

# ANTS AND PLANTS

## *A Profitable Partnership*

In Borneo forests a pitcher plant and *Colobopsis* ants have struck a deal. The plant gives the

ants room and board. In return the ants help their host digest insects—a new discovery.



**D**uring millions of years of evolution, ants have developed intriguing relationships with many different kinds of plants. Most of these associations are loose ones—the ants find dwelling places on the plants, while bringing neither harm nor benefit to them. Often the ants live in hollow dead stems or small pockets of soil that accumulate on branches. Thus ants inhabit trees over our heads and

herbs at our feet, carving out living chambers and foraging for food. As many as 72 different species of ants have been found living on one tree in Peru's Amazon Basin alone.

However, in some relationships between ants and plants both sides give and get. The plants in such mutualistic partnerships are called ant-plants. Many of them are beautiful examples of coevolution, having adapted together with their ant partners to thrive in nutrient-poor areas.

In ant-plant relationships ants provide nutrients, protection, and housekeeping to plants. Plants provide food and shelter to ants. Some ants in these types of relationships serve their hosts as devoted sentinels, repelling or killing unwelcome intruders

such as beetles and caterpillars. Others fertilize their hosts with waste from the food they drag home to eat. In return, many plants have evolved special structures to house and feed ant colonies, including leaves with hollow cavities and seeds with edible coatings or attachments. Frequently plants and ants become so dependent on one another that they cannot live apart.

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Ecologist MARK W. MOFFETT is a frequent contributor to the magazine.



**Deadly beauty**, the pitcher plant (above) traps insects in its fluid-filled cup, where they drown. But *Colobopsis* ants that live in the tendril (cutaway, right) are unharmed. Charles Clarke and Roger Kitching of Australia's Griffith University began to understand why when they discovered the world's only known ant swimmers (following pages).







## AQUATIC ANTS

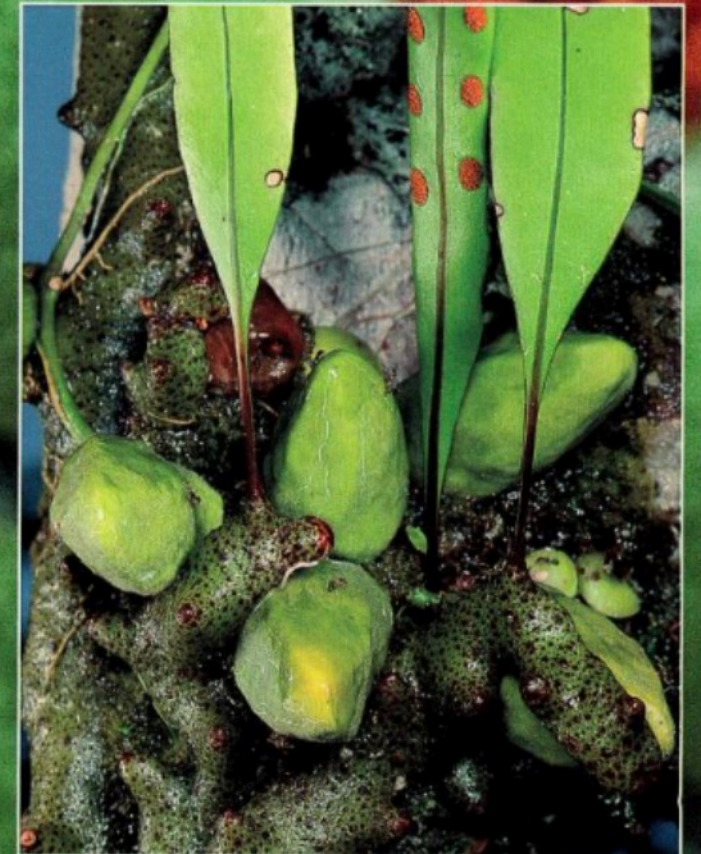
Venturing out from their tiny homes in the pitcher plant *Nepenthes bicalcarata*, *Colobopsis* ants dive into the plant's digestive juices and paddle about, patrolling the liquid trap. They collect large prey like a cricket (above). Several workers were needed to haul this heavy meal up the pitcher's wall to the rim for a communal feast (right). Such apparent thievery benefits the plant. When large prey pile up in the pitcher and start to decompose, the juices turn foul—plant indigestion. *Colobopsis* ants keep this from happening by removing large insects. How do the ants manage to climb the slick walls and escape? As yet, no one knows.





## ROOM AND BOARD

On infertile sandstone hills in Borneo, *Philidris* ants act like mobile root systems, bringing nourishment to their host plants, according to ecologist Dan Janzen (pages 76-7). A fern feeds its ant colony with edible masses of oily orange spores. The ants live in the fern's speckled stems (inset), where they drag nutrient-rich debris to create a sort of compost for the plant. Among the stems grows *Dischidia*, another plant that prospers in partnership with *Philidris*.





## ANT CONDOS



Slicing open a *Dischidia* leaf, I find a thriving *Philidris* nursery between the plant's slender white roots (cutaway, left). Because of their unique location within leaves, the roots can draw nourishment from insect parts that *Philidris* ants collect and bring back to their home. Another plant, grayish-brown *Hydnophytum*, which grows plastered to tree trunks (below), also provides *Philidris* a place to live in return for such "fertilizer." In French Guiana, scientists are studying whether *Tillandsia bulbosa* (right) relies on nutrients from the ants it shelters.





## PLANTING AND PROTECTING



Ants defending their plants can be ferocious. In Singapore an army of ants together with the plant's spines guards a rattan palm (facing page). Even more aggressive are the South American ants *Pachycondyla goeldii*, which readily attack passersby to protect the plants that keep the ants' fragile nests and gardens from dissolving like cardboard in the rain.

Diligent planters as well as loyal defenders, ants also sow plant seeds in gardens dispersed throughout the canopy. Researcher Bruno Corbara (right) studies a pair of ant gardens in French Guiana. One *P. goeldii* ant (above) carries an anthurium seed back to its nest, where it will eat the sticky string attached and then plant the seed. Later the seed will sprout—and thus the ant garden grows. □







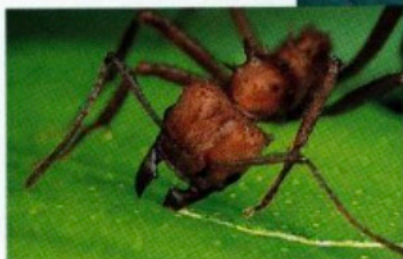
DAVID FAIRCHILD (LEFT AND ABOVE)



## Bugging Out With NATIONAL GEOGRAPHIC Photographs

We've been giving you the creepy-crawlies for years. In our May 1913 issue David Fairchild's photographs make bugs seem to skitter right off the page. Trained as a botanist, Fairchild designed an expandable camera he called "Long Tom" to photograph insects in his Maryland backyard. He'd spend half an hour sweltering beneath black cloth to focus on each tiny, lifeless subject—like this longicorn beetle—that his wife had mounted on a leaf with paraffin. Fairchild's photographs were head-on at a time when most textbooks showed insects from above. He relished presenting "these monsters to the public as a showman might."

Fairchild, who helped establish Fairchild Tropical Garden in Coral Gables, Florida, first became interested in bugs through his small son. "He was hunting for them with the same enthusiasm that a big-game hunter stalks his game in the jungle," Fairchild recalled, "and the thought flashed into my mind, why shouldn't we hunt them with a camera."



MARK W. MOFFETT



ROGER LEGUEN

Mark Moffett has been doing just that for years. An insect aficionado since childhood, the Smithsonian researcher uses considerably less camera than Fairchild did and takes it to more exotic locales, including repeated visits to the New Guinea rain forest (above). Another difference: Mark doesn't kill his subjects, such as this leafcutter ant in Brazil (above left) from our July 1995 issue. "Unfortunately, plenty of natural history photographers still kill their subjects or chill them so they stop moving," he notes. "But would you kill a lion to photograph lion behavior? You can't learn much from a posed picture of a frozen ant." With Mark there's no such thing as the one that got away. "They all get away," he says, "after I get the picture."