roots rather than from annuals' seeds.

NSA Graduate Research Fellowships
Posters have reached universities to promote this year's fellowships. Applications are due March 1. Please alert any would-be participants that information and application are on our web site.

In September, we held a short course to introduce NSA to potential fellows.

Sunshine Farm

With the numbers in, Sunshine Farm cattle have gone to other pastures. The farm's 10 years of data collection for analyzing agriculture's energy economics ended with 2001, and most of the longhorn herd, which figured in the study, were auctioned in January.

Last year, with the birth of 25 calves, the cattle population on our 160-acre prairie pasture reached 62, a high.

Rural Community Studies Program

The Prairie Park Nature Center program, presented to each grade at the junior high school in Baldwin City, Kansas, was part of a series to help students consider their place in the environment and how they might live in a way that protects it. Students gazed into the eyes of a barred owl and stroked the silky length of a bull snake. They visited wetlands with Roger Boyd of Baker University, studied the life cycle of monarch butterflies, mapped the vegetation in their schoolyard, planned landscaping for attracting birds, and assessed stream quality.

Work in three rural Kansas school districts to improve understanding of natural and human communities is in its third year. The Matfield Green Consortium for Place-based Education, funded by a Land Institute grant from the Annenberg Foundation, now brings experiences such as those above to 62 percent of the students in Baldwin and all of the students in the Chase County and Flinthills districts. Director Bev Worster led two weeklong workshops training 45 teachers.

In a dramatically improved version of the old home economics course, the foods class at Baldwin High School features the production and preparation of Kansas-grown foods—not just wheat, but also grass-fed beef and organic vegetables.

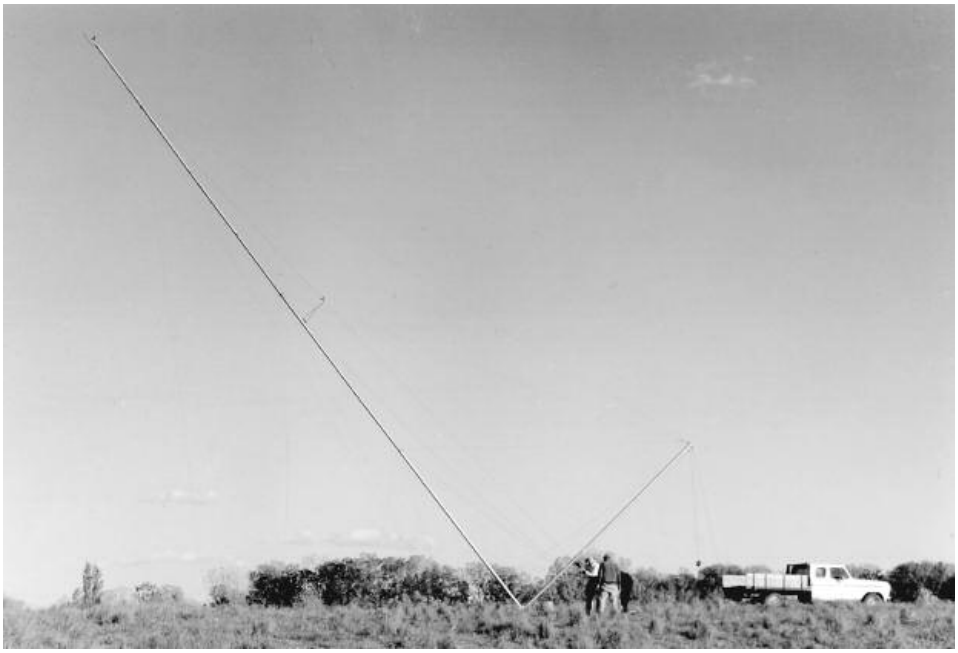
Consortium school staff members have presented their work at three state and regional conferences. Three from Chase County have been invited to give a 90-minute presentation at the Kansas Department of Education Conference in Wichita this spring.

The Rural School and Community Trust includes our prairie studies work on its web site, www.ruraledu.org.

New Faces

Lee DeHaan, a plant breeder, joined our staff in September after being a Land Institute graduate research fellow for two years. He was raised on a farm in Minnesota, earned a bachelor's degree in plant science and biology from Dordt College in 1995, and his master's degree (2000) and doctorate (2001) in applied plant science specializing in agroecology from the University of Minnesota. He received two awards there: the outstanding graduate student honor from his department and the scholarship for meritorious graduate students from the Crop Science Society of America. DeHaan's graduate research focused on developing new perennial crops. His scientific investigation will continue to be with the connection of agroecology and plant breeding.

Jerry Glover arrived in January as an agroecologist. Jerry, raised on a farm in southeastern Colorado, was an intern at The Land Institute in 1996. Jerry returned to Washington State University to finish a bachelor's degree in soil science in 1997, a bachelor's degree in philosophy in 1998, and a doctorate in soil science in 2001. As a graduate student he studied soil, crop and environmental quality, disease and pest management, and financial per-



Scott Bontz. Ray Dean, Bob Pinkall and Cork Umphrey raise a pole on high ground in our 160-acre pasture to study if there is enough wind to pay for an electricity turbine. That will be calculated from data collected over a year by anemometers atop the 90-foot pole and halfway down. The Land Institute tried wind-powered generators at its beginning. The technology's efficiency and reliability has improved.

formance in apple production. He co-authored a cover story for *Nature*, one of the most respected professional journals. Glover's primary duty will be overseeing the long-term agroecology project. This will study the effects of prairie restoration, organic annual grain cropping and Natural Systems Agriculture on soil, crop and environmental quality, and on disease and pest management in the tallgrass prairie region of the Midwest and in the bunchgrass prairie region of the Northwest.

Glover and DeHaan will coordinate the graduate research fellows program.

George Pyle arrived in November as director of our new Prairie Writers Circle. He and the other director, Harris Rayl, are recruiting members to write essays on agriculture, rural culture and the environment for mainstream news publications.

Pyle was a columnist for the *Salina Journal*, has contributed pieces for the *New York Times* opinion pages, and has written for newspapers for 20 years. By early February, his essays for us had appeared in the *Des Moines Register*, the *Wichita Eagle* and other Kansas newspapers.

Rayl, formerly publisher of the *Journal* and now on the board of the *Journal's* parent company, volunteers for The Land Institute both his skill as a journalist and his knowledge of horticulture.

Darlene Wolf became our receptionist and assistant in August. She is a native Kansan who has worked as a secretary and with computers for certified public accountants and a feed lot. She, her husband, their three children and a menagerie of livestock make their home on six acres.

Public Notices

Visitors

John Holland, professor in psychology at University Michigan Medical School, co-chairman of Santa Fe Institute and an NSA advisor, met with staff members for half a day. The editor of the *American Journal of Alternative Agriculture*, Bob Papendick, visited. Jean François Vallee of European TV came twice for a documentary on agriculture. Three participants in the No-till on the Plains conference visited in January: the president, who is a local farmer, a Colorado representative of the National Resources Conservation Service and the keynote speaker, who was from Paraguay. A research group leader from Mallee Research Station in Victoria, Australia, came to learn more about the possibilities of polycultures.

Visitors to our facilities in Matfield Green, Kansas, were an elderhostel group, the Kansas Natural Resources Council's annual meeting and a renewable energy gathering arranged by a local rancher.

Presentations

Talks on managing beneficial soil fungi in farming to mimic natural systems of soil fertility were given at Wichita State University, Hampshire College in Massachusetts and Siena College New York. Speakers also made presentations at the Aldo Leopold Family Farm & Shack Seminar Series and the Sustainability Symposium at Henry Ford Museum & Greenfield Village in Michigan. We presented ideas on agriculture to a panel for the Kansas legislature and participated in the Poverty Conference at Harvey Mudd College in Claremont, California.

Media

There was a half-hour interview for *Green Futures*, a show on WDBX radio in Indiana, and a response to "What kind of biotech should we be against?" for a presenter at the State Ag Development Board in Kentucky. Staff members wrote a variety of op-ed pieces for various Kansas newspapers.

Schools Gone Native

George B. Pyle

Land-Grant Universities and Extension into the 21st Century: Renegotiating or Abandoning a Social Contract
By George R. McDowell
Iowa State University Press
214 pages, $34.99 paper

The land grant university is dead. Long live the land grant university.

In his brief volume, George R. McDowell reviews the history of the American land grant university, from the Morrill Land-Grant Act of 1862 to the opening of the 21st century, and comes to the none-too-shocking conclusion that the world has changed and the land grant colleges must change with them.

His prescription for just what kind of change should occur is at once disappointing and inspiring. Disappointing because he seems ready to abandon the traditional work of the land grant college—research and development of better farm practices—to the private sector. Inspiring because he sees a range of new applications for the land grant-extension service model that can not only help farmers, but also the residents of small towns, suburbanites and the urban poor.

McDowell is a professor in the Department of Agricultural and Applied Economics at the Virginia Polytechnic Institute and State University. He has degrees from three land grant institutions and has worked with farmers from Massachusetts to Vietnam. He knows something about the way land grant colleges and agricultural extension services work.

From the beginning, the land grant colleges were designed to be universities for the people, people who were engaged in farming and manufacturing. These institutions were established in every state and most territories, and so were both physically and financially within the reach of would-be students from the farms and small towns who would never have hope of attending Ivy League schools far away. And the colleges' faculty and affiliated extension offices in every county were to make their knowledge available to the individual farmers across their states, at no cost, so that they could always take advantage of the latest thinking, techniques and technologies.

Over the decades, McDowell persuasively argues, the land grants and extension programs ceased to lead the thinking of agriculture and started to follow it. The colleges and county agents have, in the language of anthropologists, "gone native." They became less visionary researchers than short-order cooks, reacting to farmers' questions about the newest seed varieties, newest chemicals, newest machines.

As with the farmers, the land grants became obsessed with increasing farm output, with little concern for what such hyper-production might be doing to the economy and environment of the rural landscape, or whether the world's markets could absorb their ever-larger output. By giving farmers what they wanted instead of what they needed, McDowell writes, the land grant-extension system was "taken hostage" by production agriculture, and so became of less and less real use to the constituency it was created to serve.

The problem extends beyond food production, he writes, into the traditional home economics and youth programs of extension services. Because local homemakers clubs want presentations about microwaving brownies, nobody deals with serious nutrition issues. And, while 4-H programs know all about how to raise cows and chickens, McDowell asserts, they know or care little about the needs of at-risk children.

Sadly, though perhaps logically, McDowell concludes that the "technology transfer" aspect of extension will probably remain under the control of the production agriculture establishment.

Rather than refight that battle, McDowell sees the 21st century function of the land grant college and extension service as working on the economic and social aspects of rural life—and urban life—that won't be lost to big business because there's no money in it.

Good examples are not that hard to find. They include work by Oregon State University to publish major reports on the ecosystem of the Pacific Northwest salmon and the depth of poverty in Oregon.

North Carolina State University created literature programs for use in the state's public schools. The University of Minnesota developed a Parents Forever program that was sought by, and now guides, state judges as they deal with divorce cases involving children.

McDowell holds out considerable hope that these examples of what he calls "academic engagement" with the wider community will become more common, and that the social and economic issues that face both rural and urban America will become the new way that the people's universities rediscover their links with the people they are supposed to serve.

McDowell laments the reluctance of land grant faculty to speak out on agricultural issues, noting that those with academic tenure have not only the ability but the responsibility to offer views that may be unpopular. His hope that the independent voice that has been lost in agricultural research might be found on social issues may be overly optimistic.

While there is no private industry seeking to buy the minds that would otherwise do independent economic and sociological studies—as there are agribusiness giants that pay for the loyalty of plant scientists—McDowell sees no threat of political forces objecting to the use of public funds to pay for what will be seen by some as bleeding-heart or socialistic research.

Still, as McDowell himself writes, quoting John Lennon, "You may say that I'm a dreamer, but I'm not the only one." Let us hope that McDowell is not alone in his dream for a new era of academic engagement with American life.

Thank you to our contributors, September through March 2002

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