# The Palmetto

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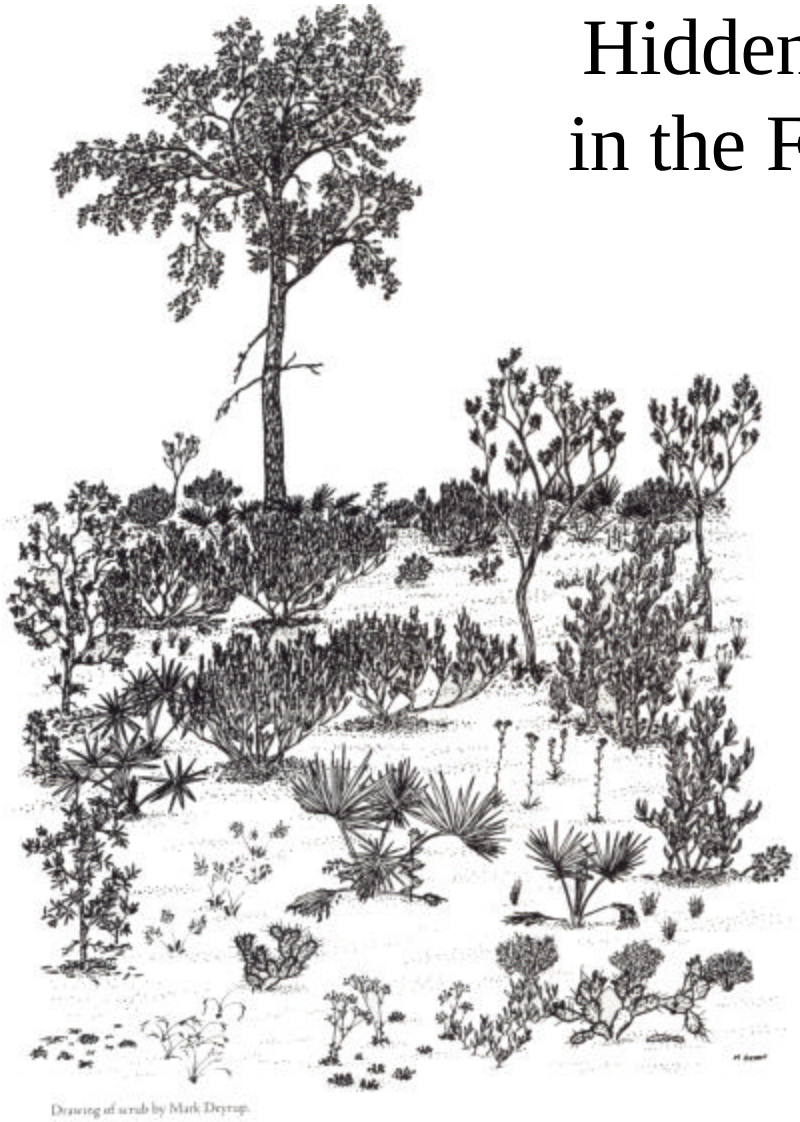
# Hidden Patterns in the Florida Scrub

Naturalist Musings by Mark Deyrup, Archbold Biological Station



Drawing of scrub by Mark Deyrup.

An expedition to study the forest canopy of Florida scrub might require a small stepladder. Perched on the top like a scrub-jay, the naturalist towers over the mature oaks and palmettos. The hard little oak leaves on their stiff little twigs are motionless in the breeze, their protective waxy coating glitters back sharply in the sun. The palmettos fan out their green daggers to the sky. It is a camera-defying vista of extreme lighting values on the scale of a single leaf, a scene of huge detail without a focal point. The eye turns with relief to the scattered pines emerging from the forest. The patches of bare sand with their sparse covering of plantlets and lichens suddenly seem like a more interesting subject. The forest canopy will go unrecorded another day.

Rumor has it that there is a whole week in early spring when all the leaves are just emerging, and there are a thousand shades of green. For this week or so the canopy is young. The newborn leaves are tinted tawny, copper, and pink before they don their olive working uniforms, before they secrete their armor of wax. At this time, the naturalist can see the pattern of the scrub canopy. Each clonal grove of oaks stands our separately, each twisted tree distinguishes itself. For a short time the structure of scrub vegetation is revealed. Every winter the naturalist says, "This is the year when I will spend that week of spring in the scrub, studying and recording its patterns." Somehow, there has never been time.

The blinding bright patches of bare sand are as characteristic of classical Florida scrub as white columns are of classical architecture. These bare patches have their own unseen patterns of plant life. Unlikely though it may seem, not all the sunlight is reflected back into the flinching eyeballs of the observing naturalist. Plenty of light penetrates the silican sand, and a few millimeters under the surface there are patches of algae. The layer itself is only a few millimeters thick, but it is composed of several species, sometimes with proto-lichens mixed in. Like pines growing up through the oak scrub canopy, seedlings of small herbs put out several leaves under the sand, then blast up into the open air. The algal layer goes through its own rapid-fire wet and dry seasons. For a week or so after a rain it is green and lush, then it shrivels and turns gray until the next shower. The buffaloes grazing this subterranean pasture are the quarter-inch pygmy mole crickets. These come up to feed after a rain, leaving characteristic little trails visible on the surface, then retreat down a vertical burrow as the sand dries. Everywhere anybody has looked in Florida scrub there is this underground algal layer. So far, two species of the pygmy mole crickets are known (one on Brooksville Ridge is yet to be described), but there could easily be additional species.

Everything about this algal layer is somewhat mysterious. What species does it contain, and do they vary from place to place? How fast does it regenerate when an opossum shuffles through it, or an armadillo enthusiastically digs up a nest of ants? What is its relationship with the surface scrub plants; does it fix nitrogen, does it manufacture herbicides? Are there other small animals associated with it? Florida naturalists may soon get answers to some of these questions, as Christine Hawkes of the University of Pennsylvania has begun an intensive study of the Florida scrub algal layer at the Archbold Biological Station in Lake Placid.

Well below the algae in the Florida scrub there is a dense layer of the extravagant root systems of scrub trees. This mat of roots is the lightless reflection of the pattern of trees on the surface. It is the dark side of competition in the scrub. In the hardwood forests of North Florida, trees occupy territory by spreading their limbs to seize a space in the light, to take their place in the canopy. In the Florida scrub, this strategy is modified in adaptation to the long history of fire. Trees are knocked back every time there is a fire, and most of the trees have evolved clonal growth, spreading to occupy territory underground instead of above. After a fire, the trees send up shoots from their roots. If one could see an oak clone dissected out of the sand, it would appear as a diffusely branching structure with luxuriant shoots coming out along he framework of roots. The framework of roots not only allows the tree to efficiently claim patches of sunlight, it is also a storage organ that holds the energy and nutrient reserves for quick growth in the scramble for a place in the canopy. This is especially important in scrub soil, which is chronically lacking in nutrients.

Every square meter of sand is likely to hold the intertwining roots of many individual trees. Here, rather than in the canopy above ground, is where long-term, intimate, down and dirty competition must be taking place. What is the nature of this competition? Nobody knows. We are in that glorious state of ignorance in which anything we might imagine might occur. Whenever there is a new and better source of nutrients or moisture is there is a little gold rush among the roots? Are the roots strangling each other? Do they repel or threaten each other with chemicals? Do mycorrhyzal fungi engage in proxy warfare for their sponsor roots?

Florida's upland ecosystems show patterns of how terrestrial systems can be vigorous and self-sustaining with extremely limited nutrients, prolonged seasonal drought, and occasional loss of the biomass above ground. When we become serious about low-input agriculture, the talents of scrub plants may be those we will teach our crops to imitate. Meanwhile, for the naturalist, an ecosystem such as the Florida scrub is a resource of hidden patterns, of enticing discoveries just out of range.

ABOUT THE AUTHOR: Mark Deyrup is a well-known “bug man” and highly entertaining and sought-after speaker. At the FNPS conference in Palm Coast, Mark's talk on pollination ecology revealed that our very own saw palmetto (*Serenoo repens*) acts as a kind of "singles bar" for a great number of insect species. in more serious moments, he can be found working diligently at the Archbold Biological Station in Lake Placid, where he is surrounded by beautiful scrub and lots of other talented folks. Learn more about Archbold Biological Station, an independent research center, by visiting the station's website at www.archbold-station.org (or attending one of the FNPS state board meetings held at the station each year).

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