



Medicinal plants being sold in Bolivia: a natural resource

# THE GREEN PHARMACY

## HERBAL MEDICINES IN MODERN USAGE

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**N**ear the Juma Masjed Mosque in Old Delhi, a herbalist sits on a cloth under his umbrella expounding the benefits of his craft. Surrounding him are a variety of bottles and vials. A crowd has gathered, women dressed in saris, men in cotton pants and long shirts. A few tourists look sceptically at the merchant's wares.

Although it is highly unlikely that any of the tourists will try his potions, feeling more comfortable with their

modern medicines, many of the others will seek his cures.

For this herbalist is not a romantic relic of an unsophisticated past. He is one of about half-a-million traditional healers who provide medical care to close to two-thirds of India's population. And indeed, chemists and pharmacologists are finding that herbalists, witch doctors, and medicine men can provide important clues leading to new drugs for modern pharmacies.

Despite remarkable progress in laboratory drug development, the earth's flora and fauna are still the most important source for potential drugs. The natural pharmacopoeia has thousands of plants to choose from, yet most of them have never been thoroughly analyzed with modern techniques.

Traditional healers and pharmacists, such as the Indian herbalist, can provide important information needed to determine which plants deserve to be taken into the laboratory for further analysis. In Brazil, where the flora of the Amazon region has been estimated at 73 000 species, scientists are focusing their studies on the 1300 species that folklore has identified as poisons, narcotics, or local medicines.

The process of deriving drugs from plant sources is not new. Over the centuries people have depended on the materials around them and through trial and error have learned the special properties of the plants in their environment. This knowledge gradually became incorporated and systematized as part of modern medicine.

In 1775, for instance, an English country doctor found that one of his patients improved after treatment with a "secret herbal remedy." Following up on this information, Dr William Withering discovered digoxin in the long, green leaves of the common Foxglove.

Digoxin continues to be a leading treatment for heart failure. It strengthens and improves the tone of the heart muscle, regulating the blood flow and bringing about a slower but stronger heartbeat. In the United States alone more than three million cardiac sufferers still routinely take digoxin.

A more recent example of the importance of traditional plant knowledge was the isolation of muscle-relaxing alkaloids from a lethal compound used as an arrow poison by numerous South American Indian tribes. Curare acts by paralyzing the victim and kills by asphyxiation when paralysis reaches the respiratory muscles. Identification of curare's active components, such as strychnine, in the 1930s opened the way for both natural and synthetic preparations that work with anesthetics and other medications to permit difficult operations and ease convulsive spasms.

Current renewed interest in traditional techniques has developed in a world where traditions are rapidly changing and plant species, especially in tropical areas, are disappearing. This threat of extinction sets a natural deadline for scientists to learn as much as possible before old remedies are forgotten, or their raw materials destroyed.

But the preserving of traditional knowledge is a complex task. It re-

quires observation and recording of medical techniques, identification of plant materials, and experimental investigation of the ingredients and the effects. It is not enough for an anthropologist to report in detail on a ceremony, such as an African poison ordeal. He/she must also record the plants used to concoct the poison and, if possible, the important chemical components.

A multidisciplinary approach to traditional medicaments called ethnopharmacology involves collaborations between anthropologists, botanists, chemists and pharmacologists. An ethnopharmacologist's success in unraveling the chemistry of a herbal tea or poultice often depends on earning the trust of local experts.

In East Africa, "Bwana mganga", village medicine men, are revealing their secrets to Isao Kubl of the University of California at Berkeley (U.S.A.). Kubo learned that a tonic brewed from the orange berries of a local shrub is used to prevent cholera and as a tonic for pregnant women. Testing the antibacterial activity of the shrub extracts, he found maesanin, a substance that blocks the chemical activity vital to cell growth in bacteria. This compound may prove to be a useful model for new antibiotics.

Kubo's promising results are not an isolated example. In the Amazon jungles, a chemist from the University of Sao Paulo, Brazil, found that Indians used the leaves, bark, and blood-red resin of certain trees of the nutmeg family in plasters for skin treatment and to wash infected wounds. Otto R. Gottlieb discovered that the wound-healing power of the plants came from chemicals called ptercarpanes. Some of these compounds are undergoing further study to evaluate their anti-fungal activity.

In one of a number of international initiatives to aid researchers in sorting the enormous amounts of data gathered on plant materials, information is being stored on a central computer system in the United States. Dr Norman Farnsworth of the University of Illinois has entered information on thousands of plants and other natural products and has listed their biological activities against specific diseases such as asthma, diabetes, and hepatitis. He has also assembled records on more than 3000 plant species used to regulate human fertility.

Dr Farnsworth's information is not just of interest to researchers and large pharmaceutical companies. Ethnopharmacology can also be an important element of a developing nation's medical and economic system.

Already, Third World countries are providing many of the raw materials needed in drug manufacturing, but they are not always receiving the

## ONLY IN CANADA, YOU SAY?

Investigation of herbal remedies is not restricted to tropical or exotic areas of the world. In Canada's maritime provinces, Frank Chandler, a professor at Dalhousie University in Halifax, studies plants used by the Micmac Indians for biologically active compounds.

Chandler has found that many of the Micmac's herbal remedies were based on sound medical and scientific logic. For instance, they brewed wild cherry bark, an ingredient still used in some cough remedies, for treatment of coughs and colds. The Micmacs also used plants containing volatile oils that have been found to have antiseptic properties.

For most of his 16 years of re-

search, Chandler has used local plant materials, such as sweet fern and bunchberry, but for the past year he has been studying a new laboratory method — cell-tissue culture. This technique uses the cells which produce the chemical compound being studied rather than the whole plant. Advantages are that only a small amount of plant material is needed and that a year-round supply of active components can be manufactured in the laboratory. This can be especially important for studies on rare species, such as the pink lady's slipper, which Chandler is investigating for its anesthetic properties.

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benefits. Medicinal plants are being exported to developed countries where they are screened, analyzed and used in drug preparations — only to be returned as high-priced medicines. Dr Halfdan Mahler, Director-General of the World Health Organization (WHO), has described this imbalance as "drug colonization."

A striking example of this is the development of hormonal contraceptives from diosinin, the active ingredient extracted from *Dioscorea* — a wild yam. *Dioscorea* grows in many parts of Asia and in India is collected for two major American drug manufacturers. Their factories, in Kashmir and Southern India, extract chemical intermediates from the *Dioscorea* that are exported to the U.S.A. and Europe for further processing into contraceptive pills. Some of these pills are returned to markets in India.

Heavy collecting of *Dioscorea* for local and foreign use has led to another major problem — stock depletion. Because of the small concentrations that many active ingredients are found in, it often takes a large volume of plant material to produce a minute amount of useful product. For example, it requires 11-14 tonnes of Madagascar periwinkle leaves to make just 30 grams of vincristine sulfate, an alkaloid used in treatment of childhood leukaemia and Hodgkin's disease.

Over-harvesting is threatening a number of species, and as more plants are needed for large-scale production, the danger of extinction increases. One solution is to use natural products as models for synthetic drugs. However, chemists have as yet been unable to reproduce the complex structure of a number of compounds such as vincristine.

But for people in developing countries, isolating active ingredients and putting them in modern pharmaceutical forms may not be as important as standardizing dosage, warning of harmful side effects or providing simple yet effective remedies of the natural medicines as they exist. And although it has been argued that because of the potential hazards traditional medicines pose, they should be put through the same pharmacologic trials as other drugs, these tests are very expensive. The danger is that the major advantages of traditional medicine use, low cost and easy access, may be lost in commercialization.

The strategic role of traditional medicine in health care has been stressed by the World Health Organization. Part of the aim of "health for all" by the year 2000 is to urge Third World governments not to rely exclusively on Western medicine or physicians but rather to aim at synthesis between the best of both worlds — modern and traditional. To determine the correct balance, coordinated research into folk traditions, plant species, growing conditions and local medical needs is necessary. Most importantly, extraction and processing must be carried out, as much as possible, in developing countries. The health of the people of those countries is too precious — and too threatened — to neglect any resource that could be used to protect them. □

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