cated that low-level inflammation triggers blood vessel damage.

While CRP's role in either inflammation or heart disease is far from clear, high blood pressure is a well-recognized danger sign for heart attacks and strokes.

To investigate a link between CRP and hypertension, epidemiologist Howard D. Sesso of Harvard Medical School in Boston and his colleagues tapped into a database of 20,525 women who had donated blood samples during the early 1990s as part of a wide-ranging health study called the Women's Health Study. The women entered the study at age 45 or older with no history of high blood pressure, heart disease, stroke, or cancer. But after roughly 8 years, one-fourth of them showed high blood pressure.

The scientists measured CRP in the initial blood samples and then divided the volunteers into roughly equal-size high-, medium-, and low-CRP categories. They found that women in the low-CRP group were about 50 percent as likely to have developed hypertension during the study as were those in the high-CRP category. The report appears in the Dec. 10 *Journal of the American Medical Association*.

Next, the researchers set aside the data from women who smoked, were overweight, had diabetes, were using hormone therapy, or had high cholesterol. Of the 6,795 women who remained, those with low CRP at the start of the study were still only about 60 percent as likely to have developed high blood pressure as were the high-CRP women.

The study shows a "potential relationship between hypertension and inflammation," says Daniel Jones, an internist at the University of Mississippi Medical Center in Jackson. But scientists still need to determine whether inflammation can incite high blood pressure in lab animals, he says. Until then, "there are too many gaps in our knowledge" to suggest that CRP causes high blood pressure, Jones says.

The largest gap lies in the absence of a recognized biological mechanism for the link, but basic research has turned up some possibilities. For example, studies show that vessel-lining cells exposed to CRP produce abundant surface molecules that activate angiotensin, a compound that causes blood pressure to rise. Other research suggests that CRP depresses production of nitric oxide, a vessel dilator.

However, since the role of CRP in inflammation remains unclear and its link to hypertension unproved, doctors should be careful about prescribing anti-inflammatory drugs—which can have side effects—on the basis of a high CRP reading, says physician Marvin Moser of Yale University School of Medicine. —N. SEPPA

RED START In sun, young cacao leaves begin crimson but later turn green and pick up fungi.

Sweet Lurkers

Cryptic fungi protect chocolate-tree leaves

A hidden world of fungi abounds inside healthy leaves, and scientists are beginning to learn what it's doing there. A research team reports that in tree leaves, these fungi, called endophytes, can limit damage from attacking disease agents.

In tests on chocolate trees in Panama, leaves colonized with endophytes that don't cause disease coped better with a vicious pathogen than fungusfree leaves did, report A. Elizabeth Arnold of Duke University in Durham, N.C., and her colleagues. "Here's a major role for broad-leaved-tree [endophytes] that's never been noticed," she says.

The endophytes in grasses fight pathogens, explains Keith Clay of Indiana University in Bloomington. He welcomes the similar result in these trees as "pretty dramatic." He adds, "I'm sure it's going to get a lot of attention."

Clay predicts that ecologists will look for similar effects in other broad-leaved trees and muses that cacao growers might find ways to harness the endophytes' disease-fighting power.

Endophytes have turned up in every plant tested, from Douglas firs and grasses to mosses and liverworts, says Arnold. Clay and other grass researchers have demonstrated fungal benefits that include reduced appeal to grazing animals, for temperate-zone grasses.

Grasses and tropical trees have very different fungal tenants, says Arnold. Unlike the grass inhabitants, the tree endophytes are quite diverse and colonize emerging leaves instead of passing from one generation to the next.

Arnold and her colleagues surveyed fungi in cacao leaves at five sites in Panama. The similarity in fungal residents decreased as the sites grew more distant, the researchers report in an upcoming *Proceedings of the National Academy of Sciences*.

Yet the pattern of endophytes isn't merely geographical, the researchers conclude. Different tree species at the same site tend to have different mixes of colonizers. In lab experiments, extracts of leaves from different tree species influenced the growth rates of various fungal types and even altered the outcomes of fungus-versus-fungus growth competitions.

Arnold and her colleagues chose seven kinds of fungi that showed up frequently in leaves of the local trees and won laboratory growth competitions. The researchers introduced these fungi to both young and old leaves on cacao seedlings that had been kept free of fungi. Then, the scientists inoculated some of the leaves with a strain of *Phytophthora*, one of the three major pathogens in commercial cacao and a relative of the organism behind Irish potato blight. Compared with leaves without endophytes, the leaves housing the friendly colonizers lost about half as much area to invaders and were more likely to survive.

The bonus turned out to be biggest for the older leaves. The fungi may compensate for the waning of defensive chemicals as leaves age, says Arnold.

Plant pathologist Christopher Schardl of the University of Kentucky in Lexington welcomes the work as a "very important advance." Aside from grass studies, he says, "there has been very little evidence of defensive mutualisms between fungi and plants." —S. MILIUS

ARNOLD