

Old-time pharmacies sold a plethora of botanical oils, powders and extracts that were used to combat a myriad of afflictions. Many of today's prescription and over-the-counter drugs were originally obtained from plants. Interestingly, most of these now-synthetic compounds come from plants native to tropical rain forests rather than deserts, says Barbara Timmermann.

"Desert plants are subjected to such stresses and produce unusual chemicals that protect them from animals, microbes and even other plants, yet very little research has been done on their medicinal value," says Timmermann, an associate professor of arid lands studies and pharmaceutical sciences at The University of Arizona.

Timmermann became interested in the medicinal properties of desert plants while part of a team studying the chemical composition of the *Grindelia camporum*, or gumweed. Researchers at the UA Office of Arid Lands Studies' Bioresources Research Facility are looking at the gumweed as one of several potential new crops for arid climates.

The gumweed—a species in the Asteraceae, or sunflower family—is a yellow, daisy-like plant that produces a sticky resin on its leaves and flower head. The resin is similar to pine resins, which are used widely in adhesives, polymers and printing inks. The gumweed



New Medicines From Desert Plants?

may prove some day to be a low-water, desert crop that complements the existing resin market.

But it was the way the plant seemed to be able to protect itself from insects and parasites that engrossed Timmermann. As a biologist and botanist who specializes in chemistry, she is fascinated by the chemical composition of desert plants and discovering "why they are there, what they are for, how they are produced and what does it mean?"

Timmermann is looking for biologically active molecules in desert plants, particularly the Asteraceae family, that could be used as natural insecticides, herbicides and medicines. She says a relative of an acid found in gumweed resin has been reported by scientists in California to be an effective insecticide against the Colorado potato beetle and other insects.

The Asteraceae also have revealed some antibacterial properties and other biologically promising activities.

"I thought maybe these plants could have anti-viral activities, also, specifically against the virus that causes AIDS (Acquired Immunodeficiency Syndrome)," she says. "I received seed money through a grant from The University of Arizona to screen desert plants for these properties." Timmermann has submitted a proposal to the National Institutes of Health requesting funding to conduct a



Grindella camporum

full-scale investigation of the anti-viral characteristics of desert plants.

"I know certain crude plant extracts have anti-viral activities," she says, "but the next steps of the research become very complicated. It involves isolation and chemical characterization of the compounds that show this activity.

"You're starting with a mixture of hundreds of compounds that you make simpler and simpler and test against a virus or bacteria. Through the process of elimination you may target the molecule you're looking for—or not."

If, and only if, the molecule remains promising as an anti-viral agent, it then must be manipulated, and made more active by synthetic modifications. The entire process, Timmermann says, may take many years.

Timmermann is involved in a number of other desert-related projects as well.

She and UA plant pathologist Martha Hawes are looking at the chemistry that may cause soil-borne bacteria to prefer certain root cells to others. Timmermann also is working with the American Association for the Advancement of Science to establish an arid lands studies center—much like the UA's—in South America.

"I have been working with desert plants for many years," she says, "I don't think I would want to work in any other environment."

—By Jan McCoy

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(Left) Barbara Timmermann examines bottles of plant-derived medications dispensed from drug stores of the past. The medicines belong to the collection of the UA College of Pharmacy.