



# Ethnobotany: A Review

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## ABSTRACT

*Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of a local culture and people.[1] An ethnobotanist thus strives to document the local customs involving the practical uses of local flora for many aspects of life, such as plants as medicines, foods, intoxicants and clothing.[2] Richard Evans Schultes, often referred to as the "father of ethnobotany", [3] explained the discipline in this way: Ethnobotany simply means ... investigating plants used by societies in various parts of the world.[4] Since the time of Schultes, the field of ethnobotany has grown from simply acquiring ethnobotanical knowledge to that of applying it to a modern society, primarily in the form of pharmaceuticals.[5] Intellectual property rights and benefit-sharing arrangements are important issues in ethnobotany.[5]*

**Key words-** ethnobotany, flora, plants, pharmaceuticals, medicines, world, knowledge, investigating

## INTRODUCTION

The idea of ethnobotany was first proposed by the early 20th century botanist John William Harshberger.<sup>[6]</sup> While Harshberger did perform ethnobotanical research extensively, including in areas such as North Africa, Mexico, Scandinavia, and Pennsylvania,<sup>[6]</sup> it was not until Richard Evans Schultes began his trips into the Amazon that ethnobotany became a more well known science.<sup>[7]</sup> However, the practice of ethnobotany is thought to have much earlier origins in the first century AD when a Greek physician by the name of Pedanius Dioscorides wrote an extensive botanical text detailing the medical and culinary properties of "over 600 mediterranean plants" named De Materia Medica.<sup>[2]</sup> Historians note that Dioscorides wrote about

traveling often throughout the Roman empire, including regions such as "Greece, Crete, Egypt, and Petra",<sup>[8]</sup> and in doing so obtained substantial knowledge about the local plants and their useful properties. European botanical knowledge drastically expanded once the New World was discovered due to ethnobotany. This expansion in knowledge can primarily be attributed to the substantial influx of new plants from the Americas, including crops such as potatoes, peanuts, avocados, and tomatoes.<sup>[9]</sup> The French explorer Jacques Cartier learned a cure for scurvy (a tea made from the needles of a coniferous tree, likely spruce) from a local Iroquois tribe.<sup>[10]</sup>

During the medieval period, ethnobotanical studies were commonly found connected with monasticism. However, most botanical knowledge was kept in

gardens such as physic gardens attached to hospitals and religious buildings. It was thought of in practical use terms for culinary and medical purposes and the ethnographic element was not studied as a modern anthropologist might approach ethnobotany today.<sup>[11]</sup>

In 1732 Carl Linnaeus carried out a research expedition in Scandinavia asking the Sami people about their ethnological usage of plants.<sup>[12]</sup>

The age of enlightenment saw a rise in economic botanical exploration. Alexander von Humboldt collected data from the New World, and James Cook's voyages brought back collections and information on plants from the South Pacific. At this time major botanical gardens were started, for instance the Royal Botanic Gardens, Kew in 1759. The directors of the gardens sent out gardener-botanist explorers to care for and collect plants to add to their collections.

As the 18th century became the 19th, ethnobotany saw expeditions undertaken with more colonial aims rather than trade economics such as that of Lewis and Clarke which recorded both plants and the peoples encountered use of them. Edward Palmer collected material culture artifacts and botanical specimens from people in the North American West (Great Basin) and Mexico from the 1860s to the 1890s. Through all of this research, the field of "aboriginal botany" was established—the study of all forms of the vegetable world which aboriginal peoples use for food, medicine, textiles, ornaments and more.<sup>[13]</sup>

The first individual to study the emic perspective of the plant world was a German physician working in Sarajevo at the end of the 19th century: Leopold Glück. His published work on traditional medical uses of plants done by rural people in Bosnia (1896) has to be considered the first modern ethnobotanical work.<sup>[14]</sup>

Other scholars analyzed uses of plants under an indigenous/local perspective in the 20th century: Matilda Coxe Stevenson, Zuni plants (1915); Frank Cushing, Zuni foods (1920); Keewaydinoquay Peschel, Anishinaabe fungi (1998), and the team approach of Wilfred Robbins, John Peabody Harrington, and Barbara Freire-Marreco, Tewa pueblo plants (1916).

In the beginning, ethnobotanical specimens and studies were not very reliable and sometimes not helpful. This is because the botanists and the anthropologists did not always collaborate in their work. The botanists focused on identifying species and how the plants were used instead of concentrating upon how plants fit into people's lives. On the other hand, anthropologists were interested in the cultural role of plants and treated other scientific aspects superficially. In the early 20th century, botanists and anthropologists better collaborated and the collection of reliable, detailed cross-disciplinary data began.

Beginning in the 20th century, the field of ethnobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual reorientation. This is also the beginning of academic ethnobotany. The so-called "father" of this discipline is Richard Evans Schultes, even though he did not actually coin the term "ethnobotany". Today the field of ethnobotany requires a variety of skills: botanical training for the identification and preservation of plant specimens; anthropological training to understand the cultural concepts around the perception of plants; linguistic training, at least enough to transcribe local terms and understand native morphology, syntax, and semantics.

Mark Plotkin, who studied at Harvard University, the Yale School of Forestry and Tufts University, has contributed a number of books on ethnobotany. He completed a handbook for the Tirio people of Suriname detailing their medicinal plants; *Tales of a Shaman's Apprentice* (1994); *The Shaman's Apprentice*, a children's book with Lynne Cherry (1998); and *Medicine Quest: In Search of Nature's Healing Secrets* (2000).

## DISCUSSION

Plotkin was interviewed in 1998 by *South American Explorer* magazine, just after the release of *Tales of a Shaman's Apprentice* and the IMAX movie *Amazonia*. In the book, he stated that he saw wisdom in both traditional and Western forms of medicine:

No medical system has all the answers—no shaman that I've worked with has the equivalent of a polio vaccine and no dermatologist that I've been to could cure a fungal infection as effectively (and

inexpensively) as some of my Amazonian mentors. It shouldn't be the doctor versus the witch doctor. It should be the best aspects of all medical systems (ayurvedic, herbalism, homeopathic, and so on) combined in a way which makes health care more effective and more affordable for all.<sup>[15]</sup>

A great deal of information about the traditional uses of plants is still intact with tribal peoples.<sup>[16]</sup> But the native healers are often reluctant to accurately share their knowledge to outsiders. Schultes actually apprenticed himself to an Amazonian shaman, which involves a long-term commitment and genuine relationship. In *Wind in the Blood: Mayan Healing & Chinese Medicine* by Garcia et al. the visiting acupuncturists were able to access levels of Mayan medicine that anthropologists could not because they had something to share in exchange. Cherokee medicine priest David Winston describes how his uncle would invent nonsense to satisfy visiting anthropologists.<sup>[17]</sup>

Another scholar, James W. Herrick, who studied under ethnologist William N. Fenton, in his work *Iroquois Medical Ethnobotany* (1995) with Dean R. Snow (editor), professor of Anthropology at Penn State, explains that understanding herbal medicines in traditional Iroquois cultures is rooted in a strong and ancient cosmological belief system.<sup>[18]</sup> Their work provides perceptions and conceptions of illness and imbalances which can manifest in physical forms from benign maladies to serious diseases. It also includes a large compilation of Herrick's field work from numerous Iroquois authorities of over 450 names, uses, and preparations of plants for various ailments. Traditional Iroquois practitioners had (and have) a sophisticated perspective on the plant world that contrast strikingly with that of modern medical science.<sup>[19]</sup>

Researcher Cassandra Quave at Emory University has used ethnobotany to address the problems that arise from antibiotic resistance. Quave notes that the advantage of medical ethnobotany over Western medicine rests in the difference in mechanism. For example, elmleaf blackberry extract focuses instead on the prevention of bacterial collaboration as opposed to directly exterminating them.<sup>[20]</sup>

Many instances of gender bias have occurred in ethnobotany, creating the risk of drawing erroneous

conclusions. Anthropologists would often consult with primarily men. In Las Pavas, a small farming community in Panama, anthropologists drew conclusions about the entire community's use of plant from their conversations and lessons with mostly men. They consulted with 40 families, but the women only participated rarely in interviews and never joined them in the field. Due to the division of labor, the knowledge of wild plants for food, medicine, and fibers, among others, was left out of the picture, resulting in a distorted view of which plants were actually important to them.<sup>[21][22]</sup>

Ethnobotanists have also assumed that ownership of a resource means familiarity with that resource. In some societies women are excluded from owning land, while being the ones who work it. Inaccurate data can come from interviewing only the owners.<sup>[23]</sup>

Other issues include ethical concerns regarding interactions with indigenous populations, and the International Society of Ethnobiology has created a code of ethics to guide researchers.<sup>[24]</sup>

Ethnomedicine is a study or comparison of the traditional medicine based on bioactive compounds in plants and animals and practiced by various ethnic groups, especially those with little access to western medicines, e.g., indigenous peoples. The word *ethnomedicine* is sometimes used as a synonym for *traditional medicine*.<sup>[1]</sup>

Ethnomedical research is interdisciplinary; in its study of traditional medicines, it applies the methods of ethnobotany and medical anthropology. Often, the medicine traditions it studies are preserved only by oral tradition.<sup>[1]</sup> In addition to plants, some of these traditions constitute significant interactions with insects on the Indian Subcontinent,<sup>[2][3]</sup> in Africa, or elsewhere around the globe.

Scientific ethnomedical studies constitute either anthropological research or drug discovery research. Anthropological studies examine the cultural perception and context of a traditional medicine. Ethnomedicine has been used as a starting point in drug discovery, specifically those using reverse pharmacological techniques.

Ethnopharmacology is a related field which studies ethnic groups and their use of plant compounds. It is linked to pharmacognosy, phytotherapy (study of medicinal plants) use and ethnobotany, as this is a source of lead compounds for drug discovery.<sup>[4]</sup> Emphasis has long been on traditional medicines, although the approach also has proven useful to the study of modern pharmaceuticals.<sup>[5][6]</sup>

It involves studies of the:

1. identification and ethnotaxonomy (cognitive categorisation) of the (eventual) natural material, from which the candidate compound will be produced
2. traditional preparation of the pharmaceutical forms
3. bio-evaluation of the possible pharmacological action of such preparations (ethnopharmacology)
4. their potential for clinical effectiveness
5. socio-medical aspects implied in the uses of these compounds (medical anthropology).

## RESULTS

The medical ethnobotany of India is the study of Indian medicinal plants and their traditional uses. Plants have been used in India for treatment of disease and health maintenance for thousands of years, and remain important staples of health and folk medicine for millions. Indians today utilize plants for both primary medical care (principally in Rural and underserved areas) and as supplementary treatment alongside modern medical science. It is estimated that 70% of rural Indians use traditional plant based remedies for primary healthcare needs.<sup>[1][2]</sup> This reliance of plants for medicine is consistent with trends widely observed in the developing world, where between 65% and 80% of people use medicinal plant remedies.<sup>[3][4]</sup>

Herbal medicine in India is largely guided by folk medicine, both in codified cultural practices shared widely (Ayurveda,<sup>[5]</sup> Siddha, Unani), and highly localized practices unique to individual tribes or tribal groups (Adivasi). Between 3,000<sup>[6]</sup> and 5,000<sup>[7]</sup> species of medicinal plants grow in India with roughly 1,000 threatened with extinction.<sup>[7]</sup> Of these, more than 2,400

plant species have been documented for medicinal use.<sup>[2][8][9]</sup>

Ayurveda practitioners believe certain plants can restore balance distorted by disease.<sup>[5]</sup> The vast majority (90%) of Ayurvedic remedies are plant based.<sup>[11]</sup>

Although firmly rooted in folk medicine, Ayurvedic herbal remedies have been evaluated by laboratory and clinical studies to evaluate treatment efficacy. Some plants used in Ayurveda have biologically active secondary metabolites with potential value.<sup>[12]</sup> Other remedies do not have established therapeutic value, and some may have deleterious health effects.<sup>[12]</sup>

At least 700 plants have been identified from Ayurvedic medicinal systems. Although more than 12,000 Sanskrit plant names have been identified in classical Ayurvedic texts (including samhitas and nighantus) there is great difficulty in establishing exact botanical identities of many referenced species.<sup>[13]</sup> Plants are prepared according to tradition, utilizing specific plant parts as indicated in historical texts.<sup>[11][5]</sup> Ayurvedic belief stipulates that certain plant parts (e.g. leaf, flower, root) have specific properties key to treating disease.<sup>[14]</sup>

Ayurvedic medicine is guided by a complex set of cultural, religious, and textual practices. Despite diversity in its application and practice, it operates as a codified system of folk medicine with a coherent methodology. Broadly speaking, Ayurvedic practitioners evaluate plants for medical use by examining 5 purported physical and energetic properties:

1. *Rasa* - taste or "essence"- broadly categorized into sweet (*madhura*), sour (*amla*), salty (*lavana*), pungent (*kaṭu*), bitter (*tikta*) or astringent (*kaṣaya*).
2. *Vīrya* - effect on metabolism or body temperature
3. *Vipāka* - effects on digestion
4. *Prabhāva* - unique properties inherent to the plant
5. *Karma* - therapeutic action (e.g. digestive, stimulant, purgative)<sup>[5]</sup>

In the Western Himalayas, Ladakh contains the nomadic mountain Changpas with agricultural Laddakhis, Dardi, and Balti peoples inhabiting valleys. Kashmir Valley (Jammu & Kashmir) and the Pirpanjal valley (Jammu & Kashmir, Himachal Pradesh) are inhabited by Kashmiris, Gujjars, and Bakkarwal peoples. The Central Himalayas (Uttarakhand) contain the agriultural Paharis in valley regions and the Tibetan-speaking Bhotiya peoples in the mountains. The Paharis are a diverse group are also found in Kashmir.

Between 4,000 and 5,000 plants are reported in the Western and Central Himalayas. Surveys have identified 1,338 medicinal plant species specifically from the state of Uttarakhand, 948 species from Jammu & Kashmir, and 643 species from Himachal Pradesh

## CONCLUSIONS

Richard Evans Schultes (*SHULL-tees*;<sup>[1]</sup> January 12, 1915 – April 10, 2001) was an American biologist. He may be considered the father of modern ethnobotany. He is known for his studies of the uses of plants by indigenous peoples, especially the indigenous peoples of the Americas. He worked on entheogenic or hallucinogenic plants, particularly in Mexico and the Amazon, involving lifelong collaborations with chemists. He had charismatic influence as an educator at Harvard University; several of his students and colleagues went on to write popular books and assume influential positions in museums, botanical gardens, and popular culture.

His book *The Plants of the Gods: Their Sacred, Healing, and Hallucinogenic Powers* (1979), co-authored with chemist Albert Hofmann, the discoverer of LSD, is considered his greatest popular work: it has never been out of print and was revised into an expanded second edition, based on a German translation by Christian Rätsch (1998), in 2001.<sup>[2]</sup>

Schultes was led to study psychoactive drugs by Heinrich Kluver, a leading scholar of this subject (personal communication from Schultes). This interest evolved by way of Schultes' field observations on peyote, studying the peyote cult among the Plains Indians in his travels with Weston LaBarre in the early 1930s (in 1938, LaBarre based *The Peyote Cult* on these travels and observations).

In Western culture, Schultes' discoveries influenced writers who considered hallucinogens as the gateways to self-discovery, such as Aldous Huxley, William Burroughs and Carlos Castaneda.<sup>[1][5]</sup> Although he contributed to the psychedelic era with his discoveries, he personally disdained its proponents, dismissing drug guru and fellow Harvard professor Timothy Leary for being so little versed in hallucinogenic species that he misspelled the Latin names of the plants.<sup>[1]</sup> When Burroughs described his ayahuasca visions as an earth-shaking metaphysical experience, Schultes famously replied, "That's funny, Bill, all I saw was colors."<sup>[1][4][5]</sup>

Schultes' personal hero was Richard Spruce, a British naturalist who spent seventeen years exploring the Amazon rainforest.<sup>[1]</sup>

Schultes, in both his life and his work, has directly influenced notable people as diverse as biologist E.O. Wilson, physician Andrew Weil, psychologist Daniel Goleman, poet Allen Ginsberg, ethnobotanist, conservationist and author Mark Plotkin, and authors Alejo Carpentier, Mary Mackey, and William S. Burroughs. Timothy Plowman, authority on the genus *Erythroxylum* (coca) and ethnobotanist, and Wade Davis were his students at Harvard.

## Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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