



The transit of plants: circulation of medical knowledge and practices in South America during the Modern Era

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Abstract

From records on plants and herbs made by doctors, healers, missionaries, and colonial administrators in the seventeenth and eighteenth centuries, this article explores ways of constructing knowledge about flora using the concept of circulation proposed by Kapil Raj. The distinct experiences and documents analyzed demonstrate the process of observing, collecting, systematizing, and circulating knowledge, and the influence of natural history and the Hippocratic tradition on the classification of herbs and plants and on the descriptions adopted in these texts. From printed books to notes scattered through travel diaries, usefulness of these species to humankind was the element valued by those who directly observed the potential of American plants, fruits, and herbs.

Keywords: circulation; history of plants; medical practices.

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Since the first voyages to the New World, the identification of products that could be used as commodities guided observations of plants in the Americas as well as their uses by native populations. Alongside species unknown to Europeans there were some that at times resembled plants from Europe and other places in terms of their shape, color, and scent: most notably, the spices of the East Indies. Construction of knowledge about flora occurs simultaneously as the market expands; the transit of goods and knowledge is part of a complex process of transforming plants into goods, and constructing knowledge about them played a central role in this process. According to Kopytoff (2008, p. 96), “from a cultural point of view, the production of goods is also a cognitive and cultural process: goods must not only be produced materially as things, but also signaled as certain kinds of things” (see also Raj, 2007a, 2007b).¹

The idea of circulation proposed by Kapil Raj opened up new possibilities for reflecting on the construction of knowledge in colonial areas of the New World during the Modern Era. One of its main contributions is to counter the premise that modern sciences have a fixed birthplace in Western Europe. On the contrary, the sciences constitute the movement of ideas, practices, objects, and above all interactions between individuals involved in the process of building knowledge in colonial areas. These individuals assume a leading role in Raj’s analyses because in his understanding, circulation is not synonymous with movement or transit but rather translates into the fact that the sciences are formed in a constant exchange between people, places, practices, artifacts, colonial areas, and individuals, who cannot be considered passive recipients but now play a role as producers of knowledge, even in a hierarchical and asymmetrical network. Still, Raj does not neglect to point out the role of European metropolitan institutions in making the data and results obtained flow back to them as a long process of ownership and accumulation.

Adopting the idea of circulation leads us to the understanding that science is a complex set of exchanges and mutations that can occur in very large spaces on a global scale, or in restricted places within a single institution, for example. In Raj’s (2007a, 2007b, 2013) analyses we are invited to think about the dynamics of markets and circuits of exchange as privileged loci where the paths and networks through which the sciences traveled the world during the Modern Era materialized. Finally, recalling that this scholar focuses on South Asia, when adopting this analytical model for societies in the Americas we should consider that these societies combine a wide variety of agents and circumstances that often reinforce hierarchies and asymmetries when we perceive the interactions between agents of the metropolis, settlers and, above all, individuals with plant-related knowledge among the indigenous peoples who do not dominate the literature (Gesteira, 2004b).

Even so, natural history writing from the sixteenth to the eighteenth centuries was an important reference for cataloging nature in the Americas in the various cases we observed in this analysis. Still marked by the model inherited from antiquity (mainly through the writings of Pliny and the Hippocratic tradition), through minutely detailed descriptions of a certain place natural history brought together new information about geography, climate, plants, animals, and people’s customs and their relationship with the environment into a single text. In reading the primary sources for this article, we noted that the observation,

collection, and systematization of information about flora species followed some certain criteria. Knowing a plant meant producing a textual and (in some cases) iconographic report that identified where it occurred, its size, shape, colors, smells, qualities (hot, cold, dry, wet), and utility for humans. In this sense, the descriptive form prepared by various actors made it possible for the information to follow a pattern which in turn allowed the transit of information about plants from the Americas on a larger scale (Secord, 2004).

We begin our reflections with the natural history books that resulted from the observations of the physician Guilherme Piso and the mathematician Jorge Marcgraf, made in Dutch Recife. Next, we move to a manuscript authored by the missionary Pedro de Montenegro and a collection of medical formulas attributed to the Jesuits. Finally, we examine excerpts from field diaries containing records of flora which were the product of border demarcation commissions that traveled within Brazil after the signing of the Treaty of Madrid in 1750. In this way, we have limited our analysis to the period between 1630 (when the Dutch landed in the captaincy of Pernambuco) and the 1760s (when the demarcation trips took place after the signing of the Treaty of Madrid). This time period allows us to consider natural history and botany in particular before the transformations in this field during the eighteenth century, especially after the works of Linnaeus. Our intention is to demonstrate how the construction of knowledge about plants involved a number of agents and was designed to allow circulation of this knowledge in various directions, depending on a variety of interests and circumstances.

The *História natural do Brasil* and gardens in Dutch Recife

From 1637 to 1645, the physician Guilherme Piso (1611-1678) and mathematician Jorge Marcgraf (1610-1644) were hired by the Dutch West India Company to provide services in Brazil during the years it was held by the Dutch, especially when it was governed by Count John Maurice of Nassau-Siegen. During their time there, these scholars made numerous observations of fauna and flora that resulted in the publication of the books *Historia naturalis Brasiliae*, edited in 1648, and *India eutrius quere naturaliet medica*, edited in 1658. As a starting point for this reflection, we shall explore some ways of observing, collecting, and systematizing knowledge about the plants in colonial spaces which are recorded in these texts within the context of Dutch colonization in the Americas (Gesteira, 2001, 2004a).

Dutch Recife, which comprised the city of Mauritius and the village and port of Recife, provided special conditions for observing plants. There was a garden (*ménagerie*) outside the Vrijburg palace, the official residence of count John Maurice of Nassau-Siegen built in Mauritius. Among other uses, the garden was used as a space for observing plants, and provided support for the circulation of some species. From the port of Recife, samples of American flora were sent to Europe. In the Netherlands, the species were added to botanical gardens such as the one at the University of Leiden. The transit of plants and drawings and paintings representing New World flora intensified as the count of Nassau returned to Europe and organized his own collections in the Hague and Cleves; he also presented gifts to distinguished men with whom he hoped to establish political ties, such as the prints attributed to the painter Albert Eckhout which were offered to Frederick

William, the Elector of Brandenburg. This set of prints was organized into four volumes and became known as the *Teatro das coisas naturais do Brasil* (Theater of Brazil's natural things) (Whitehead, Boesman, 1989; Gesteira, 2004a; Françaço, 2014).

The exchange of information and plants was recorded by Guilherme Piso in his description of the *caraguatá*, a species of bromeliad which in his own words he “brought from Brazil, I gave it to the most illustrious man Baron Dr. Vortio, to be kept in the Garden at Leiden” (Piso, 1957, p.409; originally published in 1658). The doctor also mentions a cactus, noting that “with paramount industry I have carried from Brazil a trunk the thickness of a human leg, measuring about twenty feet long; it is now in the Academic Garden of Leiden under the care of the most illustrious professor D. Vortio” (Piso, 1957, p.403).

This same dynamic can be seen in the part of the *Historia naturalis Brasiliae* describing the work of Jorge Marcgraf organized by Johannes de Laet, director of the Dutch West India Company. At several points we find passages indicating an exchange of information via shipments of dry plants that reached the director, as in the case of the *guaieru*, which “grows at every step in the arid, marine woods. I attempted to outline it with the florets and leaves of dry plants harvested by the author, because he did not provide any drawing,” (Marcgraf, 1942, p.77) and even an unidentified shrub which Laet in one of his comments notes that he tried to draw “this image, taking advantage of a dry twig harvested by the author, and for this reason I depicted it in that black color” (p.78).

Movement in the opposite direction also occurred. In his introduction to the *Historia naturalis Brasiliae*, Johannes de Laet (1942) stated that he would adopt the following procedure to support the work of Piso and Marcgraf in Dutch Recife, thus doing his best to ensure the identification of American plants in Dutch Recife to the greatest extent possible:

To this end, I strove to send my friends many dried plants arranged on blotting paper, and I had begun to send the descriptions of Ximenes to our author so that the comparison would show that they grew in Brazil and resulted in a relation to others, as you shall see during the course of this text (Laet, 1942).

Information was collected in the Americas in several ways. Following the lessons of Hippocrates, the procedure adopted by Guilherme Piso was to study aspects related to the environment, air, and water. In Hippocratic thinking, people's customs and ways of life are related to the environment in which they live. Indigenous habits did not play a fundamental role in Piso's work by chance: they were revealing in how these efforts proceeded, and also offered a way of observing how plants were used. The incorporation of local knowledge into the *Historia naturalis Brasiliae* can be seen in its use of the Tupi terms for most of the species described. Less formal procedures are also included, as in the chapter of this text dedicated to *caapeba*, the name given by the indigenous peoples to the “*erva-de-nossa-senhora* (in Portuguese),” also called snake root: “the root is very excellent against calculi; this was what a Portuguese man gave to Mr. Vander Dussen, with great results” (Marcgraf, 1942, p.26).²

Furthermore, the Nassau entourage included painters, soldiers, and employees of the West India Company who helped observe and record the species. Notable among these were the painters Albert Eckhout and Frans Post, along with Zacharias Wagener from the court of Nassau and Kaspar Schmakalden, a soldier hired by the company.

The ships moving between Recife (the main Dutch outpost in the Americas) and Amsterdam ensured the flow of shipments of some American species that could be observed by the scholars at Leiden University. During the first half of the seventeenth century, Leiden's botanical garden became one of Europe's main centers that received information on species from the Dutch West and East India companies' ships. Additionally, the presence of Piso and Marcgraf in Dutch Recife, with their mission to observe and collect information about nature in the Americas, further intensified the regular transfer of data to North Holland (Cook, 2005; Hochstrasser, 2005).

In terms of studies on plants, the procedure for describing species is repeated throughout the pages of the *Historia naturalis Brasiliae* (Marcgraf, 1942) and *História natural e médica da Índia Ocidental* (Piso, 1957). First came the nomenclature in three or four languages: the indigenous term, classical names (Latin and Greek), Portuguese, and Dutch. At some points in the text, it is clear that Guilherme Piso questioned the European names given to some American species; the physician thus demonstrated both contact with natural history literature about the New World as well as his knowledge of the ancient texts.

Each species is described thoroughly, including size, shape, color, smell, and taste. This careful observation made it possible for Piso to highlight in his work all the potential uses of a species to humankind. Classification according to use reinforces the idea that all natural objects were seen as a function of their ability to serve man, expanding the potential for consumption (Thomas, 1988). After a detailed description of the plant and fruit of a passionfruit species, Piso ends the chapter with a report on its therapeutic features, a common procedure in all chapters:

I used the pulp daily, an excellent replacement for cordial syrup as well as the syrup made from blackcurrant or barberries. Its cooling properties exceed [those of] all the other granadillas, and it does no harm, even if eaten in abundance; exaggerated consumption numbs the teeth, however. It admirably restores heat fatigue and eliminates thirst. Additionally, it awakens the appetite, represses burning of the stomach, restores vital spirits, which is obtained with the fresh fruit or its juice made into syrup and mixed into a beverage with water and vinegar (Piso, 1957, p.12).

Some of the criteria Piso utilized throughout the work can be extracted from his own descriptions. For example, "edible" and "inedible," "known" and "unknown," "useful" and "harmful." Another of Piso's concerns when selecting the species that would be cataloged in the book was to describe only those that were native to the New World and had already been properly studied: in other words, those whose virtues had been identified. He therefore valued plants and herbs that were useful to humankind: "Omitted, therefore, [were] all those whose medical use is still ignored, or those brought here from elsewhere and already sufficiently well revealed by others before me... I thought that only those for use in Medicine should be addressed, and employed by others and by me successfully to expand our art" (Piso, 1957, p.248).

Piso's book highlighted the therapeutic qualities of the species, which did not preclude their use as foodstuffs or ornaments or any other application. In numerous passages

he stressed his concern about “expanding” medical knowledge, one of the purposes of publishing his work in Europe.

The descriptions mostly comprised texts and engravings; the intention was to depict species as realistically as possible to allow them to be identified by other scholars. The book was intended to make readers, particularly learned readers, feel in touch with nature in the Americas. This may have been the main contribution of Piso and Marcgraf, his partner in these efforts: to offer European scholars the chance to observe a significant number of species from the New World. The expectations of Johannes de Laet (the book’s editor) as well as Guilherme Piso were to contribute to the expansion of medicine and natural history. We close with a passage from the book’s prologue:

With these journeys, I wished to simultaneously serve the Homeland and myself, and [with] something to pass on for posterity... I myself collected it and indicated applications; I have examined the land and its animals and finally even the men inside and out; I have drawn the images of the species from life; I explained the virtues and the faculties in a simple style, and demonstrated how they can enrich the science of medicine in many ways (Piso, 1957, p.IV).

Circulation of medical knowledge and practices in the Portuguese Americas

Pedro de Montenegro and medicine in the Jesuit missions

From a document cataloged in the Fundação Biblioteca Nacional do Rio de Janeiro as *Curiosidad un libro de medicina escrito por los jesuitas en las misiones del Paraguay* (1580), we determined that texts on medical matters circulated among the priests of the Society of Jesus who were working in the Americas.³ Careful reading of this document soon revealed that the date assigned does not make sense, as there are multiple references to the text by Guilherme Piso. In addition, when comparing it with the text by Pedro de Montenegro (1710), *Libro primero de la propiedad y birtudes de los arboles i pantas das missões y provincias de Tucuman com algunas Del Brasil e Del Oriente* in the collection of Spain’s National Library, we identified identical sections. This material circulated in the missions of the South in different copies (Fleck, 2014).

Healing work was notable among the Jesuit missionaries’ activities in the Americas. The priests of the Society of Jesus organized infirmaries and apothecaries in the spaces administered by the order such as villages, farms, mills, and schools; these served the internal public as well as the surrounding population, and processed and sold medications. Many were prepared using products from apothecaries in other places, but there was also widespread use of native plants, herbs, and roots, and in some cases these were cultivated in their yards. Not only did the missionaries use practical and theoretical supports to ensure that the treatments were as effective as possible, they also accumulated knowledge of nature in the Americas from their own experiences, especially by observing the healing practices adopted by the indigenous peoples. Besides medications, the apothecaries also had printed books and manuscripts on medical subjects (Gesteira, 2004b; Gesteira, Teixeira, 2009; Leite, 2013; Fleck, 2015).

Writing in Spanish, Pedro de Montenegro dedicated his work to the “most serene Queen of the Angels Mary Most Holy, Our Lady of Sorrows” (Montenegro, 1710, f.7), introducing it as a work intended to organize medical knowledge to assist those who practiced the healing arts in lands where doctors and apothecaries were scarce. In the prologue, we can see traces indicating Montenegro’s understanding of the art of medicine. Above the wise men of antiquity, God appeared as the true creator of medicine, a fact that the great Greek and Latin scholars (Montenegro, 1710) had also considered. Montenegro did not fail to value the role of the “wise man,” since wisdom was a quality that differentiated some men who could “discover the hidden virtues” in the products of nature: metals, stones, animals, and plants. It was the role of these wise men to reveal the virtues of the products “offered” by the “Great Architect,” or by “Divine Goodness” to humankind in order to sustain its well-being on earth. There are also signs that the author identified himself with Hippocratic medicine, because the qualities he selected as worthy of observation in each natural object were “heat,” “moisture,” “coldness,” and “dryness.”

Before working in the missions of the Spanish Americas, Montenegro worked for thirty years as a doctor at the Colégio de Madri, and throughout the text he refers to places he likely visited while in the New World: the Colégio de Córdoba, in Tucumán Province, and the Colégio de Asuncion. References to Paraguay and the missions of Paraná, Uruguay, St. Borja, and St. Gabriel appear numerous times throughout the text. The manuscript is divided into two parts. In the “second book,” the author gathered information “on herbs and medicinal roots from these Missions in Paraguay, with some from Brazil and the Provinces of Chile” (Montenegro, 1710, f.159). The plants are described in detail, and the structure of the text follows common practices in natural history. First, the name of the species appears in Spanish, Guarani, and Tupi, followed by the morphological aspects; when possible, the author associates each species described in the book with some plant known in Europe. This is followed by the therapeutic virtues of the plant, and always includes a reference to Hippocratic qualities such as hot, cold, wet, or dry, virtues that can be perceived by the healer through the senses (taste, smell, sight) to help identify the species.

Pedro de Montenegro was born in the Galicia region in 1663 and practiced medicine at the Madrid General Hospital. The exact date when the missionary landed in the Americas is not known; he went to the province of Paraguay, where he served as a nurse in the missions. After checking against documentation from the same period that circulated in the region, Arata (1898) concluded in the late nineteenth century that there were many copies of the same text, which may lead to some doubt about the originality of Pedro de Montenegro (Fleck, Poletto, 2012). One challenge we face in looking at this type of text (whether printed or hand written, as we have seen above) is that the author is not always the person who writes the text. Moreover, in the natural history of the Modern Era we often see identical information in texts by different authors, and the same is true of drawings. For this reason, in this analysis I would like to point out that what we read in books and manuscripts, even when authorship is identified, was not always drafted by the individual who is credited, which reinforces the concept of circulation in thinking about how these texts were produced even if it is not always possible to identify the network of collaborators. We can consider such works as being the result of a compilation of knowledge circulating in

printed books or manuscripts as well as the medical practices of the indigenous populations that were observed, as previously noted.

In the specific case of the Jesuits, who established themselves on four continents, there were networks of exchange between the missionaries and agents of healing. In South America these networks interconnected in areas dominated by the Spanish and Portuguese crowns, since borders in the Americas were fluid and entered Portuguese as well as Spanish territories. With regard to the circulation of ideas in the Americas, in our view looking at the past in light of current national borders is limited. We understand that as goods, plants, and roots circulated throughout the world, they carried with them the knowledge that helped broaden their consumption on a global scale; for example, “Copaiba balm is now well known and used throughout Europe, Africa, and the Americas, and is well regarded with high prices in Japan and China” (Montenegro, 1710, f.34).

Circulation of products accompanies the exchange of information about them, and occurs in multiple directions. In some cases, medical practices were accompanied by a process of experimenting and cultivating medicinal plants that stimulated the spread of species throughout the world. In its text, Montenegro (1710, fl.1) described the virtues of cocoa that originated in the Grão-Pará region and was used in the missions in the South; this description complemented information and the drawing from the work by Guilherme Piso and other natural history texts. The passage dedicated to passionfruit includes some similarities to the well known description by friar Vicente do Salvador: in addressing *la granadilla* (passionfruit) it provides a detailed description of the flower, named for its association with the story and the mysteries of Christ (Montenegro, 1710, fl.178). Finally, Montenegro alludes to the legend of Saint Thomas in his description of yerba maté, stating that “this herb soaked in water is an ancient tradition in these countries and missions of Paraguay, and was given by Saint Thomas to the natives” (fl.32). According to Sérgio Buarque de Holanda (1994), the legend of Saint Thomas arrived in the Spanish Americas via Jesuit priests linked to the province of Brazil who traversed the *sertão* badlands in search of souls.

Montenegro’s instructions for manipulating plants and preparing “simple” medicines (made with a single product) cover everything from planting and harvesting some species to preparing the medications. Knowing how to plant and harvest at the precise moment was fundamentally important to extract the essences, virtues, and qualities of plants and herbs. The planting and harvesting times for each species were related to its hot or cold temperament, and ignoring these qualities could make the preparations harmful or lose their desired effect. The site chosen to cultivate the plants was equally important, since they needed to be protected from cold, dry winds and excessive heat, elements that influenced the final products. These suggestions can be found on the topics of “mode of cooking the plants, in which the time and circumstances for their preservation and duration, taken from the works of Andres Mathiolo on the writings of Dioscorides and the necessary warnings” (Montenegro, 1710, fl.XIV) and “explains the virtues and ways of learning about the plants and their qualities, taken from the works of [Andres] Mathiolo and Lagunas” (fl.XVII).

Finally, as Montenegro recorded in the prologue, the objective of his work was to assist those who worked with and dedicated themselves to healing the sick in the missions, isolated and far from apothecaries and doctors, ensuring the efficacy of the therapies they

adopted based on precise directions and inspired by the medical culture of his time while still incorporating local practices, which undoubtedly enriched its work. He was concerned with providing information to those who did this work in the Americas, unlike Piso, who wanted his own text to broaden medical knowledge in Europe.

A book of recipes assigned to the Jesuits (c.1700)

The *Formulário médico: manuscrito atribuído aos jesuítas e encontrado em uma arca da Igreja de São Francisco de Curitiba* (Formulário médico: a manuscript ascribed to the Jesuits and found in a chest in the Church of São Francisco de Curitiba) (Formulário médico..., 2019), henceforth referred to as the *Formulário*, is a 230-page document containing hundreds of formulas to treat the diseases and ills that affected inhabitants of the Portuguese Americas, and is part of the collection of rare works in the Manguinhos Library at the Oswaldo Cruz Foundation in Rio de Janeiro. Handwriting analysis confirmed that this text was produced by one person, since the entire document contains the same writing pattern. One of the formulas, “the recipe or great secret to curing all the corruption of Herpes or Gangrene,” contains a name that could be a clue: Manoel de Oliveira Cerial (Formulário médico..., 2019, p.310). But since there is no attribution, we cannot be sure that this was the owner of this notebook and compiler of all the recipes. So far, no element has been identified confirming that the text was written by a missionary or someone linked to the Society of Jesus, as indicated in the catalog. Studies related to the material aspects of this document (the characteristics of the text itself, the handwriting, paper, and ink) allow us to safely state that it was produced between the end of the seventeenth century and the first half of the eighteenth century, even if the year 1703 is cited (Leal, 2019; Hannesch et al., 2019).

Reading the *Formulário* provides interesting observations on how the knowledge and uses of some plants (originating in the Americas or otherwise) are systematized. Document analysis expanded reflections on the transit of plants that were used in the formulas and how such practices reached places that were far from colonial towns and cities, the *sertão* backlands and trails that were traversed for a variety of reasons and created permanent circuits. For this reason, medical practices should not be separated from those of markets and cultural exchanges, particularly forms of knowledge about plants, herbs, and roots (Barrera, 2002).

The pages of this text bring together medicinal compounds (made from another product) in formulas for syrups, ointments, oils, and emetics, among other apothecary remedies made from ingredients including plants, herbs, animal parts, ashes, human feces, blood, urine, and other ingredients that now seem strange to us. Unlike the other printed books and manuscripts cited above containing simple remedies, this document presents compound formulas. Following the model of the pharmacopoeias of that time, most formulas are accompanied by their use in certain circumstances, for instance those used to “heal any gangrenous, rotten, and deep wounds in any part of the body.” Two formulas that were tested and cited “are those that Captain Pedro de Macedo e Moura did wonders with for Chagas [lesions] ... [Considered] incurable by the surgeons to cured in less than 12 days. With this recipe it never fails” (Formulário médico..., 2019, p.311).

Recommendations of places and comments about the presence or absence of certain products indicate that the text was written by someone who actually circulated in the southern Portuguese Americas between São Paulo and Rio Grande de São Pedro. When the text presents a formula using passionfruit from the tropical Americas (Ferrão, 1993, p.17), it notes that this fruit can be traded for “black stone dusts of the *capão*” since it is not found “in these parts.” Another example is the formula to treat the “belly asleep because of the cold,” which used “grass called *tirimindî* in São Paulo and *Minuâne* herb in Rio Grande de São Pedro” (Formulário médico..., 2019, p.394-395). Many indigenous terms appear in the *Formulário*, especially words from the Kiriris (also known as Kariris). Against phlegm, the text suggests “chewing licorice root, which the kiriris call *locorodi*” (p.195). For toothache, it recommends “the root of the herb that the kiriris call *suâxadziaskrâ*,” cooked (p.203).

Finally, for this analysis I highlight the way in which the herbs used in the formulas were classified from the very first pages. In the section “On the general qualities of the herbs,” the products are organized into three categories: hot, cold, and temperate. These attributes or “qualities” were a recurrent feature in species descriptions and were used by healers to identify what type of plant was suitable for curing specific diseases, keeping in mind that according to the Hippocratic tradition, illnesses were caused by an imbalance of the humors that circulated in the human body, which in turn were characterized according to these same qualities. From a therapeutic point of view, this form of classifying plants points to the tradition of medical botany that organized species according to their essential qualities (hot, cold, dry, wet) as well as the procedure for characterizing some diseases.

The herbs used in the concoctions described in the *Formulário* are native as well as exotic species. The trade in medicines encouraged the dissemination of new consumption habits. From the prescriptions recorded in pharmacopoeias during the Modern Era we can perceive the spread of cosmopolitanism in the use of some plants; the *Formulário* embodies this dynamic in the Americas and even in areas that were separate from the coast. The countless apothecary products used in the recipes or on their own show that market circuits had the potential to distribute drugs produced in various places (Almeida, 2017). In suggesting the use of “Dr. Stoughton’s stomach elixir,” the person who compiled the formulas adds that this medication, “prepared only by his only child,” could only be purchased from the “warehouse at Bartholomeu Lane, next to the Royal London Stock Exchange” (Formulário médico..., 2019, p.322).

The formula for the *Triaga Brasília* sold by the Jesuits in Bahia and recorded in the *Coleção de Várias Receitas e Segredos Particulares das principais boticas da nossa Companhia de Portugal, Da Índia, de Macau e do Brasil* (Collection of various formulas and private secrets from the main apothecaries of our Company in Portugal, India, Macau, and Brazil, 1766), like so many others, contained products from four continents. But what captured our attention was the recommendation of plants and places where some species could be found, such as “*abutua* root, in Pernambuco, Camamu, Village of Espírito Santo, and in the *sertão*,” “*capeba* root, at the College of Bahia,” “*jaborandi* root, in the yard of the College of Bahia,” “*cobra* root, in the yard of the College of Bahia,” “*pindaíba* seed, in the Village of Espírito Santo” (Coleção de várias receitas..., 1766, fl.411, 412).

In addition to planting, as we pointed out above, the circulation of plants and medical practices was intense in the interior of the Americas, which certainly encouraged the formation of local circuits of products as well as medical practices.

Diaries: demarcating the boundaries within South America

After the 1750 signing of the Treaty of Madrid between Portugal and Spain, an agreement that sought to establish boundaries between the Catholic monarchies in South America, astronomers and engineers were sent to carry out the work in the field: to demarcate the land along the border. One commission made up of representatives from each kingdom took charge of the north, while another went south; each was organized into different subgroups that were assigned sections that were predetermined in the treaty. This article will only consider the work carried out by the southern team.

The details of the trips were settled between the plenipotentiary ministers Viscount Thomaz da Silva Telles (on the Portuguese side) and José de Carvajal y Lancaster (on the Spanish side). The routes and tasks were determined in the “*Tratado, pelo qual os Ministros Plenipotenciários de S.S.M.M. Fidelíssima e Católica ajustaram, e determinaram as instruções, que haviam de servir de governo aos Comissários das duas Coroas na Demarcação dos limites respectivos na América meridional, em execução do Tratado de Limites, assinado em Madrid a 17 de Janeiro de 1750*” (Treaty by which the Plenipotentiaries of the Most Faithful and Catholic [Highnesses] adjusted and established instructions serving to govern the Commissions of the Two Crowns in Demarcating the respective limits of South America in executing the Border Treaty signed in Madrid on January 17, 1750), hitherto referred to as the “*Instruções*”. Astronomers, cosmographers, engineers, surgeons, soldiers, and an entourage of Indians to do the heavy work and assist in identifying roadways were hired by the Portuguese and Spanish crowns.

The “*Instruções*” were given to the commission members for each kingdom. The Portuguese delegation was led by Gomes Freire de Andrade.⁴ From there the paths from which the boundaries would begin were defined, along with the procedures to be adopted to resolve geographical disputes and potential conflicts with native populations. The document also indicated the type of information that was to be collected, such as data on the land, fruit, animals, and indigenous customs. More precisely, Article 25 states that

the commission members, geographers, and most intelligent people of each troop pointing out the directions, and distances from the route, the natural qualities of the country, the inhabitants, and their customs, the animals and plants, fruits, and other produce, the rivers, lakes, mountains, and other notable features, naming by common accord those that do not yet have names so they may be declared on the maps with all distinction, and will strive for their work to not only be accurate in demarcating the line and the geography of the country, but also useful for advances in Science, Natural History, and Physical and Astronomical observations (Coleção de notícias..., 1841, p.18).

This passage allows us to realize that besides describing the paths traveled and establishing geographical coordinates, the “intelligent people” were expected to deal with topics that were to be included in the diaries: in other words, natural history. Even before

the philosophical travels in Portugal, the “Instruções” contains a clear indication that during these trips more extensive information on the region was collected, an extension of natural history. While we agree with the argument by Ângela Domingues (1991) that there is a lack of more systematic results related to the fauna and flora studies of travels in the 1750s, we do not fully agree with the idea of “adventure.” Certainly, the men who left on trips to partially unknown places like the borders of the Portuguese Americas faced adverse situations due to the weather, conflicts with the native populations living in the disputed areas, encounters with wild animals, insects, diseases, and even death. But we should not consider the experience of the journey an adventure, since this word suggests improvisation and something not meticulously planned, as masterfully outlined in *Raizes do Brasil*, by Sérgio Buarque de Holanda (1982). And in the field of the history of science, the idea of adventure helped transform the structured philosophical journeys during the final decades of the eighteenth century into a milestone that led to the erasure of previous experiences.

Among the missions given to men who would go out into the field, the “Instruções” made it clear that in writing journals and diaries that recorded the events and information for “advances in the sciences” there was an intention to accumulate data, including natural history, which in turn allows us to infer that there was an intention to observe fauna, flora, and the habits of local populations in addition to gathering information on the climate and geography. Recording natural history and geographical knowledge was part of the process of exploring the lands that were being incorporated as European nations conquered new areas. But let’s return to the records of plants in the journals of the boundary setters. I will restrict this analysis to the diary of the second set of boundaries, since this text holds important details related to our current focus.

The first group set off on its journey on January 12, 1753, and its first Commissioner was Miguel Angelo Blasco. The route began in Castillos Grandes and went to the mouth of the Ibicuy river, where the efforts were interrupted due to the Guarani Wars.⁵ Although the diary of this trip provides information about the animals in the region, does not contain detailed descriptions of plants. A small passage captured our attention:

No known medicinal herb could be found aside from *Junca*, which is found in great numbers in the same brook; from its roots a type of acid is usually obtained which the ladies used in the Americas and in Europe to comprise the tobacco they call *vinagrillo* (Diário da primeira partida..., 1841, p.47).

The idea of “discovering” medicinal herbs, even those that were known, meant finding useful species along the way. There was a clear intention to detect the occurrence of products that could possibly be marketed, especially medicinal herbs. Expanding knowledge (albeit sparse) about local resources allows us to consider that the effort of recording this information in the journals cannot be viewed as anything different from the process of conquering a colonial region.

The third party was led by José Custódio de Sá e Faria, a sergeant major of the infantry working as an engineer, and included the cosmographer Miguel Ciera. The group’s surgeon was José Politani. They were to follow the land between the Paraná and Paraguay rivers,

heading north to the Jauru river. The diary of this group is rich with information about the indigenous peoples; for example, the Bayás “sow corn, pumpkins, and other seeds; they plant cotton, tobacco.” Still, it provides little information about natural history (Diário da terceira partida..., 1841, p.437).

The second boundary party began their trip at the mouth of the Ibicuy river and concluded at the falls of the Paraná river in 1759. The first commissioner on the Portuguese side was José Fernandes Pinto Alpoim, a colonel engineer of the artillery regiment in Rio de Janeiro. The group consisted of approximately 120 men including indigenous oarsmen, men from São Paulo who were “experienced in canoe trips,” and the surgeon Bartholomeu da Silva.

The diary of the second party is the only one of all of these written records to provide more systematized information. At the end there is a section dedicated to providing a “general idea of the rivers through which the part of the dividing line runs, which served to demarcate the second party, and brief information about the animals and vegetation found there” (Diário da segunda partida..., 1841, p.335). The text opens with a brief description of the rivers and climate. It is followed by information about the indigenous peoples, differentiating between Catholics and non-Catholics; finally, the plants and animals compose a complete image of the region, whose goodness provides shelter to the natives that are considered ignorant. “In the climate we have described, nature spontaneously provides in its rivers and woodlands a large portion of the sustenance required by its ignorant inhabitants, without which in their wild state they would die of hunger and misery” (Diário da segunda partida..., 1841, p.348).

The structure in this section resembles the natural history model. Like the other diaries from the border parties mentioned herein, there is no record of its authorship.⁶ But in speaking of plants, the writer positions himself as someone without the necessary competence for more profound study of the species:

These are proportionate to the warm climate, and almost the same as those occurring in Brazil and in other countries that enjoy the same climate. Among the plants that benefit health and medicine were found *escordio*, *douradilha*, *polipodio*, *sombreiroilho*, or navel of Venus, *salsa parrilha*, and *coentrilho*, and the multitudes of others (as many more are seen in the south) would not hide from the eyes of a diligent botanist, who would thoroughly examine them and not allow us to be ignorant of these species and in the work of another destination (Diário da segunda partida..., 1841, p.350).

The species were not observed by an expert, nor was the text written by “a diligent botanist.” Here is an important element: raw data, if gathered using some criteria such as shape, color, qualities, and use of the product, may be collected by previously trained but non-specialist individuals. In this case, we may even suggest that the text in question was originally guided by the surgeon, but that any of the demarcators would be competent to collect information. This is an important stage in building knowledge on the plants and herbs of the New World. The intention to broaden information is evident when the scribe, in describing some plants, mentions how the “historical record of the journey published by D. Antonio de Ulhoa, has made many fruits that are unique to the Americas so well known in Europe” (Diário da segunda partida..., 1841, p.350).⁷ The text continues, mentioning

some trees such as the *Ibarporoti*, “a fruit from a very tall tree shaped like a large cherry, not as black as this when it is perfectly ripe” (p.351); the *Jacaratiá*, a small tree with a leaf resembling that of the walnut, whose “fruit is like a small papaya, very yellow inside, and outside, with some small white seeds, and releases a harmful milk that must be purged in order to eat it without harm, and it is delicious roasted or cooked (p.351).

It continues with information about the *caraguatá*, a type of bromeliad that is eaten raw, and “its leaves are used to make the oakum used to caulk the boats of these people” (Diário da segunda partida..., 1841, p.351). There are *ingá*, pines, and other fruits, but the scribe indicates that he will omit these to describe the jaboticaba, followed by information about wood. The reddish *jacarandátan* which when well-worked “provides good tables, chairs, and other tasteful furniture,” *peroba*, which “is found in Iguasu and Paraná,” a large and thick tree “which in São Paulo is used to make the largest and most expensive canoes, and it is no less useful for factories and buildings for its resistance against wind and water,” as well as *tagibo*, cedars, and *anjico* (Diário da segunda partida..., 1841, p.356).

Finally, medicinal use of the angelica root is described as an excellent antidote for snakebite, which along with a multitude of insects threatened the lives of those who traveled the borders of the Portuguese Americas. This is the only point in the text where preparation of the traditional remedy is described: after the root is beaten and cooked in spirits, it is drunk, and can also be applied to the wound. It concludes by saying that “in all the gardens of the doctrine, multitudes of these angelicas are planted, and in addition to the repeated experiences the missionaries have had with the efficacy of this medicine, it was proven by Dr. José Duboris, surgeon of the Spanish party” (Diário da segunda partida..., 1841, p.363).

Final considerations

In this examination I opted to analyze not only one single text, but rather to bring together different documentary sources in order to reflect on how knowledge about flora in the Americas was constructed in different circumstances. I started with Dutch natural history work which led to two books that have become references for botany and zoology studies in Brazil up to the present day. In this case (and perhaps the only one in this analysis), we could apply the concept of circulation as proposed by Raj in his previously mentioned studies, from the activities guided by scholars hired by the Western India Company who traveled to a colonial region with a mission to collect information that was then sent back to the Republic, where it was processed and published. Reading the books *Historia natural do Brasil* and *História natural e médica das Índias Ocidentais* brought me into contact with practices that revealed dialogs with the local population, forms of collection, and the spaces that assisted in conducting observations, as well as maintaining correspondence with the scholars who remained in Europe.

Meanwhile, the texts produced by and attributed to the Jesuits had a slightly different fate. This is not the place to speculate whether they remained handwritten on purpose or not, but the existence of numerous copies of the texts on medical practices that circulated in the missions and the book of formulas itself indicate that this material was produced for use in areas far from the cities: on the byways and in the missions of the *sertões* (as

confirmed in the words of Pedro de Montenegro). If so, did this circulation take place on a more local scale? I believe not, since in the manuscripts we soon see the interaction and presence of current information about medical botany, and consider them only colonial production in contrast with European medicine, which to some extent would indicate isolation or backwardness that would be intrinsic to colonial areas.

Nor do I want to run the risk of stating that from the point of view of scientific practices this material deviated from broader circuits, as in the case of the book of formulas found in a chest in a church. But the pages of this book still contain references to medical books that were references in Portugal, as well as the address of a London shop where Dr. Stoughton's true elixir could be purchased; in other words, medical practices were located within broad circuits of exchange.

The information on the plants found in the diaries of the border demarcating parties that were produced during the 1750s demonstrates Portugal's strong efforts to more closely control this information, but in this case we can understand that this objective failed in part due to the travel conditions and the absence of men who were exclusively dedicated to natural history observations. But the criteria of medical botany still helped in collecting scattered data, which in theory permits the transfer of information.

All of the texts analyzed here record knowledge from indigenous peoples regarding the uses of New World plants, and in many cases they include the terms used by different native groups. This allows us to question to what extent such a procedure is a direct appropriation of indigenous knowledge, or whether inserting this knowledge into their works and describing them according to the categories of medical botany constitutes a mutation. In this case, I believe that mutation is inherent in constructing knowledge (as proposed by Raj), and we can ask ourselves if, when a product widely used by indigenous people (such as *copaiba*) becomes merchandise, does the indigenous knowledge travel along with this product, or has the product already gained other attributes like its natural qualities? This is a provocative aspect of the idea of circulation.

I also note that in addition to medicines from apothecaries, some plants (native as well as exotic) were widely used in simple and compound medicines in the Americas. In most cases, the flora species studied by physicians, missionaries, healers, and even colonial administrators could be observed in gardens, apothecaries, manuscripts, and printed books even though they may have been collected during travels and expeditions; this demonstrates that among other elements, this knowledge depended on a network of exchanges which were provided by the market routes and circuits. Here I reinforce my argument that procedures from medical botany were widely used to describe plants, thus intensifying and ensuring the exchange of information.

The Dutch records represented here by Guilherme Piso and Jorge Margrave, and the information contained in the boundary party diaries, had similar objectives: to gather information and broaden knowledge on natural history or medicine in Europe. In contrast, the book of formulas and the manuscript attributed to Pedro de Montenegro show that this material was organized to assist healers who worked in the Americas, circulating a set of medical practices and apothecary remedies as well as stimulating consumption and trade of plants.

All of the texts examined here incorporated indigenous terms to catalog species, and this may be the main feature of what we call local medical practices, even though many products like *copaíba* oil (and so many simple medications) have attained consumption on a global scale. Another factor that must be stressed is the formation of imperial networks and circuits, but since these do not always follow the more official routes, they are more difficult to follow. The networks are formed within the market circuits.

I conclude with the consideration that the idea of circulation as defined by Kapil Raj in questioning paradigms of the history of sciences is more than a concept: it offers a rich methodological approach to medicinal practices in the Americas and all the agents involved in them (each in their own way) as individuals who participated on different scales in constructing knowledge about natural history and medicine during the Modern Era.

NOTES

¹ For this and other texts in Portuguese, a free translation has been provided.

² Adriaen van der Dussen, a colonial administrator, was a member of the Privy Council of the West India Company, an organization that supported Count John Maurice of Nassau-Siegen.

³ The document signed by Montenegro, in which the author inserted numerous drawings of plants to supplement the descriptive text, is organized in a format that suggests the intention to publish. The copy in the National Library in Rio de Janeiro has no images, and seems to have been bound at a later time.

⁴ According to the documentation of the time, I identify the groups that went to the South as the first, second, and third boundary parties.

⁵ The first party suspended its work during the Guarani Wars, which extended from 1753 until 1757. The second departure began its demarcating journey in 1758. The Treaty of Madrid affected the areas where the Jesuit missions of São Francisco de Borja, São Nicolau, São Miguel Arcanjo, São Lourenço the Martyr, São João Batista, São Luiz Gonzaga, and Santo Ângelo Custódio were located. The movement of troops resulted in a confrontation between the Spanish and Portuguese parties against the missionaries, resulting in the death of more than 1,500 Indians.

⁶ The diaries that record the activities carried out by the border parties do not specify their authorship. However, the passages and tables that present observations made with instrumentation include the signatures of the first commissioners and astronomers in each party, below these data.

⁷ Antonio de Ulloa was a member of the Spanish Royal Armada. Accompanied by Jorge Juan (also of the Armada), he was part of the expedition to Peru captained by Charles Marie de La Condamine. This voyage led to the publication of the book *Relaciones Historica del viage a la America Meridional hecho de orden de s. Mag. para medir algunos grados de Meridiano terrestre, y venir por ellos en conocimiento de la verdadera figura, y magnitud de la tierra, con otras varias observaciones astronomicas e físicas* [Historical records of the trip to South America at the order of His Majesty to measure some grids of the terrestrial meridian and through them knowledge of the actual shape and magnitude of the land, along with various other astronomical and physical observations] (Ulloa, Juan, 1748).

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