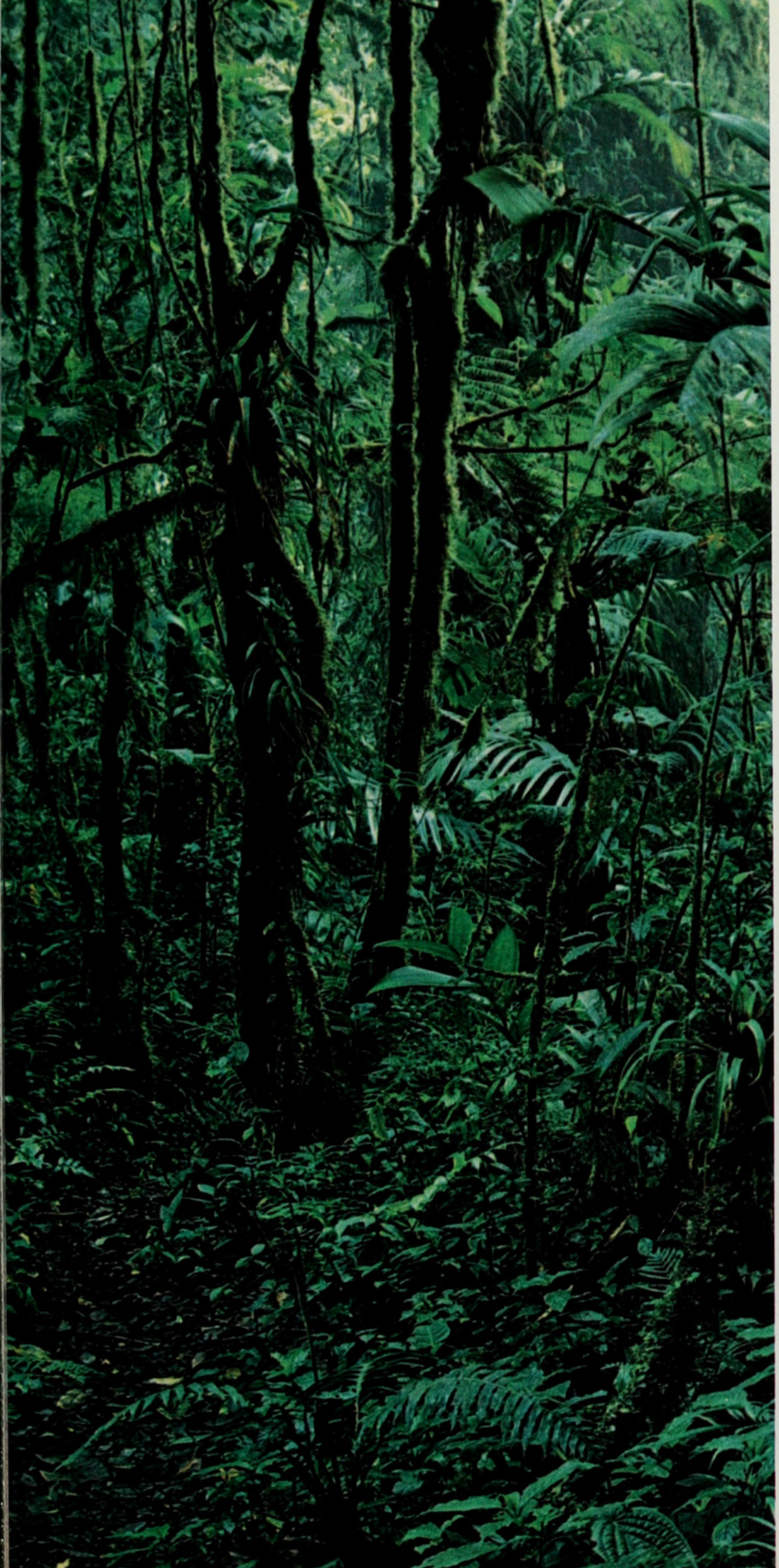

Cloud Forests

By William Burger

Photos by the author

Of tropical plant communities, among the most interesting to the botanist are cloud forests. These usually occur on steep tropical slopes at higher elevations or on small mountains that abruptly rise above the surrounding land.

Here the prevailing winds are forced upward, become cooler, and produce clouds and mist or rain. (The rising air expands because of lower pressure at higher elevations and the expansion causes what is called adiabatic cooling. Refrigerators work on the same principle, first compressing gas and then allowing it to expand and produce the cooling effect.)

Cloudiness and rain or drizzle have a secondary effect: they screen out the sun and tend to moderate the daily temperature cycle. If the slopes are at elevations of 5,000 to 10,000 feet, the combination of cloudiness, wind, and altitude can make it quite chilly even in midday. The combination of cool, moist weather with frequent cloudiness means that water stress—the threat of drying out—is much less severe in a cloud forest than in most other plant formations. While a lowland rain forest may receive as much precipitation as a cloud forest, the longer clear periods of hot sunshine in the rain forest create very different growing conditions there. ►

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The unusual weather conditions of the cloud forest create an appearance that is quite unlike that of forests in the wet lowlands and very different from that of seasonally very dry forests, but it is impossible to define the cloud forest precisely; and attempts to show where one begins or ends, even on a single mountain slope, are quite arbitrary.

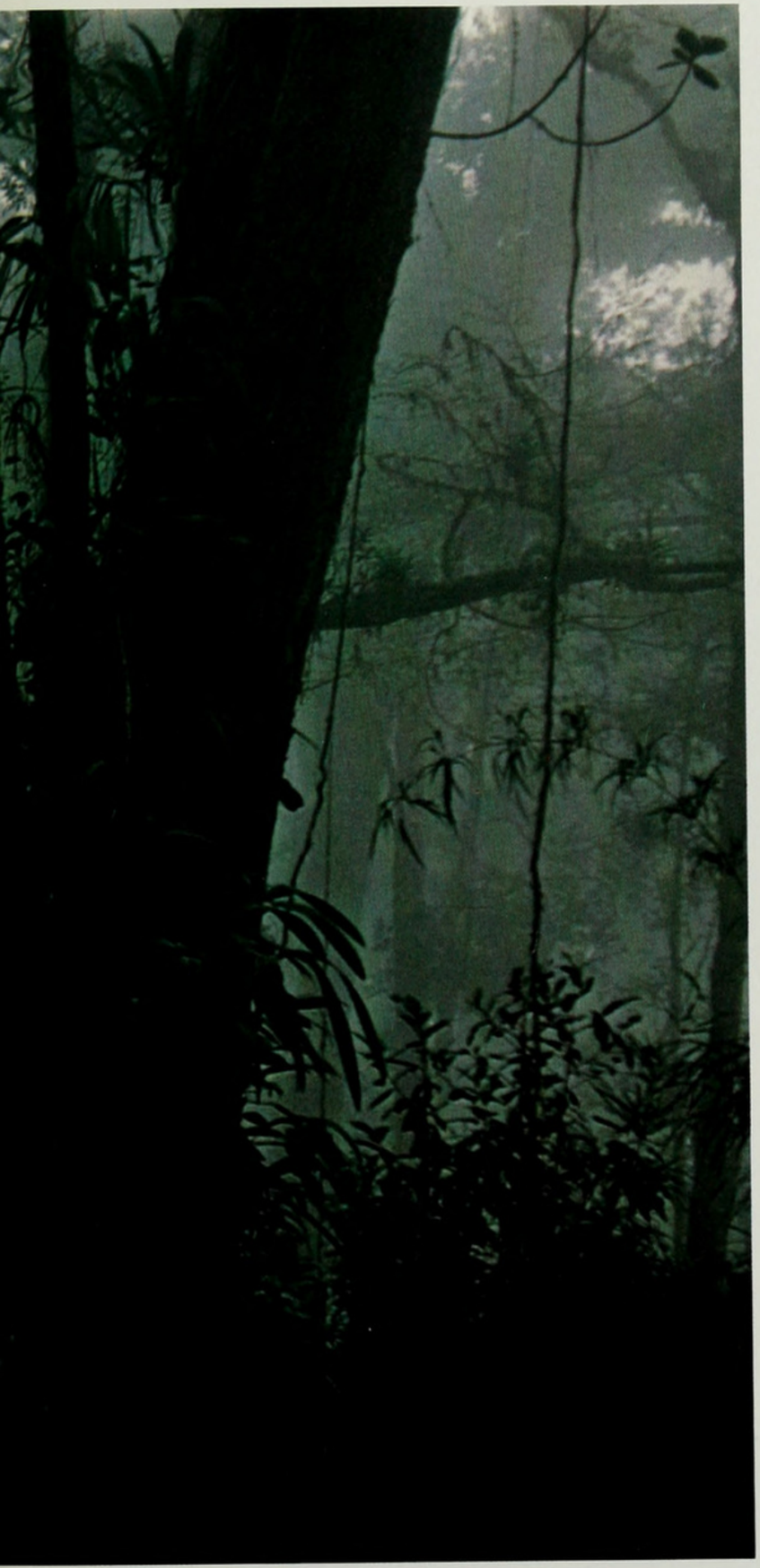
Cloud forest trees average between 30 and 80 feet in height, while trees in a lowland rain forest are generally twice as tall. The crowns of typical trees in the two communities also differ considerably. The broad, spreading crowns of the tall rain forest "emergents" that stand above the forest canopy are not to be found in a cloud forest. Instead, crowns tend to be compact or very irregular—conditions often due to breakage by high winds. In

Flowers of Columnea gloriosa, *an epiphytic member of the Gesneriad, or African violet, family.*

Tree fern in Costa Rica's Monteverde Cloud Forest preserve.

the cloud forest, branches tend to be denser and more numerous, and bear smaller, stiffer leaves. Both conditions are probably in response to frequent winds.

The understory of the rain forest is also distinctly different from that of the cloud forest. While the rain forest usually has a very dark interior, with few small trees and shrubs, the cloud forest understory is usually better illuminated and has a great variety and profusion of plants—especially on very steep slopes and where high winds cause frequent branch falls. The more open nature of the cloud forest favors the abundant growth of small trees, shrubs, and epiphytes—which spend their lives perched on other plants. Epiphytes are not to be confused with parasites—such as mistletoe—which get their water and nutriment directly from the supporting plant, or host. Epiphytes may get nourishment from debris caught in the bark of the supporting branch, but their roots do not invade the host's tissues. Because of frequent rain and misting, cloud forests usually support more epiphytes than any other kind of vegetation and it is here that the epiphytic orchids, bromeliads, gesneriads, ferns, and other "perching" plants are most diverse. ►



Winds may be especially strong for part of the year on mountain tops and in saddles between ridges. These windy sites often support so-called mossy forests, or elfin forests, which consist of densely crowded, crooked, and stunted trees only 10 to 30 feet tall. Their tops are generally rather flat and uniform in height—the result of strong, persistent winds. Usually, there are few shrubs but a great many mosses on trunks and branches as well as on the ground.

Where slopes are gentler and winds more moderate, the cloud forest gives way to the montane forest, which tends to be taller, and has a darker understory with fewer shrubs and epiphytes. Like the cloud forest, the montane forest is also cool—because of the higher elevation—and most of the trees retain their leaves throughout the year.

The cooler conditions that characterize cloud forests also make them ideal for human habitation and exploitation. Thus, cloud forests are often replaced by coffee or tea plantations, potato or barley fields, dairy pastures, and the like. While cloud forests do not directly produce food for large-scale human consumption, there are sound utilitarian reasons for protecting them, the most important being water conservation. Along ridges and steep slopes these forests intercept the clouds, capture their moisture, and pass it on to feed small brooks and streams. These, in turn, maintain water tables and river flow in the lowlands.

Because cloud forests are often on steep slopes, their destruction can result in severe soil erosion. In their absence, torrential downpours may result in flooding during the rainy season and during the dry season streams that once carried water year-round may cease to flow altogether. Watershed management, especially where reservoirs for household water supply or hydroelectric power are involved, is one of the important ways to ensure the preservation of tropical cloud forests. ➤

Moisture-laden winds from the Caribbean obscure the top of Cerro Zurqui in Costa Rica's central highlands.

Concern over the destruction of cloud forests has yet another, but less utilitarian dimension. Cloud forests can be regarded as cool or moist islands standing above a sea of hotter and drier lowland vegetation. And like islands in the sea, they are often the homes of plants and animals that can survive nowhere else. The more isolated the cloud forest—that is, the more distant from other cool montane forests—the greater the percentage of plants and animals that are apt to be unique. Thus, the destruction of a cloud forest may well result in the extinction of species that are found nowhere else.

The destruction of large portions of our planet's natural diversity is, apparently, ongoing and irreversible. Land that once supported montane tropical forests and cloud forests now produces milk, coffee, tea, grains, and a host of other useful products, including strawberries shipped by air to help us maintain our escalating standard of living. But let us hope, while sipping our coffee and savoring our strawberries, that a few of these unusual forests can be saved and their unique biota preserved. □