

Trees hog nitrogen to survive on tough turf

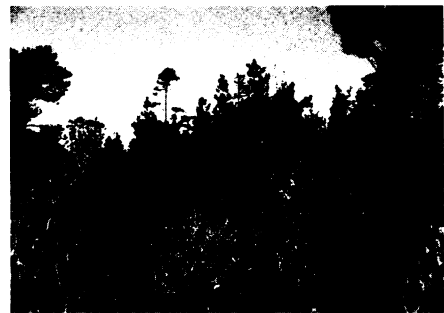
Plants have a variety of tricks enabling them to survive on infertile, acidic soils. To conserve their nutrients, evergreens, for example, grow slowly and shed their foliage infrequently. Now, scientists studying a unique Northern California forest have uncovered another bit of their survival strategy: how they get by on small amounts of the all-important nitrogen.

Like many other kinds of vegetation, Bishop pines (*Pinus muricata*) produce compounds called polyphenols; many ecologists believe these substances ward off pathogens and herbivores. "But we show that polyphenols have a function that has nothing to do with defen-

sive chemistry," says Robert R. Northup of the University of California, Davis.

Instead, the compounds have a lot to do with ensuring that nitrogen remains useful to pine trees and worthless to most other types of vegetation, he and his colleagues report in the Sept. 14 NATURE.

The scientists studied Bishop pines in a coastal forest known as the Ecological Staircase, where the trees grow close together but on three different soils: one very old and extremely infertile, another moderately acidic and infertile, and the third slightly acidic and fertile. In earlier work, the researchers found that the concentration of polyphenols in the



In California's coastal Ecological Staircase, some evergreen trees grow no bigger than shrubs. Other members of the same species on nearby, but much more fertile, territory tower above their pygmy cousins.

pinus' foliage increases as soil fertility declines.

In their new study, Northup and his colleagues examine the relationship between nitrogen release and polyphenols in the pine needles littering the ground under the trees.

They find that litter containing large amounts of polyphenols also has a high ratio of dissolved organic nitrogen (DON) to inorganic nitrogen, the form used by most plants. The least fertile soil had, on average, twice the concentration of polyphenols and one-third more DON than the most fertile soil but less than one-tenth of the inorganic nitrogen, says Northup.

Polyphenols bind the organic nitrogen and prevent a process called mineralization, which turns organic nitrogen into its inorganic form, other studies indicate.

The Bishop pines benefit from the polyphenols' ability to bind with organic nitrogen, the authors suspect. Mycorrhizal fungi living on the trees' roots get enough carbohydrates from the trees to make enzymes that break down the nitrogen-polyphenol compound, Northup explains. That enables the pines to use the organic nitrogen—a feat most plants cannot perform.

Other studies have shown that vegetation growing on infertile soil absorbs more nitrogen than mineralization produces, suggesting that such plants must have another source of the nutrient, notes Northup.

In an accompanying comment, F. Stuart Chapin III of the University of California, Berkeley, contends that the new research adds "to the developing body of evidence that organic nitrogen is a major and direct source for plants in nitrogen-limited ecosystems."

The new report also "shows for the first time that a pine... can strongly influence [the] release of DON in soils through the production of polyphenols in leaf litter," Chapin adds, although he cautions that the authors' assumption that the trees absorb DON and benefit from it still needs to be demonstrated.

—T. Adler

AIDS progression depends on quality of care

One of the many mysteries of AIDS is why the disease seems to develop more rapidly in individuals from certain groups, especially women and blacks. A new study suggests that the link between the progression of HIV infection and factors such as race and sex has nothing to do with biology. Rather, unequal access to medical care may explain why some HIV-infected people stay healthier and survive longer than others.

Understanding this association is important, says Richard D. Moore of the Johns Hopkins University School of Medicine in Baltimore, so that "people don't go off on wild goose chases for biological" links that don't exist. Moore and his colleagues Richard E. Chaisson and Jeanne C. Keruly report their findings in the Sept. 21 NEW ENGLAND JOURNAL OF MEDICINE.

The group analyzed demographic and health information from 1,372 people who went to the Johns Hopkins HIV Clinic for treatment over a 5-year period. They continued to track the patients to determine how quickly HIV infections developed into AIDS.

The researchers measured the individuals' disease progression by counting their CD4 cells, immune system cells killed off by HIV (SN: 3/18/95, p.172). Among people with comparable initial CD4 counts, the scientists found no association between rates of survival or development of AIDS and such factors as race, sex, use of injected drugs, income, education, and insurance coverage. Therefore, correlations of this sort found in other studies probably reflect differences in access to medical care, the researchers say.

Although previous findings have suggested similar conclusions, the strength of the Johns Hopkins study lies in the group examined, says Paul A. Volberding of the University of California, San Francisco, and the AIDS Program at San Francisco General Hospital. "They're looking

at a well-characterized patient population," he says. "It has the advantage of being a demographically diverse group of people receiving care at a single site."

The breadth of the subject pool lends weight to the idea that access to care predicts survival more reliably than other characteristics. "If there were biological differences in disease progression based on these demographic factors, we probably would have seen differences in our [group]," Moore says. "When you control for access, the sociodemographic disparities aren't there."

Some factors did correlate with lower or higher rates of survival, but none of these was inconsistent with previous findings, Moore says.

For example, people diagnosed with AIDS before seeking care at the clinic or who had previously received AZT (zidovudine) therapy had a lower rate of survival. These factors, Moore says, singled out patients who had more advanced HIV infections initially, which in turn affected their chances of survival. Older patients also had lower survival rates, perhaps because their bodies are less able to cope with the lower immunity to other diseases caused by HIV infection.

On the other hand, patients who received drugs to combat AIDS-related pneumonia or who began taking AZT after arriving at the clinic had a higher rate of survival.

Amid the shifting opinions over the biology of AIDS, this study turns the focus back on the providers of care, Volberding says. "Instead of being a passive issue of one group progressing more rapidly than another, it puts the burden back on the health profession," he adds. The study shows that "one's health behaviors, apart from access to medical care, probably don't influence how the virus progresses. It reinforces the idea that HIV itself really doesn't discriminate." —C. Wu