The Importance of Ethnobotany in Environmental Conservation

NUMEROUS DEFINITIONS OF ETHNOBOTANY exist. The widely employed and simplest definition explains it as the study of the knowledge and use of plants in primitive societies in the past and present.

In view of the many fast-developing specific subdivisions of this interdisciplinary field, it seems necessary to adopt a wider definition. A more inclusive definition might be: the study of the uses, technological manipulation, classification, agricultural systems, magico-religious concepts, conservation techniques and general economic and sociological importance of plants in primitive or pre-literate societies.

Ethnobotany is certainly not new. The earliest humans must have been incipient ethnobotanists. It began when man first of necessity classified plants: those of little or no utility; those which were useful in many practical ways; those alleviating pain or otherwise ameliorating illness; and those that made him ill or killed him. He must have wondered at the unworldly effects of the few psychoactive species, and he could explain their extraordinary properties only by assuming that they were endowed with spiritual power from supernatural sources. It has been proposed that man's early experiences with hallucinogens was a principal factor leading to the origin of religious concepts.

It was not long before the knowledge and manipulation of the properties of plants became associated with certain individuals, and these early medicine men or shamans ultimately acquired great powers. This endowment continues to-day in most, if not all, primitive societies where this specialist is the repository of vast knowledge of plants and their properties and is privy to the secret and superstitious rituals connected with their use. However, many members of the general population in primitive societies are conversant with the properties of their food, medicinal and other plants of daily use. Many indiginous groups around the world—the Indians of the Amazonian regions, for example—are literally masters of their ambient vegetation as a result of inherited knowledge.

This knowledge—of great potential value to humanity as a whole—is unfortunately doomed to extinction with the rapid acculturation and westernisation in many parts of the globe where indiginous peoples can still live peacefully without disruption, from road-building, airstrips, missionary pressure, warfare, tourism, industrial penetration, dam-building, local greed on the part of settlers or various efforts to "civilise" the natives. The loss of this knowledge, and of the natives themselves, will be a grave hindrance to progress in many aspects of environmental conservation. Realization of the seriousness of this impending loss has given rise in recent years to the need for ethnobotanical conservation.

One example of the value to conservation of ethnobotanical knowledge of the natives lies in the study of their acquaintance with the properties of bioactive plants and their numerous subspecific variants or ecotypes. Although techniques of ethnobotanical research will differ according to the kind and condition of culture of the aboriginal people and the type of ecology in which they live, there seems to exist an underlying similarity in the relationship of ethnobotany to environmental conservation. I shall use examples from my work in the past 47 years in the Colombian Amazonia, since this relationship is clearly manifest in my studies of the medicinal, toxic and rubber yielding plants of this north-western corner of the great Amazon Valley.

The Amazon basin supports the world's largest rain forest, 2,700,000 square miles, with an estimated 50,000 to 80,000 species of higher plants or perhaps 15% of the world's flora. The number or species and their diversity increases towards the westernmost part of the hylaea. The Colombian sector, protected from easy penetration by rapids and waterfall in most of its rivers, has not suffered the extensive acculturation and wanton environmental devastation that many other parts of the basin have had and are experiencing. Furthermore, the Colombian government have wise and stringent programmes directed towards environmental conservation. The 70,000 Indians in 50 ethnic groups speak a mosaic of languages classified into more than 12 linguistic families. Their knowledge and use of medicinal and toxic plants is outstanding; during my field work since 1941, I identified 1500 species in 596 genera in 145 plant families; and I am certain that I missed many.

A major contribution that ethnobotanical research offers concerns biodiversity. Many, if not most, have local variants or ecotypes. Botanists seeking diversity find it advantageous to utilise the perspicacity of the Indians in recognising slight, often hidden, differences in these variants. Several examples of cultivated plants may be cited.

The peach palm, *Guilielma speciosa,* produces a highly nutritious fruit. Unknown in the wild, it is widely cultivated throughout tropical America. Recently, a programme of germ plasm collection discloses an extraordinary range of diversity. In one region of the Colombian Amazonia, for example, Tanimuka and Yukuna Indians cultivate clones with unusually large, seedless fruits and lacking the normal stout spines on the trunk which makes harvesting much easier. The great value to genetic programmes of these rare clones of the Indians is obvious.

The pineapple, *Ananas comosus,* is another example. The Witoto Indians of Columbia cultivate and have names for more than 12 clones with fruit of varying sizes but with exceedingly tender and sweet flesh. The pineapple-growing industry might well make collections of this unusual biodiversity in the Rio Igaraparana region.

In 1876, the British domesticated *Hevea brasiliensis,* the world's now principal source of natural rubber. The first seeds came from the eastern Amazon. Most of the extraordinary improvements that have been made in these 115 years have been carried out on clonal descendants of the originally introduced ecotype. This species exists in a vast area south of the Amazon River. There are numerous local ecotypes, some of which are, in many characters, superior to the eastern ecotype. Ethnobotanical knowledge from native rubber tappers has been of extreme value to botanists seeking biodiversity in this major economic plant.

There are nine other species of Hevea, each with its different type of latex and each with local ecotypes. Modern programmes of hybridisation might well utilise some of the variants of these other species. The expanding plastics industry often needs what they call "fillers," *i.e.,* latexes to mix with new plastics to alter physical characteristics.

There are real enigmas which botanists cannot easily explain in the Indian recognition of "kinds" or "strains" of wild species which offer no morphological or otherwise tangible differences but which are well established and named in the native classifications. And this skill on the part of the aborigines is manifest not only to their useful and cultivated species but to wild plants, even many which are devoid of utilitarian significance. Two examples—yoco and yaje—will illustrate this extraordinary native ability to distinguish what we may call "hidden" diversity in plant species.

Yoco (*Paullinia Yoco*) is a large, sapindaceous forest liana of the westernmost Amazonas of Colombia and Ecuador. Numerous tribes use a drink prepared from its bark as a strong stimulant. It has a high content of caffeine: 3% caffeine. A gourdful of the drink is taken upon rising in the early morning, and no food is eaten until 10 or 11 o'clock. The stimulant effect is rapidly felt. Pieces of the liana may be taken on fishing or hunting trips instead of food.

There are at least 14 different named variants of the yoco plant. The most common are *yoco blanco* and *yoco colorado,* but some of the others are *yoco de tigre, yoco de brujo, po-yoco, taruco yoco* and *yoco yajé.* The natives can, with no hesitation, name a liana at a distance without cutting, feeling, smelling or tasting the bark, without looking at the leaves which are usually high in the tree tops; several variants growing nearby show that the differences cannot be ascribed to soil or other ecological factors, such as shade or sunlight; age or size of the trunks of the liana seem not to be an element. I have tested the perspicacity of the Indians in different tribes and have rarely found them hesitant, doubtful or in error. And natives living at appreciable distances from one another and in different tribes will identify these many variants with amazing consistency.

The forest liana *Banisteriopsis Caapi* of the Malpighiaceae, source of a potent

hallucinogen widely employed in the western Amazonia in native ceremonies, is a drink prepared from the bark in various ways. It is known as *yajé, ayahuasca* and *caapi.* The plant is often cultivated in medicine men's gardens, but the wild material is considered to be stronger in its effects and is preferred.

Little was known of the source of this important hallucinogen, until Richard Spruce, the famous British plant explorer of the Amazon and Andes identified its source with voucher specimens in 1853.

We have a list of some 30 epithets designating the recognised variants known to the Indians. Each name indicates a special type of the liana, most of which the natives can identify at a distance, but with no morphological differences that a botanist might use for a subspecific determination. Some studies of this peculiar aboriginal ability have been offered, but no satisfactory explanation seems acceptable.

What is even more significant from the viewpoint of biodiversity is their ability to use these "kinds" of the liana to prepare drinks of different strengths or in connection with the varieties of ceremonies, dances or magico-religious needs or for whatever the partaker wishes to kill in the hunt.

There is a further example of the Indian perspicacity of plant diversity in connection with the use of hallucinogens. The drink prepared from *Banisteriopsis Caapi* is hallucinogenic without additives, as the plant contains beta-carboline alkaloids. Many other plants, some themselves toxic, may frequently be added to the drink to increase the bioactivity, lengthen the intoxication or for other purposes.

Two plants are most often employed as additives: the leaves of *Diploptera Cabrerana,* locally known as *oco-yajé* or *chagropanga* and *Psychotria viridis,* called *chacruna;* the former belongs to a genus allied to Banisteriopsis; the second is a member of the Rubiaceae. Each of these two additives contain another type of bioactive alkaloid, the tryptamines. Tryptamines are bioactive only when ingested with a monoamine oxidase inhibitor. The bark of the main ingredient, *Banisteriopsis Caapi,* has in its beta carboline alkaloid content the needed monoamine oxidase inhibitor.

How did these natives with not even minute knowledge of plant chemicals find in 80,000 species these two that contain alkaloids that, when taken with a proper activate contain alkaloids that increase and lengthen the basic bioactive drink?

In conclusion, perhaps these few examples of the intensely thorough indigenous familiarity of the intricately meticulous individuality of species in one of the world's richest floras may serve to encourage the use of Indian help in searching out the often hidden biodiversities from the forests. Biological diversity

of subspecific categories are often not easy for specialists, even trained botanists, to discern. Ethnobotanists, taxonomists, geneticists, agronomists and others would do well to utilise the familiarity and knowledge before it is forever lost.

These aspects of the knowledge of peoples in primitive societies indicate how very valuable this asset of ethnobotanical investigation can be to the benefit of all of mankind, of academic as well as practical use of the world's flora, particularly the tropical rain forests which make up by far the greatest portion of the 500,000 species of higher plants.

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Managed Faculty Writings

THE INCREASE IN JOURNAL PRICES, largely engineered by for-profit publishers, and the capabilities of computers, have caused a management group, The Association of American Universities, in cooperation with a body of administrators, the Association of Research Libraries, to ponder possible changes in the conduct and ownership of scholarly publishing. Their report is due in April.

This matter has been reported upon by *The Chronicle of Higher Education* ("Remaking Scholarly Publishing," by Thomas J. DeLoughry, Dec. 15, 1993, and in Letters to the Editor Dec. 1, 1992 among other associated articles).

Faculty members would be well-advised to take notice expeditiously of the implications of changes in these matters. Rice bowls may be cracked and the nature of the professional life remarkably changed! Two sentences from the article may serve to raise concern and lead to the requisite intelligent, informed and careful consideration by faculty groups.

Copyright experts note that the question of who owns the rights is an ambiguous one on many campuses. While many faculty members consider the rights to be theirs, experts on copyright law say that universities could make a compelling case that they own works of scholarship under the 'work for hire' provisions of the Copyright Act.

The associated question of the editorial process, or its lack, under electronic publication is also a matter that needs examination and appreciation.

F.C.G.