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— SLOWLY DOES IT —

FOR A LONG time, even I did not know how slowly trees grew. In the forest I manage, there are beeches that are between 3 and 7 feet tall. In the past, I would have estimated them to be ten years old at most. But when I began to investigate mysteries outside the realm of commercial forestry, I took a closer look.

An easy way to estimate the age of a young beech tree is to count the small nodes on its branches. These nodes are tiny swellings that look like a bunch of fine wrinkles. They form every year underneath the buds, and when these grow the following spring and the branch gets longer, the nodes remain behind. Every year, the same thing happens, and so the number of nodes corresponds with the age of the tree. When the branch gets thicker than about a tenth of an inch, the nodes disappear into the expanding bark.

When I examined one of my young beech trees, it turned out that a single 8-inch-long twig already had twenty-five of these swellings. I could find no other indicator of the tree's age on its tiny trunk, which was no more than a third of an inch in diameter, but when I carefully extrapolated the age of the tree from the age of the branch, I discovered that the tree must have been at least eighty years old, maybe more. That seemed unbelievable at the time, until I continued my investigations into ancient forests. Now I know: it is absolutely normal.

Young trees are so keen on growing quickly that it would be no problem at all for them to grow about 18 inches taller per season. Unfortunately for them, their own mothers do not approve of rapid growth. They shade their offspring with their enormous crowns, and the crowns of all the mature trees close up to form a thick canopy over the forest floor. This canopy lets only 3 percent of available sunlight reach the ground and, therefore, their children's leaves. Three percent—that's practically nothing. With that amount of sunlight, a tree can photosynthesize just enough to keep its own body from dying. There's nothing left to fuel a decent drive upward or even a thicker trunk. And rebellion against this strict upbringing is impossible, because there's no energy to sustain it. Upbringing? you ask. Yes, I am indeed talking about a pedagogical method that ensures the well-being of the little ones. And I didn't just come up with the term out of the blue—it's been used by

generations of foresters to refer to this kind of behavior.

The method used in this upbringing is light deprivation. But what purpose does this restriction serve? Don't parents want their offspring to become independent as quickly as possible? Trees, at least, would answer this question with a resounding no, and recent science backs them up. Scientists have determined that slow growth when the tree is young is a prerequisite if a tree is to live to a ripe old age. As people, we easily lose sight of what is truly old for a tree, because modern forestry targets a maximum age of 80 to 120 years before plantation trees are cut down and turned into cash.

Under natural conditions, trees that age are no thicker than a pencil and no taller than a person. Thanks to slow growth, their inner woody cells are tiny and contain almost no air. That makes the trees flexible and resistant to breaking in storms. Even more important is their heightened resistance to fungi, which have difficulty spreading through the tough little trunks. Injuries are no big deal for such trees, either, because they can easily compartmentalize the wounds—that is to say, close them up by growing bark over them—before any decay occurs.

A good upbringing is necessary for a long life, but sometimes the patience of the young trees is sorely tested. As I mentioned in chapter 5, "Tree Lottery," acorns and beechnuts fall at the feet of large "mother trees." Dr. Suzanne Simard, who helped discover maternal instincts in trees, describes mother trees as dominant trees widely linked to other trees in the forest through their fungal–root connections. These trees pass their legacy on to the next generation and exert their influence in the upbringing of the youngsters.[18] "My" small beech trees, which have by now been waiting for at least eighty years, are standing under mother trees that are about two hundred years old—the equivalent of forty-year-olds in human terms. The stunted trees can probably expect another two hundred years of twiddling their thumbs before it is finally their turn. The wait time is, however, made bearable. Their mothers are in contact with them through their root systems, and they pass along sugar and other nutrients. You might even say they are nursing their babies.

You can observe for yourself whether young trees are playing the waiting game or putting on a growth spurt. Take a look at the branches of a small silver fir or beech. If the tree is obviously wider than it is tall, then the young tree is in waiting mode. The light it is getting is not sufficient to create the energy it needs to grow a taller trunk, and therefore, the youngster is trying to

catch the few leftover rays of sunlight as efficiently as possible. To do this, it lengthens its branches out sideways and grows special ultra-sensitive leaves or needles that are adapted to shade. Often you can't even make out the main shoot on trees like these; they resemble flat-topped bonsai.

One day, it's finally time. The mother tree reaches the end of her life or becomes ill. The showdown might take place during a summer storm. As torrents of rain pour down, the brittle trunk can no longer support the weight of several tons of crown, and it shatters. As the tree hits the ground, it snaps a couple of waiting seedlings. The gap that has opened up in the canopy gives the remaining members of the kindergarten the green light, and they can begin photosynthesizing to their hearts' content. Now their metabolism gets into gear, and the trees grow sturdier leaves and needles that can withstand and metabolize bright light.

This stage lasts between one and three years. Once it is over, it's time to get a move on. All the youngsters want to grow now, and only those that go for it and grow straight as an arrow toward the sky are still in the race. The cards are stacked against those free spirits who think they can meander right or left as the mood takes them and dawdle before they stretch upward. Overtaken by their comrades, they find themselves in the shadows once again. The difference is that it is even darker under the leaves of their cohort that has pulled ahead than it was under their mothers. The teenagers use up the greater part of what weak light remains; the stragglers give up the ghost and become humus once again.

Further dangers are lurking on the way to the top. As soon as the bright sunlight increases the rate of photosynthesis and stimulates growth, the buds of those who have shot up receive more sugar. While they were waiting in the wings, their buds were tough, bitter pills, but now they are sweet, tasty treats —at least as far as the deer are concerned. Because of this, some of the young trees fall victim to these herbivores, ensuring the deers' survival over the coming winter, thanks to the additional calories. But as the crowd of trees is enormous, there are still plenty that keep on growing.

Wherever there is suddenly more light, flowering plants also try their luck, including honeysuckle. Using its tendrils, it makes its way up around the little trunks, always twining in a clockwise direction. By coiling itself around the trunk, it can keep up with the growth of the young tree and its flowers can bask in the sun. However, as the years progress, the coiling vine cuts into the expanding bark and slowly strangles the little tree. Now it is a question of

timing: Will the canopy formed by the old trees close soon and plunge the little tree into darkness once again? If it does, the honeysuckle will wither away, leaving only scars. But if there is plenty of light for a while longer, perhaps because the dying mother tree was particularly large and so left a correspondingly large gap, then the young tree in the honeysuckle's embrace can be smothered. Its untimely end, though unfortunate for the tree, brings us some pleasure when we craft its bizarrely twisted wood into walking sticks.

The young trees that overcome all obstacles and continue to grow beautifully tall and slender will, however, have their patience tested yet again before another twenty years have passed. For this is how long it takes for the dead mother's neighbors to grow their branches out into the gap she left when she fell. They take advantage of the opportunity to build out their crowns and gain a little additional space for photosynthesis in their old age. Once the upper story grows over, it is dark once again down below. The young beeches, firs, and pines that have put the first half of their journey behind them must now wait once again until one of these large neighbors throws in the towel. That can take many decades, but even though it takes time, in this particular arena, the die has already been cast. All the trees that have made it as far as the middle story are no longer threatened by competitors. They are now the crown princes and princesses who, at the next opportunity, will finally be allowed to grow up.