

OF Oaks and Squirrels

The snow had finally stopped falling, but the air remained opaque with blowing crystals. In sheltered places it had settled to a foot of fluffy white. All morning I watched out the window to see how Priscilla would manage in this transformed world—Priscilla who had never imagined snow before—Priscilla whose legs are just three inches long.

I finally saw her descending the little pine at the edge of the woods. Six feet from the bottom she hesitated and then leapt. She landed in an explosion of snow and bounded intrepidly toward the house, a furry porpoise. Halfway to her destination she vanished. A disturbance in the surface marked her progress, and four feet farther, still traveling straight, she burst to the surface again. I trotted to the door to greet her and offer her breakfast.

Of the orphaned squirrels I have raised and released here, Priscilla is the only one that comes to visit me daily. I occasionally see some of the others and know that at least a few have not just survived but reproduced. These squirrels no longer depend upon me. They depend upon a more primal relationship, that between the squirrel and the mighty oak.

The squirrel offers the oak outward mobility. By transporting acorns from beneath the parent tree, squirrels increase the chances that a resulting seedling will have enough sunlight to grow, and, if it matures, that unrelated oaks would pollinate its flowers conferring greater genetic fitness on future generations. Further, by hiding the acorns, the squirrels remove them from the sight of the many birds and mammals that would feast on them. Burying the acorns also increases the chances of germination—if the squirrel does not return to eat them, that is.

The squirrel's needs are quite different from those of the oak. The squirrel must gather and cache a



sufficient store of nourishment to survive the lean months of winter. Acorns provide quality nutrition in durable packaging. The relationship between squirrels and oaks has been refined by the ancient dance of co-evolution, and is surprisingly complex. Since I can tell just a small part of it in this space, I will include a story that says as much about our own species as the other two.

Biologists Smallwood, Steele, and Faethe, wondered if squirrels exercise discretion in deciding which nuts to hide and which to eat, and if so, which characteristics were important? North America hosts many species of oaks, most of which fall into two sub-groups—the red oaks and the white oaks. The acorns of these two groups differ in significant ways. The red oaks have more fat, a desirable quality, but also more tannin. Tannin reduces palatability and digestibility; yet it also deters insect infestation. White oak acorns have less tannin, but also less fat. They begin to germinate soon after they fall, while red oak acorns remain dormant until spring. The nutritional value of an acorn erodes quickly when it germinates.

The biologists knew that squirrels could distinguish between the two types of acorns, but there had been no studies to determine if they were treated differently when squirrels were making storage decisions. In their first study, they simply offered park squirrels acorns from each oak group, and noted whether the acorns were eaten or stored. Their findings showed that nearly all white oak acorns were eaten immediately and that most red oak acorns were buried. They also observed something that other squirrel watchers had observed before: when white oak acorns were cached, the squirrels would destroy the embryo with a quick nip to the bottom, and thus prevent the acorn from germinating.

Smallwood, Steele, and Faethe, decided to make some trick acorns to further test the discernment of the fluffy-tailed rodents. After mixing shells and their contents in a variety of permutations, they learned that the squirrels were not basing their decisions on the acorn contents, but rather on a chemical signal from the shell itself that indicated dormancy. Their research suggests that red oaks and white oaks have separated in their dance with the squirrel. The red oak has developed a symbiosis with the squirrel that the white oak has not. Our team of squirrel biologists hypothesized that in a forest containing both types of oaks, the red would be more widely dispersed and the white oaks would be clustered. They counted oaks on forest transects and found this was the indeed case.

As you might guess, the red and white oaks have developed different parameters for germination. Red oaks do well in sunny, dry conditions. White oaks are more tolerant of shade and moisture. Has the white oak found that the risks of dispersal outweigh the benefits? Does some other dispersal agent, like a blue jay, serve the white oak better than the squirrel? In our region, red oak is far more abundant than white oak. Perhaps the red oak can attribute its success in part to Priscilla's clan.

When Priscilla finished her breakfast, she took one last nut between her teeth and headed back into the gale. With another bold launch into the snow, she bounded to a tall yellow birch and hoisted herself to the summit. With the branches thrashing in the wind, I could see no way she could maneuver to the forest beyond, but I'm not a squirrel. When the wind velocity dipped, Priscilla scampered to the end of a branch and leapt. Paws spread, she hit the distant tangle of blowing twigs, managed to grab one, righted herself, and was off through the treetops to enjoy her hazelnut in the comfort of her nest. She tackled wintery weather with the innate competencies of her kind. I should have known she would. After all, squirrels have been shaped by snow and blowing branches as well as by oak trees.