Chapter 1
History and Concepts

John William Harshberger, an American, formally designated the term "ethnobotany" in 1895. In an article published in 1896 (entitled *The purposes of ethnobotany*), Harshberger considered that ethnobotany could help to elucidate the cultural position of the tribes that use plants for food, shelter, or clothing, and that such elucidation, in turn, could clarify the problem of distribution of plants. Harshberger posited that it would be possible to understand an entire culture from how it made use of plants, but this idea has been rejected by many researchers, since the relationship with nature is only one component of a complex cultural system. Today we understand that the use and knowledge of plants as a part of complex social-ecological systems[1] can help us understand how we relate to nature and how this relationship evolves in time and space.

However, long before Harshberger, data on the use of plants for different cultures were employed in studies of the origin and distribution of cultivated plants. Here we can highlight the work of Alphonse De Candolle, published in 1886 (*Origin of cultivated plants*), an essential book for those interested in the issues of cultivated plants and ethnobotany. On that note, it must be said that the human being is—and was—an important agent of changing biodiversity, because it has always been dependent on nature for its survival. Manipulation of nature was historically employed not only to meet humans' most urgent needs but also to carry out other empirical or symbolic activities like magic, medicine, and rites that would manage their lives and maintain their social order. Many ethnobotanists try today to understand the implications of our use of nature on the ecology and evolution of species affected by this intervention.

[1] Here we understand social-ecological systems as a product of the intimate relationship between two systems: the sociocultural, formed by the knowledge, practices, and values of a human group; and the ecological, composed of living beings and their relationships. See: Berkes and Folke (1998).

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For a long time, under the influence of Harshberger's definition, ethnobotany was understood as encompassing the use of plants by aborigines. From the mid-twentieth century, it began to be understood as the study of the interrelations between primitive people and plants, adding a cultural component to its approach because of the increasing engagement of professionals in the human sciences. However, the idea of "primitive" peoples still suggested a strong component of ethnocentrism. Currently, the definition of ethnobotany has been expanded, extending its field of research to the study of both traditional populations as urban-industrial societies, and nontraditional populations as rural societies, concerning itself with the relationship between human populations and the botanical environment. With this expansion and with the collaboration of cultural anthropology and other sciences (phytochemistry, ecology, economics, linguistics, history, and agronomy), there was an even greater diversification of objectives and methods. Therefore, it no longer makes sense to say that ethnobotany is interested exclusively in so-called traditional peoples—an expression that, in fact, has generated much controversy among ethnobotanists, since the concept of "traditional" can evoke different interpretations. Among these interpretations, some researchers advocate that the term "traditional" refers to an idea of immutability as if such knowledge is not altered over time. In light of this interpretation, some scientists prefer to use the term "local" as a replacement for the term "traditional" (see Alves and Albuquerque 2010). However, this new term is not exempt from criticism, since, for some, the term "local" may give the impression that this knowledge is restricted to a location, when in fact elements of this knowledge are often distributed among various populations in scales larger than the local.

Ethnobotany is part of the broader field of ethnobiology, a discipline that includes the study of direct interrelations between humans and biota, among other things. That is to say, it is the study of knowledge and concepts developed by any culture on living organisms and biological phenomena. This field of study is vast, and ethnozoologists, ethnoecologists, ethnomycologists, ethnobotanists, and other professionals can operate within it.

It is very common to associate ethnobiology with the study of indigenous societies. However, as we have discussed, this historical limitation was imposed by early ethnographic and anthropological reports. Today, the amplitude of the field allows us to realize various other approaches, and we are armed with an appropriate theoretical framework. A good example is the cults of African origin in Brazil, which have also been targeted by ethnobiological investigations, particularly by ethnobotanists (see Voeks 1997, 2013). Another example of a field that is gaining prominence is urban ethnobotany, which includes ethnobotanical studies of urban gardens (Corlett et al. 2003), ethnobotany in the context of migration toward urban centers (Ceuterick et al. 2008, 2011; van Andel and Westers 2010), and ethnobotany in markets and fairs (Bussmann et al. 2016).

Ethnobotany has been given various definitions over time, each reflecting the academic background of its proponents. Being an interdisciplinary field (according to the vision of different authors), it is perfectly natural for this to happen. For the

American Richard E. Schultes (1995), ethnobotany has existed since the beginning of humanity's written history, being recognized as a scientific discipline only in the last 100 years. In recent decades, because of global conservation efforts, it has grown rapidly as a theoretical and practical branch of botany.

We agree in part with the idea of Schultes. Undoubtedly, the relationship between humans and plants is as old as humanity itself. However, we recognize that ethnobotany is a science of recent origin, since it was formally defined only in 1895, and that its recency affects our study of this relationship (see Harshberger 1896). Therefore, in our view, it makes no sense to speak of "ethnobotanical knowledge of the people x" since the person who produces ethnobotanical knowledge is a scientist or researcher who studies the relationship between a particular culture and the plants of its environment.

Leaving aside any debate about it, there is a tendency to consider ethnobotany as a natural ethnoscience that is still in the midst of progressing methods and theory. However, nothing could be more mistaken, since ethnobotany has proven over time that it is an independent science, like ethnobiology in general, and therefore can establish relationships with various disciplines. We will explain this in more detail later, but now the aim is to understand a little more of this relationship with ethnoscience.

Ethnoscience studies the way the world of experience is rated by a culture. We can mention, for example, the way people classify colors, objects, and nature. The first ethnoscientists had the pretension to understand a whole culture based on this study, an assertion that became the target of very harsh criticism from anthropologists. There is still a tendency for some researchers to include ethnobotany as a subspecialty of cultural anthropology. The fact is that ethnobotany has progressed to position itself well within the realm of botany, which lent it special characteristics, despite its interdisciplinary nature and its diversity of objectives that allows for the contributions of researchers with different backgrounds.

Albuquerque (2005) considers ethnobotany to be *the study of the interrelationship between people of* ***living cultures*** *and the plants of their environment*. Cultural and environmental factors, as well as any culture's concept of plants and the use that is made of them, combine with this definition. We believe that *indirect* interrelationships are also important for ethnobotanical research. For example, the use or management of useful species by a human group can indirectly affect the distribution of other species in the vegetation; the hunting of a seed dispersal animal by people could affect the dispersion of a plant species not useful for humans. These are some examples that demonstrate the importance of understanding also the indirect consequences of people's actions on plants (Fig. 1.1).[2]

The above definition, dear reader, although it is still not ideal, meets our current needs. We made a point of emphasizing living cultures for a theoretical and conceptual understanding. This is because the study of past cultures' interactions with the

[2] For the reader to better understand the consequences, see the theory of niche construction applied to ethnobiology by Albuquerque et al. (2015a, b).

Fig. 1.1 Ethnobotany focuses on studying how human beings interact with plants. Credits: Gustavo Soldati

world's plants becomes the domain of archaeoethnobotany (others prefer to use the term paleoethnobotany), which, besides using different analytical methods for interpretation, obtains its information from archaeobotanical[3] explorations (see Mercuri et al. 2010). In Brazil, there are few studies that deal with this subject, while in countries like Mexico and Argentina, archaeoethnobotany has developed considerably, using plant remains and other resources to reconstruct, for example, histories of food and food processing, old subsistence activities, rituals, and weaving, and also providing important information on the spread and domestication of plants. Such explorations allow the collection of extremely important data on the culture in question, since plants have always been important in the social and religious activities, agriculture, and mythology of any society. A review of the main approaches and methods used in paleoethnobotany and archeoethnobotany can be found in VanDerwarker et al. (2015).

[3] Archaeobotany is the study of the remains of plants from archaeological contexts. In a biological perspective, it can be defined as the study of plants in contexts affected by human factors.

Historical ethnobotany also addresses the knowledge and use of plants in the past; however, the analysis of written records acts as the main tool (Box 1.1).

Box 1.1: The Plants Used in the Nineteenth Century Recorded in Historical Documents

We selected an article by Medeiros and Albuquerque (2012), published in the *Journal of Ethnopharmacology,* to illustrate a study of historical ethnobotany. The study evaluated the prescriptions book of Dr. Joaquim Jerome Serpa containing information on medicine prescription to patients in the Monastery of St. Benedict (City of Olinda, State of Pernambuco, NE Brazil) between the years of 1823 and 1829. The abovementioned doctor was a surgeon who was directing the monastery hospital in the period in which he wrote the book and, as with several of the doctors of the time, had training in botany and gained important knowledge about medicinal plants.

Medeiros and Albuquerque transcribed Dr. Serpa's book and recorded the popular names of plants mentioned in it. This information was crosschecked with medical literature data of the time to identify the scientific names possibly related to the vernacular. The "possible species" were classified according to their origin in the Americas, whether native or exotic. The uses attributed to plants or plant parts that have been prescribed are also reported.

The survey found that 23% of prescriptions contained some plant material. Seventy-two species were identified in Dr. Serpa's manuscript. The vast majority of these species were not native to the Americas, considering that the doctors of the time usually studied in European universities and ended up incorporating the plants used there in their medical practice in Brazil.

The main applications of the plants described in the book were as tonics; stimulants or excitants; antipyretics, diaphoretics or sudorifics; laxatives; emollients; and antispasmodic. The authors also found that the roots, perhaps because of the longer storage potential, were the most prescribed part of the plants.

However, the inclusion of living cultures in the definition remains controversial because (1) many researchers believe that archeoethnobotany and historical ethnobotany are part of ethnobotany, and (2) even living cultures can be investigated under the perspective of archaeobotany, for example, if they are observed from an archaeological perspective. Cultures that are very old and still survive and can be targeted both by ethnobotanical and archeoethnobotanical investigations (Box 1.2) can stand out in this sense.

Box 1.3 offers other views on the relationship of ethnobotany with other sciences, from the understanding of Argentine researcher Julio Hurrell (1987).

Box 1.2: Plant Remains in Archaeological Research

The literature related to archaeoethnobotany is still not extensive. On the one hand, there are methodological and instrumental difficulties in conducting this type of study. On the other hand, there are studies with similar approaches, but that identify themselves "paleoethnobotany" or even "archaeobotany" (in the latter case the archeobotanists' studies on useful plants fit).

Among the works that directly use the term "archaeoethnobotany," it is possible to highlight the study of Kaplan (1963) published in *Economic Botany*. The study identifies the plant species found in the cave of Cordova (New Mexico, USA), a site of human habitation between 300 BC and 1100 AD. These are remaining fragments of plant material that were taken to the cave during the time it was inhabited.

Among the most common plant species in the cave, *Cucurbita foetidissima* Kunth, fragments of the exocarp of the fruit of this species were very common in the cave and there were indications in the literature that the fruits and seeds of *C. foetidissima* were eaten by US Southeast Indians.

Other species often found were *Lagenaria siceraria* (Molina) Standl. (calabash exocarp), *Juglans major* (Torr.) A. Heller (walnut), and *Zea mays* (cobs).

Box 1.3: Ethnobotany and Its Relationship with Other Sciences

Ethnobotany as a field of botany

The meeting of ethnobotany with botany began occurring since the first definitions of this field of study. The definition of ethnobotany given by J. W. Harshberger in 1895, as relevant to the study of plants used by Aborigines, for example, shows a strong component of botany. The focus is on the description of plants useful to human groups. In the first half of the twentieth century, this approach gains strength for having practical implications for the discovery of plant resources with economic potential (for pharmaceutical and timber industries, for example), which has characterized the field of economic botany. Even though other ethnobotanical approaches have emerged over time, currently this first approach can be found in studies that focus on a descriptive proposal where results are presented mainly as a list of plants known to a particular human group, along with their uses, parts used, application methods, and other characteristics. Some researchers consider that, although studies that only employ plants surveys are important, such an approach has contributed very little to the theoretical and methodological growth of ethnobotany.

Ethnobotany as a field of anthropology

The union of ethnobotany and anthropology occurred when the study of the relationship between people and plants captured the interest of anthropologists concerned with understanding cultural aspects of human groups. In this approach, the study of plants becomes important for understanding the role of these plants for a culture. Thus, this anthropological approach to ethnobotany would seek to use plants for describing a particular culture, since the use of plants is of great importance for many human groups. However, this approach has been criticized, because describing or understanding a culture on the basis of plants would be a particularly complicated task, given the difficulty of understanding the whole culture by studying useful plants, which represent only one of its parts.

Ethnobotany as an ethnoscientific discipline

This approach also consists of a union of ethnobotany with anthropology, but there is a difference. The aforementioned approaches study the relationships between people and plants without necessarily considering the minds of the people themselves about their culture. A study ruled by previous approaches, for example, could select useful plants within a human group and identify and classify these plants from a scientific point of view. However, a study using the ethnoscientific approach could verify the way the people of a culture themselves identify and classify the plant resources of the environment. Here, ethnobotany relates to the ethnosciences and can be described as a line of research that studies the understanding of people about their own culture. Thus, ethnobotanical studies from this approach seek to understand how people name and classify the plants in the environment from their own classificatory logic. This type of ethnobotanical study became known as studies of folk classification, ethnotaxonomy, or even folk taxonomy.[4]

Ethnobotany as an integrative or synthesis science

According to the three previous approaches, ethnobotany studies the relationship between people and plants. However, they differ in the sense that the research mainly focuses on one of these two components of the relationship (people or plants). In the first approach (of ethnobotany as a field of botany), for example, the focus of research is the useful plant; in the second approach (the meeting of ethnobotany with ethnography), the focus is on culture, that is, on the cultural aspects that can be described from the useful plants; in the third approach (the meeting of ethnobotany with ethnoscience), the focus is to understand the way the people belonging to a particular culture apprehend the plants they use.

(continued)

[4] Still, in this book, we present the folk taxonomy studies in the chapter on classical approaches in ethnobotany.

Box 1.3: (continued)

In this fourth approach, however, the focus is not directed on any of these parts, but on the relationship that is established between them. For example, the abundance of certain species of useful plants in a given landscape can be a product of the interaction of these plants with the human groups using them. Accordingly, the manner in which these relationships occur (such as management methods applied by individuals in the environment) leads to an increase or a decrease in the abundance of useful species. In summary, the focus here would not be plants or people, but the relationships between these components. Therefore, ethnobotany would be a science of synthesis that focuses on understanding these relationships, approaching theoretical scenarios of different disciplines, such as anthropology, ecology, pharmacology, and history, among others.

More recently, one of us and Dr. Julio Hurrell started to consider that ethnobotany could also be a part of ecology (Hurrell and Albuquerque 2012). From the epistemological point of view, when we study the relationship of the human species with the biota, we are trying to understand an ecological relationship. Over the years, many researchers have incorporated more ecological knowledge, whether theoretical or methodological, to understand these relationships.

Understand, therefore, that the way people relate to plants and the results of this relationship are things that ethnobotanical research can investigate, specifically by answering a few questions: what might plants indicate about the society that produced this knowledge? How do different cultures think about their biological world, especially the plants? And what does this world represent? What makes people select certain plants as useful to the detriment of others? And beyond these questions, from a historical and phytogeographical perspective, it becomes possible to recognize the distribution, origin, and diversity of plants that are affected by the human species.

In this sense, according to the concept of ethnobotany that we offer, we soon realize that this approach is an interactive analysis between two systems: the social (or cultural) and the ecological. The botanical knowledge developed by any society combines myths, divinities, spirits, chants, dances, and rites, so that the natural and the supernatural are part of a single reality. There are plant collection rites for medicinal or magical applications (Box 1.4); the designation and assignment of spirits or divinities to trees; divinatory practices; and propitiatory chants to, among other things, denote the healing or magic energy of the plant that is used for a particular purpose. A classic example is the mandrake (*Mandragora officinarum* L.), a plant species whose morphology (especially the root) resembles a human figure. In medieval societies, such similarity was responsible for a range of legends involving the species, among them that the mandrake screamed when it was removed from the soil, in a way to kill those who heard its scream. Thus, the mandrake was tied to a dog, so that the dog would die in place of the collector.

Box 1.4: The Use of Medicinal Plants in Healing Rituals in Northern Peru and Southern Ecuador

Researchers Rainer Bussmann and Douglas Sharon documented the use of medicinal plants by healers of northern Peru and southern Ecuador (Bussmann and Sharon 2009). The authors interviewed healers belonging to local groups and found that many plants indicated as medicinal are used in healing rituals. For example, about 40% of medicinal plants indicated by Peruvian healers are used in rituals for the treatment of "magic" diseases.

The authors observed that the main magical diseases that plants treat are (1) *mal aire*: a condition that is caused by spirits and affects mainly adults; (2) *mal viento*: disease caused by spirits, similar to the previous condition, but that affects mainly children; (3) *susto* or *espanto*, which occurs when a person is affected by a big scare; and (4) *inveja*: a condition that affects adults and is caused by envy of others.

Treatment of these conditions involves a set of practices with medicinal plants in healing rituals. Rituals occur mainly at the residence of the healer, which has healing altars (also called *mesas*) containing power objects such as stones, sticks, and other objects. In healing altars, one of the most important ceremonies involves spraying extracts of medicinal plants throughout the patient's body to achieve their purification. In ceremonies, the patient may also drink a juice containing the cactus 'San Pedro' [*Echinopsis pachanoi* (Britton & Rose) Friedrich & G.D. Rowley] in an attempt to "clean up" the patient.

Many investigations have encountered limitations related to the scientific researcher's mentality, perfectly in accordance with the prevailing thinking at the time they were developed: the primitivism and racial superiority. Note, reader, that some of the first notes about the interaction between people and plants came from ethnographic observations made by several researchers studying cultures considered to be "primitive." The great naturalist travelers also brought important reports of their explorations, highlighting, among other things, the habits and customs of the people they knew. In nineteenth-century Brazil, for example, the German Johann Baptist von Spix and Carl F. P. von Martius made notes of the use of plants by indigenous people. In seventeenth-century northeastern Brazil, the Dutch Guilherme Piso and Georg Marcgrave, long before the cited German naturalists, collected plants and recorded uses known by the Northeasterners, especially in Pernambuco and Paraíba (Medeiros and Albuquerque 2014).

At that time, therefore, the prevailing view was merely utilitarian, so that the interest was only to seek plants with potential applications for urban-industrial society. Thus, the study of how people were related to plants, as well as the symbols and local perceptions, was not part of the interest of ethnobotany.

In ethnobotany, researchers need to be shorn of the presumptions of cultural categories in order to better understand the culture that they observe. The emic and

its opposite (ethical) are derived concepts of anthropology. Such terms are adaptations of the terms "phonemic" and "phonetic" from sociolinguistics. In a simple way, an emic category is internal, produced and contemplated within the culture, that is, it is the view of the participants of that culture. The ethical, in turn, is external, that is, the scientist's point of view.[5] We discuss this because the speech that is passed from generation to generation through oral tradition is, among other things, a mechanism mobilized to rationalize and understand how all that is living (in our ethnobiological point of view) is sacred, along with food, medicine, and magic. The biological phenomena perceived by the ethnobotanist therefore often appear shrouded in mythological discourse and magical explanations. Because of this, many pieces of information have been discarded or neglected because they were considered naïve tales or legends. However, these legends may cover an experimentally verifiable biological reality. In medical preparations of folk medicine, there is an entire logic behind the local knowledge, which enables the effectiveness of the remedies that are used.

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It is possible to find some conceptual inconsistency in a good deal of research, especially in studies about medicinal plants based on data obtained from surveys of traditional communities. Generally, these works bring information such as species used, parts utilized, forms of use, indication, preparation methods, and dosage. There are numerous publications that label all these data within an ethnomedicine perspective. However, ethnomedicine studies lend themselves more properly to an anthropological perspective to understand the knowledge of and practices related to illness (Hughes 1968). Some researchers prefer therefore to use the anthropological expressions of the disease rather than the term ethnomedicine (Buchillet 1991). Therefore, it is possible to verify that this term is often used incorrectly, since work in ethnomedicine should be based on analyzing representations and practices associated with the disease, not just performing a simple collection of plants. In view of this, some researchers prefer to use the term "medical ethnobotany" when they want to specify that their ethnobotanical data refers exclusively to medicinal plants (Pake 1987). Moreover, ethnobiology faces a major challenge in this regard, because many researchers end up creating new terms by adding the "ethno" prefix, which leads to a great inflation of expressions, many of which are completely redundant and unnecessary (Alves and Albuquerque 2010).

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Returning to the conceptual question of ethnobotany, we should examine a point of view more widespread about this subject. Wade Davis (1986) explains that:

– *… I am an ethnobotanist.*
– *and what is it?*
– *something between an anthropologist and a biologist. We seek to discover new drugs from plants.*

[5] For a relevant and in-depth discussion of the distinction between emic and ethical, we strongly recommend the text of Batalha (1998).

Unquestionably, this is one of ethnobotany objectives: to study the use of plants for medicinal purposes in order also to offer practical elements for other researchers in the areas of phytochemistry and pharmacology, favoring the discovery of new drugs. For a long time, this goal guided ethnobotanical research, giving to science, in general, a great benefit. In the Amazon, the aforementioned researcher Richard E. Schultes could catalog hundreds of plants by coexisting with indigenous people for many years of research, bringing a valuable contribution especially with regard to hallucinogenic plants.

However, will it be just that, dear reader? No. The interactions or connections between people and plants do not occur only on the medical or therapeutic level. They also occur, for example, on the magical-religious level. In this case, the plants are useful for provoking visions of the spirit world, getting rid of bad luck, inducing well-being through various magic formulas, and embalming and mummifying corpses (as certain cultures used to do). Thus, ethnobotany is not limited to the study of medicinal plants, although this is the most studied subject in the field.[6]

We also highlight the role of psychotropics from plants in certain cultures. Within the network of beliefs that form the magic system, these plants, when properly used with all the necessary preparation and ritual handling, guide wizards or magicians in their advice and their divining practices. The plants guide them to perform their beneficent or maleficent magic, and all that concerns the individual and the community. The survival of the use of hallucinogenic plants, in the systems in which they operate, is only possible through a collective belief in the power of their plants and in the priest.

The plants integrate various situations from the utilitarian point of view. Wade Davis, for example, illustrates how some plants are used in West Africa. Many tribes used *Datura stramonium* L., such as the Hausa of Nigeria, who used the seeds to enhance the intoxicating effects of drinks used in rituals. It was also used in criminal poisonings, in which women fed this plant to beetles, harvesting their feces and using them to sacrifice unfaithful lovers. Many plants, either alone or in combination with other elements, may have played a role in the social regulation mechanisms of a society. This is because they begin to exercise some control over individuals, dictating norms and behavioral patterns, such as food taboos present in different cultures. That control was noted by Wade Davis in his ethnobiological studies in Haiti about the zombie poison.[7]

In Brazil, the use of "jurema" is notable as the ritual drink of some indigenous tribes, as well as the liquid concoctions of African-Brazilian cults. Despite the known presence of substances that can cause hallucinogenic effects in some plants, cultural factors may influence the feelings and perceptions according to the cultural and psychological expectations of those who use the plant. It was from the observation of the use of plants by indigenous people from the backlands of Pernambuco that the researcher Oswaldo Gonçalves Lima managed to isolate from the roots of

[6] See Oliveira et al. (2009) and Albuquerque et al. (2013).

[7] Recently we reviewed this interesting work of Wade Davis. See Albuquerque et al. (2012).

Mimosa tenuiflora (Willd.) Poir. (Synonym: *Mimosa hostilis* Benth.) ("jurema-preta") the DMT (*N*,*N*-dimethyltryptamine) responsible for the plant's psychopharmacological effects.

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The reader, by now, may have realized that to fully achieve their goals, ethnobotanical studies require an interdisciplinary approach, which allows for an understanding of all observed phenomena. Obviously, an inside view of the observed reality is necessary, integrating it without interfering with the dogmatized concepts carried by the researcher. In botany developed by other cultures, starting from the premise of the existence of a folk (or traditional) botanical knowledge, there is a visible effort to classify and record the plant domain for their rational use, that is, to achieve ordination of their plant community. In addition to the attention given to these factors, the ethnobotanist also records the popular names and ethnic denominations (any term given by a particular ethnic group) that make up the vernacular systems of which we will speak further.

Besides all this, in most cases, it is essential to collect the plant for its scientific determination and to assign the scientific name. In our view, when the intention of the study is, for example, to identify priority species for conservation or for new drugs, one study alone constitutes a significant contribution when, among other things, it provides taxonomic information.

Some available reports that specify the co-participation of people and plants in a given cultural, social, and historical context were not sufficiently complete, neglecting the scientific determination of the plant or making it invariably incorrect. This has limited the scope of the investigations, particularly those wishing to contribute to the discovery of new drugs (Bennett and Balick 2014; Albuquerque et al. 2014).

However, depending on the purpose of the work, the lack of taxonomic identification may not cause major problems. For example, it is not especially problematic if the topic of interest of the ethnobotanist is how the transmission of knowledge about medicinal plants occurs. In this case, plants are no longer the focus; instead, the most important component would be the process and not the plant itself.

The correct definition of the scientific name provides more data than would be imagined at first glance, allowing you to check the cross-cultural influences and underlying issues. This deeper understanding is the result of the predictive value of the binomial nomenclature, which allows for the recovery of all the information that has been linked to that species over the years. The coupling of a popular name to a species and a set of information that, decoded, expresses cultural or biological peculiarities cannot be conducted in a mistaken manner (Box 1.5).

Box 1.5: Problems Found in Ethnobotanical Studies Some studies assess possible biases in ethnobotanical research arising from problems in species identification. Ethnobotanical studies often fail to strictly follow the standard procedures to identify botanical material, which includes an adequate collection protocol, herborization, identification with the help of experts and reference material, and incorporation into an herbarium.

The study by Medeiros et al. (2013), published in the *Journal of Ethnopharmacology*, for example, used botanical identification as one of the criteria for classifying 126 Brazilian studies of medicinal plants according to their risk of bias (high, moderate, or low). In other words, they were classified according to their likelihood of presenting methodological problems that could compromise the reliability of the research results. The authors considered, for this particular criterion, that the lack of information about an identification process of the botanical material would cause the study to present at least a moderate risk of bias.

Furthermore, the percentage of plants identified to the species level was also used as a criterion for risk so that the study was classified as having a high risk of bias when fewer than 60% of the plants were identified, a moderate risk of bias when 60–80% of the plants were identified, and a low risk of bias when more than 80% of the plants were identified.

This factor, combined with sampling problems also evaluated in the study, meant that of the 126 studies considered, only 6 presented a low risk of bias and 28 presented a moderate risk, while the remaining were classified as presenting a high risk of bias.

Another study by Łuczaj (2010) sought to estimate the percentage of inadequacy identified in 45 Polish ethnobotanical studies. The errors of identification for studies that have not incorporated plant material in herbariums were accessed by: (1) observing whether the assessments made in the studies refer to the species that do in fact occur in the studied region and (2) paying attention to plants that have been assigned scientific names that diverge from the description that the study presents of the plant in question. The studies for which there was an incorporation of herbarium specimens were evaluated by observing the herbarium specimens themselves, in order to check whether they in fact corresponded to the scientific name attributed to them.

Although most studies have shown no detectable errors, there were cases in which, for example, 8 out of 85 taxa of a study were misidentified. In studies without incorporation of herbarium specimens an average of 6.2 taxa with identification problems was observed, while this average reached 9.2% for studies that deposited specimens in an herbarium (possibly because it is easier to detect misidentification once it is possible to access the material incorporated in the herbarium).

The result of this investigation is alarming, since for most of the studies included (for which there was no deposit in herbarium) the errors found may only represent the tip of the iceberg. Thus, other errors may exist that are not detectable by the method used in this investigation, which could reveal strong bias in ethnobotanical studies.

Let us see some examples. It has happened very frequently that, in conducting ethnobotanical inventories, some researchers collect many common names without taking care to collect the plant itself and carry out its scientific determination by an expert like a botanical taxonomist. Desiring to attribute a scientific name to the common name that was obtained, they might then seek out bibliographical sources (or more commonly, on the Internet) offering a name for the species. However, the same species can possess several common names, and the same common name can designate several species, depending on the region. Thus, the true species being studied is then obscured. What are the possible consequences of these inaccuracies? First, laboratory studies that are based on ethnobotanical inventories of plant material with identification problems may be wasting time that would be better applied to research on a plant that is in fact related to a local medicinal indication. Also, when the mistake of the scientific name is made under laboratory research, there is the risk of spreading false information about a plant when it is confused with the species that was studied in fact. In this case, it is possible that a species with a great medicinal potential is confused, for example, with another plant that has the same common name, but without the biological activity in question, which may lead to health problems ranging from the wrong treatment of a disease to serious cases of poisoning.

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Before we move forward, we would like to return to the definition presented by Wade Davis about what constitutes an ethnobotanist: *something between an anthropologist and a biologist. We seek to discover new drugs from plants.* Well, this definition may contain some truth, but it is not always so. This idea mistakenly generated the notion that the ethnobotanist will necessarily have classical training in anthropology or that all work in ethnobotany should include anthropology as a theoretical component. Today, at least in Latin America, most of the professionals who conduct research in this field come from the biological sciences. Few studies incorporate strong theoretical components of anthropology. The methodological tools used are essentially those from anthropology, combined with those from botany. However, theoretically, ethnobotanical research does not necessarily need anthropology, since it can make use of theoretical references from other sciences, such as ecology and evolution.

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