in the germ and bran that would destabilize any flour that still contained them. (Since the bran and germ are removed when milling white flour, tempering in that case is not a problem.) Enzymes are activated. Some of them begin to break open the polymers of starch and protein, while others liberate the sequestered minerals—all to nourish the nascent plant. The miller's job is to keep the seed in dormant mode rather than throw it into germination mode.

"So, to mill whole-grain flour well," I had said to Joe, "you really have to be able to think like a seed, don't you?" He smiled.

"You're a very good student."

That's when it dawned on me: The same holds true for the baker. He, too, needs to think like a seed in order to bake a whole-grain loaf full of flavor and air. Except that his seed thoughts are a little different from the miller's. The baker *wants* to set off that cascade of chemical events. He wants the amylase enzymes to break up those tasteless balls of starch, creating simple sugars to flavor his bread and feed his hungry yeasts. (The baker needs to think like yeast and bacteria, too, which is a lot of thinking.) The baker wants the proteases to begin breaking the wheat proteins into amino acids and the phytase to unlock the minerals, not to nourish the plant but to nourish us. And water was the key.

I had read about techniques for "presoaking" flours—part of the traditional culture of whole-grain baking that we have lost—and now I understood the logic behind them: to trick the crushed seed into thinking it was time to germinate. So I embarked on a set of experiments to kick-start the enzymatic activity in my dough even before fermentation got under way. I began mixing my flour and water in the evening, at the same time I started my leaven. Not until the next morning, however, would I introduce the one to the other. By the time the sourdough culture began to work on the presoaked flour, it would find all the nutrients it could want: plenty of sugars, amino acids, and minerals. This was a fact I could taste: The flour sweetened dramatically overnight. And the results out of the oven were encouraging. I started getting loaves that were generous with their flavors, had crispier and more handsome crusts (probably because more sugars and amino acids were available for browning reactions), and markedly more air.

But not quite as much air as I hoped for, not yet. The bran was still undermining the gluten, either by puncturing the gas bubbles or by weighing them down, giving me a too-tight crumb. I hit on a slightly wacky idea: I would remove the bran from the inside of the bread and put it on the outside, where it could do no damage to the gluten. So, before mixing my flour and water, I sifted the chunkiest bran out of the flour, maybe 10 percent of the total volume.

In effect, I was making white (or whitish) flour circa 1850, pre–roller mill, the kind of flour in the painting by Émile Friant that had inspired Chad Robertson. It still had the germ, but only those particles of bran small enough to slip through an ordinary sieve. However, I reserved the sifted bran in a bowl, and after shaping the loaves, I rolled them in the stuff, making sure that every last shard of bran was taken up by the wet skin of the dough.

It worked: The trick allowed me to bake an airy and delicious loaf with a toasty, particulate crust—all the while preserving my claim to a "100 percent whole-grain" bread. Does this seem like cheating? I don't think so: Every last bit of the whole grain was somewhere in this triumphantly voluminous loaf. I felt like I had broken whole grain's Gordian knot.

Though on reflection I seriously doubt this solution is original with me. In the age-old quest to bake the airiest possible loaf from whole-grain flour, a great many other bakers would surely have hit on the same trick. Like presoaking flours, it is too good an adaptation not to have been tried before. In all likelihood, "my" technique or

one like it is part of the traditional culture of whole-grain baking that got crushed by the roller mills late in the nineteenth century.

In the weeks and months since, I've loosened up considerably in my baking. I still mostly use whole-grain flours, but I no longer obsess about percentages or purity. I don't always roll my loaves in bran—sometimes I use it in the garden instead, to thwart slugs and snails. I've also found a commercial version of the kind of flour I was making by sifting whole grains. Called "high extraction" flours, these are milled whole and then partially sifted. This strikes me as a reasonable compromise between 100 percent whole-grain and white flour, between nutrition and aesthetics. (After all, even 100-percent whole-grain flour is 75-percent endosperm.) But even when I bake with these flours, I add a variety of other whole grains to deepen and complicate the bread's flavor: some pumpernickel that I got from Joe Vanderliet, some purple rye that Chad Robertson gave me, even lately some Kernza, an experimental flour milled (whole) from a new strain of perennial grain being developed by the Land Institute in Salina, Kansas. A perennial wheat field that could be mowed like a lawn rather than planted each year from seed would have tremendous benefits for both the land and the farmer, but it is probably still some ways off. Kernza has an interesting flavor but, as yet, not enough gluten to raise a loaf of bread on its own.

Everything that I've learned about wheat and milling, fermentation and baking has definitely complicated my understanding of what "good bread" is, but that hasn't dimmed my ardor for the stuff. When I buy whole-grain bread I look for words like "stone milled" and "whole grain"* and I check the ingredients to make sure whole grain is listed first. And, white or brown, I look for breads that have been

*Not that these terms are ironclad guarantees: "Stone milled" is not a government-backed claim, and whole grain, if it's not stone milled, may or may not contain the germ.

fermented with a sourdough culture; the word "levain" indicates as much. And I stay away from any bread containing any ingredient that isn't the name of a grain or salt.

But I try to bake my own when I can, and I can see that I've gotten fairly improvisational in my baking. I never look at recipes anymore. Instead, I look at dough, and feel it, taste it, and smell it, almost continuously. I also check in every morning with my starter, gauging by eye and nose its happiness before feeding it a few tablespoons of fresh flour and water. When I started baking a few months ago, I could never have imagined the work would become such an intuitive and sensory process—or such an obsession—but there it is. Actually, baking has begun to feel a lot like gardening, a pastime, or practice, I've been working at much longer.

In my experience, gardening successfully depends on two different but related faculties, both highly relevant to baking. The first is the green thumb's ability to notice and absorb everything going on in his garden, from the precise tint of the leaves to the aroma of the soil. The data of your senses have more to tell you about the work than anything you can read in a book. The second is the green thumb's knack for imagining what his plants and soil want in order to be maximally happy and thrive. Same with baking bread: It helps to be able to think like a grass seed and, at the same time, like the community of yeasts and bacteria living in your sourdough culture. Control you can just forget about: There are too many interests and variables in play. (The dream of control is seductive, but it leads straight to monoculture in the field and fortified white bread in the supermarket.) Behind a great loaf of bread is a deft orchestration, not only of time and temperature, but also of a great many diverse species and interests, our own—for something nourishing and delicious to eat—included. I am no maestro, no white thumb yet, but my bread is getting tastier, and airier, all the time.

III.

CODA: MEET YOUR WHEAT

The morning before I toured the mill in Woodland, I paid a visit to one of the growers that supply wheat to Community Grains. The Rominger family plants a dozen or so different crops, and runs sheep, on seven thousand acres of rich, dark bottomland a few miles down the road from Woodland, near the town of Winters. They use wheat as a rotational crop, planting it in November, before the winter rains, and harvesting it in the scorching heat of July.

I had never set foot in a wheat field before. Yet the sight of one is so iconic that the landscape feels immediately familiar, weirdly so. Standing in a field of wheat, it is impossible not to think about Flemish painters like Brueghel or van Ruisdael, or van Gogh. The wheat itself has changed—modern breeders have made the plant shorter in stature and its seed head fatter—but from a distance the overwhelming impression of ripe golden bounty, of nature's grace and sufficiency, remains indelible. The Romingers' wheat crop was still a few weeks away from harvest, almost but yet not completely dried to gold in the sun. If you looked closely at the leaves, there were still streaks of grassy green.

I picked a stalk of wheat. A wooden stake planted on the edge of the field said it was a variety called Red Wing. This, it would turn out, was the variety in the sack of flour I got from Joe Vanderliet. Up close, a wheat plant looks like a particularly buff and muscular grass, handsome, but perhaps just a little over the top, like a bodybuilder. The spike formed an intricate ladder of seeds arranged around the stem in a stepped, herringbone pattern, each with its own elegant golden needle reaching for the sky. I rubbed the seed head between my palms. The light jacket of chaff came free from the kernels and blew away, leaving a small handful of seeds. I bit into one of the fresh kernels. It was still slightly soft, and though not quite ripe it already tasted wheaty and sweet. The complexities and possibilities contained within this inconspicuous speck, this seed, were hard to imagine, but there they were: everything needed to produce a wheat plant. And much more than that. With enough of these seeds, and the knowledge of how to process them into bread, you had most of what is needed to grow a person. Or for that matter a civilization.

From where I stood, the field stretched west to the bluish ridge of the Coast Range, a shimmering blond avenue of lawn. If you stand in a wheat field at this time of year, a few weeks from harvest, it's not hard to imagine you're looking at something out of mythology: all this golden sunlight brought down to earth, captured in kernels of gold, and rendered fit for mortals to eat. But of course this is no myth at all, just the plain miraculous fact.