



ANTS AND PLANTS

Tree Fortresses

Article and photographs by
MARK W. MOFFETT

Drinking nectar from the acacia tree that shelters their colony, *Pseudomyrmex* ants pay

rent by fending off leaf-eating enemies—a tree-size symbiosis designed for mutual survival.

In Costa Rica a *Pseudomyrmex* ant rips apart a vine that grips leaves of an acacia tree (right) where the ant's colony resides. If left to grow, vines could weigh down, shade, and possibly kill the tree. In West Africa a *Crematogaster* ant smashes butterfly eggs on a *Barteria* leaf (below). Hatching caterpillars would eat the leaves of this tree, the ant's home. In both cases, specialized ants—often of species living nowhere else—tend trees day and night with the diligence of obsessive gardeners.

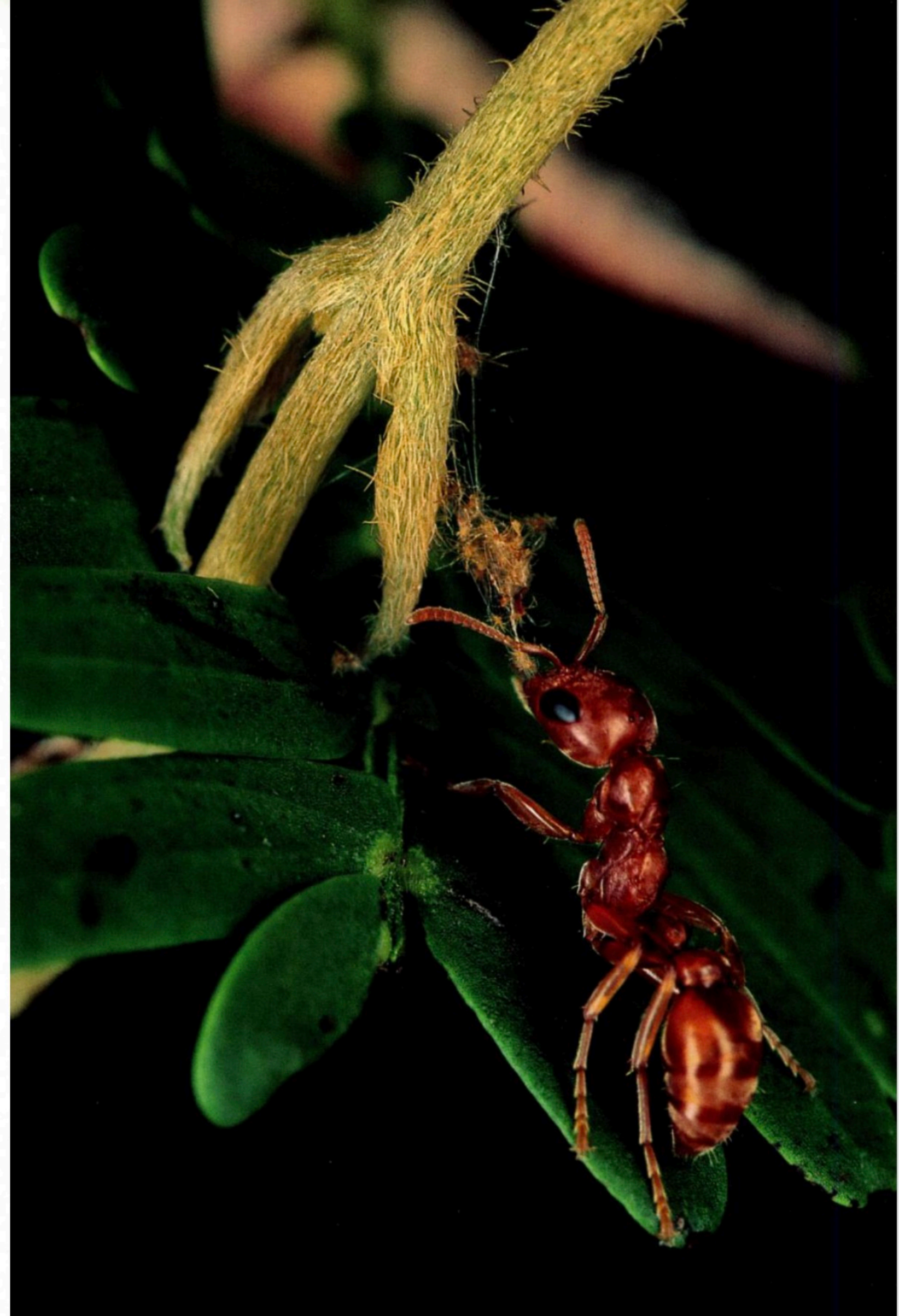
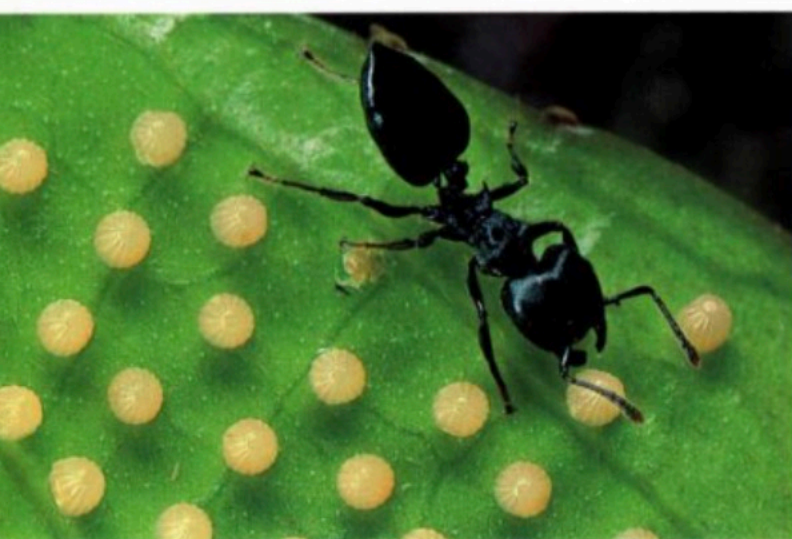
Ants and plants have developed many curious relationships, some

positive, some negative. Extreme examples occur with tropical plants called myrmecophytes, or “ant plants,” which provide their insect guests with housing and often food. Many of these ant plants are vines or other types of tree-top vegetation, but in the examples shown here, the hosts are the trees and shrubs themselves. I have explored, documented, and marveled at whole groves of ant trees in Brazil and Borneo, in

areas where biting and stinging ants are the true lords of the jungle.

Often the ants' behaviors can be interpreted as self-serving: The worker killing eggs gets a meal; the one gnawing vines destroys a route that might be used by invading enemies. In other cases workers defend particular parts of the plant that affect their tree's long-term health and reproductive ability with no apparent immediate benefits to the ants.

Either way the interaction tends to be beneficial in the long term to both ant and plant—a symbiotic relationship that ecologists call mutualism. But as I will show you, sometimes this relationship breaks down, as when parasitic ants seize control of a tree.



Ecologist MARK MOFFETT contributed the two earlier installments of this “Ants and Plants” series: “A Profitable Partnership” (February 1999), an overview of these curious relationships, and “Friends and Foes” (May 1999), which focused on other species of ant plants.

KILL OR BE KILLED

Dwelling within hollow branches of the tree *Cordia nodosa*, the orange-colored workers of an *Allomerus* colony dismember the corpses of their enemies (bottom right). *Allomerus* is a parasite: It sterilizes its host by dismantling the tree's flowers (below). With its energy diverted from reproduction, the tree grows larger, thereby providing more living space for the colony. Other ants are mutualists: They encourage reproduction of their habitat by protecting the host's flowers.

Studying *Cordia* and other ant plants in Peru, biologist Doug Yu plucks vicious *Pseudomyrmex* ants from a *Triplaris* tree, its base cleared of vegetation by the ants (bottom left).

In West Africa *Leonardoxa africana* trees harbor either *Petalomyrmex phylax*, a helpful ant that kills leaf-eating insects, or *Cataulacus mckeyi*, a parasite. The "good" ants keep out competitors by shaping their nest entrances as narrow slits, which a round-bodied *Cataulacus* queen cannot enter (right).



FIT FOR A QUEEN

This Azteca queen was lucky: She found a hollow, unoccupied chamber inside a *Cordia* tree branch (sliced open by the photographer) big enough to accommodate her distended abdomen as well as her milky white brood. The tree also provides a defensive shield: Stem hairs are spaced wide enough to permit future workers to maneuver, yet narrow enough to thwart larger enemy ants.



HOME SWEET HOME

Chiseling an entry into the hollow stem of a *Cecropia* sapling, a *Pachycondyla* queen (below) seeks a place to start a new colony. *Cecropia* trees are common along rivers and near human settlements in tropical America; *Macaranga* trees are an ecological equivalent in Old World tropics. Ant workers, lured by sugary rewards along the margins of young *Macaranga* leaves (bottom left), patrol and protect this foliage, which is tasty—and vulnerable—to beetles and other herbivores.

Macaranga also furnish their ant guardians with main courses, stashed in larders beneath purple stipules (near right). Inside, pearly globules of fat glisten, tasty as mini-marshmallows (far right). Like peas in a pod, *Pheidole* ants live in tiny pockets on the leaves of *Maieta* shrubs (bottom right). One chamber usually serves as a nursery for ants and their brood, while the adjoining one contains ant refuse—a compost heap from which the shrub might absorb nutrients.



POINTED CONFLICT

Thorns of the African *Acacia drepanolobium* have swollen bases occupied by any of four ant species. One of them, the mutualist *Crematogaster mimosae* (right), vigorously guards the tree's leaflets. By contrast, an acacia occupied by parasitic *Tetraponera* ants (below) looks bare and sickly. While *Crematogaster* ants attack anything eating their tree, their feistiness fails to deter patas monkeys, which enjoy protein-rich meals by biting open the thorns and savoring the pungent mass of ants within (bottom). After a monkey gulps a mouthful of ants, it dashes to the next tree before ants at the first one begin to swarm.





CARROT ON A STICK

Besides supplying adult ants with a sweet nectar, American acacia trees offer carrot-like growths at the tips of their leaflets (facing page)—a specialized “baby food.” *Pseudomyrmex* workers deliver this nutritious fare to their nest chambers (top) for the growing larvae to devour (middle). Even when ants are absent, acacias continue to produce the growths. A Costa Rican *Piper* shrub, though, is more frugal. It secretes sticky white food globules only after the favored ant species moves in (bottom), then stops producing them if the colony dies out. All in return for some ant-size tender loving care. □