

Biology

Ron Cowen reports from Tempe, Ariz., at the annual meeting of the Society of Ethnobiology

Medicinal plants of the prairie

A rich variety of drought-resistant grasses and wildflowers carpets much of the North American prairie. But botanists, having long focused on woodlands as nature's chief source of medicinal plants, have assumed that most herbal remedies developed by Plains Indians traced instead to the prairie's more wooded sections.

Now, a historical review indicates that these tribes' traditional medicines sprouted mainly on the plain, in the form of the drought-adapted species rather than forest plants. "This indicates that prairie, rather than woodland, was the original predominant vegetation type of their native homelands, and that these peoples should be considered to have affinities with prairies, rather than woodlands," asserts ecologist Kelly Kindscher of the University of Kansas in Lawrence. Kindscher's analysis reveals that 20 prairie tribes – including the Arapaho, Blackfeet, Comanche, Osage and Sioux – developed their medicines from 165 plants found on the open prairie.

At the Rosebud Sioux Reservation in South Dakota, Kindscher observed healers treating wounds by burning certain plants above the injury site. In addition, he says, traditional beliefs hold that green milkweed and snow-on-the-mountain – both of which exude a milky sap – encourage new mothers to produce more breast milk.

Some traditional plant remedies may have a biological rationale, Kindscher says, noting that 28 of the 165 species examined in his study have at one time been listed in the *U.S. Pharmacopoeia*. Although medicinal plants could be vitally useful in Third World nations, scientists so far have tested only about 5 to 15 percent of the world's species of higher plants for biomedical activity, he adds.

Making the most of desert plants

Candy, dental floss, makeup and building materials are just some of the traditional uses of two desert plants that flourish on Arizona's tribal reservations.

When spring rains come to the hilly country of northern Arizona, the thorny limbs of the desert plant ocotillo sprout tiny green leaves and red flowers. As a young boy growing up in a mountain village, recalls O'Odham tribe member Daniel Lopez, "I would carefully pull the thorny limb down and pull off the flowers. Then I would take the flowers and taste the sweet nectar from them." He and other children on the reservation viewed the ocotillo flower as their main candy supply.

For centuries, O'Odham women rubbed the yellowish flower stems on their cheeks as a form of rouge, says Lopez, who has compiled a historical review of tribal culture. When tribespeople became ill, men would strike the outside of the patients' homes with ocotillo branches, believing sickness would stick to the thorns. Then they buried the branches away from the village, where the limbs could do no harm. The men still construct house frames of mud-plastered ocotillo limbs and use thorny ocotillo fences to keep out snakes and even human trespassers. Some of the fences have taken root, leading English-speaking people to call ocotillo the "living fence," adds Lopez, who now lives in Big Fields Village, Ariz.

An anthropologist tells a similar tale about the use of *Yucca baccata* among Western Apaches. With the help of tribe members Robert and Lola Machuse, Gayle Potter-Basso of Heber, Ariz., studied plant resources on the Fort Apache Reservation in Arizona. She reports that the tribespeople pound *Y. baccata* roots to produce soap and shampoo, while processing the flat, broad leaves into dental floss and rope. A traditional Western Apache belief holds that praying over the plant helps protect people and horses from misfortune and returns eclipsed celestial bodies to their proper heavenly abode, she adds.

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Biomedicine

Kathy A. Fackelmann reports from Daytona Beach, Fla., at an American Cancer Society science writers' seminar

Air pollution boosts cancer spread

The brownish haze smothering Los Angeles and other smoggy cities not only makes breathing difficult but also encourages cancer spread within the body, animal studies suggest. The research also raises the concern that living in heavily polluted areas increases a cancer patient's chances of dying from the disease.

Arnris Richters at the University of Southern California School of Medicine in Los Angeles and his colleagues have evidence implicating nitrogen dioxide – a common pollutant from auto exhaust – in the lethal spread of cancer. For eight weeks they exposed mice to air containing 0.25 to 0.5 parts per million nitrogen dioxide (concentrations common in Los Angeles), then injected the mice with melanoma, a particularly serious type of skin cancer. After 21 days, the team reports, mice that had inhaled nitrogen-dioxide-laced air prior to the injections showed more tumors in their lungs than did control mice receiving the injections after inhaling pristine air. Furthermore, the mice exposed to nitrogen dioxide died sooner than the control mice.

"Our results indicate that inhalation of nitrogen dioxide facilitates the spread of blood-borne cancer cells," Richters says. Studies show that many people with cancer have millions of malignant cells circulating in their blood, especially during and immediately after surgery, when tiny tumor cells break off and enter the bloodstream, he says. In most cases, the immune system destroys these cells before they have a chance to take root in distant body parts. But Richters says his work suggests nitrogen dioxide in the air can impair certain components of the immune system, including the killer T-cells that attack tumor cells.

In addition, nitrogen dioxide appears to damage endothelial cells lining the lung capillaries, he says. Richters' work shows that platelets – clotting factors in the blood – plug the blistered walls of these cells, but the clogged areas ensnare migrating cancer cells that can go on to become lung tumors.

Whether the animal findings apply to people remains unclear, but Richters cites an Australian study showing that cigarette smokers with melanoma are more likely than non-smoking melanoma patients to experience early cancer spread. Cigarette smoke contains nitrogen dioxide, he notes.

The new evidence on smog hasn't prompted Los Angeles physicians to advise cancer patients to move away from the city, Richters admits. Still, he believes the implications may be strong enough to recommend that cancer patients breathe clean air during surgery and the risky postsurgical period.

A favor for kids with cancer

Children with cancer often undergo more than 300 needlesticks in the course of treatment, and up to a third must be held down by parents during the procedures, says Paul B. Jacobsen of the Memorial Sloan-Kettering Cancer Center in New York City. But kids who can distract themselves with a simple paper toy – the unfurling "party blower" ubiquitous at New Year's Eve and birthday celebrations – are less likely to cry or struggle when a nurse or doctor must draw blood or administer chemotherapy, Jacobsen reports.

He and his colleagues studied 23 cancer patients aged 3 to 9 who had screamed, flinched or struggled during venipuncture procedures in the past. They taught half of these highly reactive children to blow slowly on the party toy; the rest received no behavioral training. Afterwards, the team found that 45 percent of the children who played with blowers during venipuncture needed restraint, compared with 78 percent of those who didn't use the toy. Jacobsen says physicians should devise similar techniques to distract frightened children during other distressing medical procedures.

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