



When **Ameenah Gurib-Fakim**, professor at the University of Mauritius, looks at her garden, she sees a common weed, *Centella asiatica*, which grows wild in her island country off the southeast coast of Africa. It reminds her why she started studying traditional medicine. “I am an organic chemist by training,” she says, but after earning a Ph.D. in England and returning to Mauritius, she found it difficult to continue her research on the chemical synthesis of organic molecules, because her laboratories didn’t have the right equipment. “So I started isolating organic molecules from plants,” she says. “Then a colleague told me about medicinal plants. I realized that they are a goldmine!” She calls the study of traditional medicinal plants “my green gold.” The little *Centella* weed in her garden is an example: it is studied as a possible therapy for skin diseases like leprosy, which is still found in many parts of the world.

Many modern medicines started as traditional treatments made from plants. Aspirin was discovered in a type of willow tree whose leaves and bark have been used for centuries for pain relief. But Ameenah says when she started working on traditional medicine in the early 1990s, it was considered “quackery.” However, a few years later, health organizations like the National Institutes of Health in the United States began exploring alternative medicine, and “the European Union funded a major research initiative to document and study medicinal and aromatic plants,” says Ameenah. “Naturally, I became involved and I’ve been cruising ever



since!” She created the first full inventory of commonly used Mauritian medicinal plants—of which there are more than 600—and is publishing a similar catalog for Africa, the *African Herbal Pharmacopeia*. Ameenah, who is a L’Oréal-UNESCO Award laureate, continues to catalog the biodiversity of medical plants, saying, “Herbal medicine forms an important part of traditions and needs to be preserved so that future scientists can find new avenues for research.” She also works locally to encourage women to cultivate medicinal plants. “Herbal medicine is here to stay,” she says. “In the 1990’s I was standing on top of a very small wave that is now a tsunami.”

PRESERVING CULTURAL TRENDS

Susanna Phoboo is also riding the green medicine wave. Like Ameenah, she studies medicinal plants, at Tribhuvan University in Nepal, where she is a graduate student. Her Ph.D. thesis work is on a plant called *Swertia chirayita*, which is used traditionally to treat a variety of diseases, from diabetes to fever. Susanna says the plant is reported to have many useful properties, including acting as an antioxidant, reducing inflammation, and preventing disease. She says it is also economically important, as “one of the most highly traded medicinal plants from Nepal, providing hundreds of rural Nepali households with an extra source of income.” Susanna’s work on medicinal plants even involves global climate change. She is interested in how plants react to changes in temperature or the amount of sunlight. These types of environmental stresses could change a plant’s therapeutic properties, or could even cause it to become extinct.



Susanna, a UNESCO-L’Oréal fellow, views her work as both contributing to Nepalese health and preserving her culture. She says, “Traditional medicine is medical knowledge that is handed down from generation to generation and involves using local resources for prevention or healing of diseases and even for maintaining a healthy lifestyle. I have been fascinated with medicinal plants since I was a child, when my mother used them to treat my cuts, burns, fevers, and coughs.” But although she values tradition, Susanna’s research approach is completely 21st century. She says we must use science to overcome major challenges in traditional medicine, for example with experiments to see if and how traditional treatments work. We also need to make traditional treatments more like modern medicines, so we know how much medicine is in each pill, spoonful, or injection. Some traditional medicines are made by drying and crushing whole plants, or soaking them in water or alcohol to make an extract, so each batch can have different amounts of the useful ingredient. If we don’t make sure the right plants are used, the treatments might even contain harmful substances. Susanna’s use of modern science can help make traditional medicines more reliable.



WHAT IS GREEN MEDICINE?

Preserving biodiversity starts with cataloging a region’s plants and their uses. Many plants around the world are used as traditional therapies for local diseases. Effective traditional treatments can provide a developing region with medicines that are locally produced and economically valuable. The women interviewed here are using modern technology to study traditional medicines, finding those that effectively treat or cure disease, and discovering how they work. They are also improving these treatments to best serve the needs of local communities in a “green” or sustainable way.



TEBELLO NYOKONG

LOCAL PLANTS, GLOBAL CURES

Using today's technology to study traditional healing methods is a common approach to green medicine—one that is also used by **Nonhlanhla Dlamini**. As a Ph.D. student at the University of KwaZulu-Natal in South Africa, Nonhlanhla was inspired by a talk on traditional medicines. "I later read that some African plants have led to production of successful drugs in first-world countries," she says. So why not use African plants to fight diseases in Africa? she thought. Her UNESCO-L'Oréal fellowship research project is studying African traditional medicinal plants to find drugs that are effective against Kaposi's sarcoma, a disease that causes mouth and skin lesions, and often occurs in AIDS patients. "In South Africa alone it can affect up to 40 percent of HIV-infected individuals. And currently there are no good treatments," says Nonhlanhla. She is searching for plant extracts that affect Kaposi's sarcoma cells grown in culture dishes, as a first step to finding new therapies.

Nonhlanhla sees great possibilities in traditional medicine, saying, "it has the potential to lead to the development of new, safe, effective and cheaper treatments. My desire is for traditional medicine to reach the same status and recognition enjoyed by Western medicine." Nonhlanhla also just enjoys doing the science, especially interacting with people from around the world. "What I find the most exciting about my research is that it is multidisciplinary and I find myself collaborating with scientists and people from many different backgrounds."

PUTTING LIGHT TO WORK

Eight hundred kilometers to the southwest, Professor of Chemistry **Tebello Nyokong** also does science that is multidisciplinary, multinational, and locally focused, at Rhodes University in Grahamstown, South Africa. Tebello studies phthalocyanines, which are molecules that are chemically similar to the green chlorophyll of plants. Some are used as dyes for blue jeans. In Tebello's lab, though, they are being used as cancer therapies and to purify water.

When some phthalocyanines are exposed to light, they create chemicals called oxidants that damage cells, so new cancer therapies are being developed that send phthalocyanines into tumors, then trigger the release of their toxic chemicals with lasers. This treatment, called photodynamic therapy, specifically damages cancerous cells, so healthy cells are unharmed. But after photodynamic therapy, says Tebello, "the patient must be in the dark for several days. In Africa, we have a lot of sunlight, even indoors. So we need to design molecules that will work for phototherapy in Africa." For example, Tebello's researchers are trying to make the phthalocyanines more light sensitive—so that a lower dosage is needed—for use in African patients.



NONHLANHLA
DLAMINI



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"We are also interested in the environment," says Tebello, "so we are developing fibers containing phthalocyanines for use in water purification." The oxidation reactions that are triggered when light hits phthalocyanines can be used to destroy water contaminants, too. "And the fibers can be reused, so they are environmentally friendly." She says she has lots of projects for interested young women. In her research, she works with physicists, chemists, and biologists, and her students come from as far away as France and China.

NATURE IS THE BEST TEACHER

The women interviewed here all say that green and sustainable medicine and therapy is a growing area, although they still have to fight stereotypes about women in science. But Tebello, a L'Oréal-UNESCO Award laureate, says that anyone like her, with a practical mind and a love of knowing how things work, shouldn't be discouraged, even if other people say science is hard, or only for boys. Nonhlanhla says to think about where you are headed, and have a plan to get there. "Get good grades, use the Internet to find scholarships in your fields of interest, enter scientific competitions and be part of scientific organizations

in your schools. And writing is a big part of being a scientist, so sharpen your writing skills." Susanna advises staying alert. "Scientific research is fascinating but also frustrating. The results are not always what we expect. But some of the greatest discoveries in science were made by mistake or by coincidence, so a problem may become your greatest discovery."

Ameenah wants to encourage science teachers. "I was lucky to have enthusiastic teachers when I was a young girl interested in the sciences," she says. Although her school had little laboratory equipment, Ameenah said the natural world is a perfect science lab. As a student, she saw botany and ecology in action at a pond near the school and "learned physics from the colors of the rainbow!"

Susanna also learns directly from nature. As a plant scientist, she says, "Field study and nature walks are not only enjoyable and exciting, but also very educational. Everything in nature has a reason for being the way it is and scientists are just people who ask questions and want to know answers." So look closely at the plants you see everyday. They might contain a medical goldmine, just waiting to be discovered.