



## Original Article

# Plants from the Brazilian Traditional Medicine: species from the books of the Polish physician Piotr Czerniewicz (Pedro Luiz Napoleão Chernoviz, 1812–1881)



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## ABSTRACT

The Brazilian flora is very rich in medicinal plants, and much information about the traditional use of the Brazilian plants is only available from early literature and we are facing a rapid process of loss of biodiversity. To retrieve data about useful plants registered in the books of the Polish physicist P.L.N. Chernoviz, who lived in Brazil for 15 years in the 19th century. The aim is to improve our knowledge about Brazilian plants, and to ensure the benefits of sharing it with potential users. Data about Brazilian plants were obtained from six editions of the book *Formulary and Medical Guide* (Formulário e Guia Médico), published in 1864, 1874, 1888, 1892, 1897 and 1920. All this information was then organized in boxes, and correlated with pharmacological studies from PubMed and Lilacs. A total of 238 species were recorded and 117 different traditional uses were registered for the plants. The most common uses were to treat general skin diseases and intermittent fevers, as purgative, diuretics and andidiarrheal. From the total, only 61 species (25.6%) have been to date subject to pharmacological studies and had their activities confirmed. Chernoviz books represent an important source of data about plants used in traditional medicine of Brazil. Their records were collected at a time when Brazil's native vegetation was still largely intact, and traditional medicine was practiced based on native plants. We argue that these plants must be prioritized in development of medicines, submitting them to clinical studies or by considering their traditionality, as established by WHO. Strategies for the protection of the traditional knowledge are also necessary.

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## Introduction

Since 2002, the World Health Organization (WHO) has been stimulating the rescue of data from plants used in ancient medical practice, since they are considered potentially useful in the development of new drugs (WHO, 2002). The American plants were widely used long before the arrival of the Europeans in the continent in the 15th century, and besides being one of the richest countries in biodiversity, Brazil is also one of the most diverse in terms of Amerindian culture (Neves, 2006; Forzza et al., 2012). However, both plants and traditional knowledge are under heavy threaten due to the continued destruction of the native ecosystems,

as a consequence of the successive economic cycles along the five centuries of increasing human occupancy. In fact, today only 7% of the Atlantic Forest survives, and the Cerrado and Caatinga are also in a rapid process of destruction (Giulietti et al., 2005). This situation highlights the necessity to promote the appropriate use and conservation of useful species from the Brazilian biodiversity, as suggested by the WHO.

Historical research can play an important role in recovering valuable ethnopharmacological data regarding the use of plants (Heinrich et al., 2006; Medeiros, 2008). Over the last ten years, our research group has concentrated efforts to recover informations about useful Brazilian plants in books and other documents from the past centuries. Most registers about Brazilian plants have been recovered from works of Europeans that travelled or lived in the country in the 19th century. Hundreds of species of medicinal plants used in Brazil were registered by these scientists (Brandão

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et al., 2008; Breitbart et al., 2013; Fagg et al., 2015). Among the Europeans that lived in Brazil in this period is the Polish physicist Piotr Czerniewicz (1812–1881) or Pedro Luiz Napoleão Chernoviz, as he was known in Brazil.

Chernoviz was born in Lukov, but was forced to leave the country while still a medical student at the University of Warsaw in 1831, due to his involvement in an uprising against the Russians. In Montpellier, he continued his studies and in 1837 he was awarded by the French government with the medal of merit, due to his courageous participation in a cholera epidemic (Guimarães, 2005). Chernoviz arrived in Rio de Janeiro in the early 1840s to work as a medical doctor. He returned to France in 1855 and died in 1881.

A year after his arrival in Brazil, Chernoviz wrote the “Formulary and Medical Guide” (*Formulário e Guia Médico*) directed to physicians, a book that achieved 19 editions during his life, being published by his son afterwards. In 1842 he published the “Dictionary of Popular Medicine” (*Dicionário de Medicina Popular*), which had a more accessible language to be used by the population. Both books were a striking success in Brazil, especially the “Dictionary” that was widely used in the inner parts of the country, where professional medical assistance was virtually nonexistent. Both books present a good description about the medical techniques at the time but more importantly, a rich register of the traditional uses of Brazilian plants. The aim of this study was to retrieve data about useful Brazilian plants in six editions of the book Formulary and Medical Guide, and discuss about the possibility of their current use.

## Methods

### Survey of Chernoviz books

Data on the use of native plants were carefully collected from the following editions of the book *Formulary and Medical Guide*: 6th edition (1864), 9th edition (1874), 13th (1888), 15th (1892), 16th (1897) and 19th (1920). The editions of 1864, 1874 and 1892 were studied in the Libraries of Medicine and Pharmacy School of University of Paris. The edition of 1888 was consulted in the Library of the Museum of Natural History, also in Paris. The others (1897 and 1920) were consulted in the Natural History Museum and Botanical Gardens and the Pharmacy Faculty of the Federal University of Minas Gerais, in Belo Horizonte, Brazil.

Only the species referred as “plant from Brazil” by the author were considered. Box 1 shows the species cited by Chernoviz that were submitted to pharmacological studies correlated with the traditional uses. In Box 2 are listed the other species. Different popular names were attributed by the author for the plants in the subsequent editions, but in this study we have considered only those names from the last edition, published in 1920, considering the most complete. Only the current scientific names, obtained by consulting the website [www.floradobrasil.jbrj.gov.br](http://www.floradobrasil.jbrj.gov.br), from the Rio de Janeiro Botanical Garden, were included in the Boxes.

The confirmation of the geographic origin of the plants was also observed in this same website. Some discrepancies about the occurrence of the plants cited by Chernoviz and our current knowledge of the Brazilian flora were observed. For instance, *Cestrum nocturnum* and *Coccoloba nucifera* are currently not considered natives in the country’s flora however common these plants might be. In other cases, this is just a matter of misapplied names – *Drymis winteri* does not occur in Brazil, the correct identification of the species found in this country being *Drimys granatensis* instead. Moreover, *Chiococca* spp. and *Senebiera pinnatifida*, cited by the author as exotic plants, are currently known to be natives.

Many species, that only the popular name were cited by the author, were not included in the Boxes as “amapá”,

“muirapuama”, “pajurá”, “cabeça-de-negro”, “cabeça-de-moleque” and “tamaquaré”. Other scientific names cited by the author were also excluded from the Boxes since they were not confirmed as valid names, namely “cipó-guyra” (*Bignonia guyra*), “rabo-de-tatu” or “sumaré” (*Cyrtopodium brasiliensis*), “caámembeca” (*Polygala paraensis*), “cabacinho” or “bucha-dos-caçadores” (*Momordica bucha*) and “jaborandi” (*Monnina trifolia*). “Chiquechique” was also excluded from this survey, since the scientific name assigned to it by Chernoviz (*Cereus jamacaru*) does not match the species to which this popular name has always been assigned (*Pilosocereus gounelleii*), which could lead to ambiguous interpretations. Likewise, the species assigned to “caferana” or “jacaré-açu” (*Tachia guianensis* Aubl.) does not occur in Brazil, and although this is probably a case of misidentification, this plant was excluded.

### Survey on other historical references about Brazilian plants

We performed searches for data about the plants cited by Chernoviz in other historical bibliographical sources. The oldest one was *Triaga Brasílica*, a recipe from the 16th century (Pereira et al., 1996). The book *Historiae Naturalis & Medicae* published by Piso in 1648 was also studied, but since only the popular names of the plants were cited. Data registered in the 1840s manuscripts of George Gardner (Fagg et al., 2015), the field books (Brandão et al., 2012) and the book *Plantes usuelles des Brésiliens* by Auguste de Saint-Hilaire (Saint-Hilaire, 1824), the book *Materia Medica* by the German Karl von Martius (Martius, 1843) and the 1st Edition of Brazilian official Pharmacopoeia were also obtained (Brandão et al., 2009).

### Survey of laboratory studies correlated with traditional uses

Searches in PubMed and Lilacs for information about pharmacological studies correlated with the traditional use were also performed, and the results are listed in Box 1.

## Results and discussion

In the present study, we have recovered data about Brazilian useful plants from six editions of the *Formulary and Medical Guide*, published by Chernoviz (followed by his son) from 1864 to 1920. This book reached 19 different editions, being the first published already in 1841, just one year after the author arrived in Brazil. The number of Brazilian plants was dramatically increased along the new editions. As a physician, Chernoviz wrote detailed information about the efficacy and preparation of the remedies from each plant. As he describes in the introduction of each edition, the data were collected from literature available at that time and also from his medical experience during the 15 years he lived in Rio de Janeiro.

Data from 238 useful plants could be retrieved from the books (Boxes 1 and 2). The species are distributed among 83 families, Asteraceae and Fabaceae being the most represented with nineteen (8%) and seventeen (7%), respectively. The other most represented families were Rubiaceae twelve (5%), Euphorbiaceae, Lauraceae and Malvaceae (ten species, 4%), Apocynaceae (nine species, 4%), Solanaceae (eight species, 3%), Cucurbitaceae (seven species, 3%), Bignoniaceae and Rutaceae (six species, 3%), Meliaceae and Verbenaceae (five species), Araceae, Lamiaceae, Lecythidaceae and Myrtaceae, (four species) and Boraginaceae, Gentianaceae, Hypericaceae, Loganiaceae, Menispermaceae, Moraceae, Phyllanthaceae, Sapindaceae and Sapotaceae (three species). The remaining families are represented by one or two species.

A total of 117 different traditional uses were recorded for the plants in the six studied editions, and the two most common were as purgative and to treat intermittent fevers (30 and 26 species, respectively). Other well documented uses were as diuretic (21), antidiarrheal and tonic (18), stimulant (17), as astringent, febrifuge

**Box 1: Plants from the Formulary and Medical Guide, their uses, first edition of publication and recent studies correlated with the traditional uses**

Family/scientific name	Popular name	Part/indication	Edition	Recent studies correlated with use
<b>Amaranthaceae</b> <i>Chenopodium ambrosioides</i> L. <sup>a,f</sup>	herva-de-santa-maria	Vermifuge	1864	Amoebicidal (Avila-Blanco et al., 2014), acaricidal (Kouam et al., 2015), antischistosomal (Kamel et al., 2011)
<b>Anacardiaceae</b> <i>Anacardium occidentale</i> L. <sup>a,e,f</sup>	cajueiro, acaju	Lupus, acne, eczema, ulcers, psoriasis, leprosy	1874	Anti-inflammatory, wound healing (Olajide et al., 2004; Pawar et al., 2004)
<i>Schinus terebinthifolius</i> Raddi <sup>a,c,d,e,f</sup>	aroeira, corneiba	Leaves to treat ulcers, bark astringent, to treat leg oedemas	1864	Wound healing (Estevão et al., 2013), gastric ulcer (Santos et al., 2013)
<b>Apocynaceae</b> <i>Geissospermum vellosii</i> Allemão	camará-de-bilro, camará-do-mato, pao-pereira, forquilha, pau-de-pente	Bark to treat intermittent fevers and tonic	1864	Antiplasmodial (Mbeunkui et al., 2012)
<b>Aquifoliaceae</b> <i>Ilex paraguariensis</i> A. St.-Hil. <sup>c,d,e,f</sup>	mate, congonha	Stimulant, sudorific, digestive <sup>a</sup>	1874	Stimulant (Santos et al., 2015)
<b>Aristolochiaceae</b> <i>Aristolochia trilobata</i> L. <sup>b</sup>	milhomens, jarrinha	Lack of appetite, fevers, skin ulcers	1864	Topical antiinflammatory (Sosa et al., 2002); antibacterial (Camporese et al., 2003)
<b>Asteraceae</b> <i>Acanthospermum australe</i> (Loefl.) Kuntze <sup>a</sup>	picão-da-praia	Tonic, diuretic, intermittent fevers	1864	Antimalarial (Carvalho et al., 1991; Carvalho and Krettl, 1991)
<i>Ageratum conyzoides</i> L. <sup>d,e</sup>	herva-de-são-joão, mentrasto	Stimulant, antidiarrheal, baths	1864	Antimicrobial (Singh et al., 2013; Adetutu et al., 2012)
<i>Ayapana triplinervis</i> (Vahl) R.M.King & H.Rob. <sup>e,f</sup>	japana, ayapana	Sudorific, wound healing	1864	Antibacterial (Gupta et al., 2002)
<i>Baccharis genistelloides</i> (Lam.) Pers.; <i>Baccharis crispa</i> Spreng. <sup>c,e,f</sup>	carqueja-amargosa	Tonic, febrifuge	1864	Anti-inflammatory (Nogueira et al., 2011; Paul et al., 2009)
<i>Bidens pilosa</i> L. <sup>e</sup>	picão, cuambú, guambú	Jaundice, ulcers	1874	Hepatoprotective (Kwiecinski et al., 2011; Suzigan et al., 2009)
<i>Chaptalia nutans</i> (L.) Pol.	língua-de-vaca	Tonic, bronchitis, skin ulcers	1874	Antibacterial (Truitt et al., 2003); Antiinflammatory (Badilla et al., 1999)
<i>P. sagittalis</i> (Lam.) Cabrera <sup>a</sup>	quitoco, caculucage	Excitant, digestive	1864	Gastroprotective (Figueredo et al., 2011)
<i>Sonchus oleraceus</i> L.	serralhinha	Aperient, diuretic, jaundice, nephritis	1874	Anti-inflammatory (Vilela et al., 2010)
<b>Bignoniaceae</b> <i>Zeyheria montana</i> Mart.	mandioquinha-do-campo, bolsa-de-pastor	Roots skin disease	1874	Antiproliferative (Seito et al., 2011), antiinflammatory, antinociceptive (Guenka et al., 2008)
<b>Bixaceae</b> <i>Bixa orellana</i> L. <sup>a,b,e</sup>	urucu, orucu	Expectorant, bronchitis	1864	Antimicrobial (Fleischer et al., 2003; Castello et al., 2002), antihistamine (Yong et al., 2013)
<b>Boraginaceae</b> <i>Heliotropium indicum</i> L. <sup>e</sup>	aguará-ciunhá-açú, jacuá-acanga	Skin ulcers and burns	1874	Wound healing (Dash and Murthy, 2011; Reddy et al., 2002)
<b>Convolvulaceae</b> <i>Operculina</i> sp. <sup>a,f</sup>	batata-de-purga, ipú, jalapa, purga-de-amaro-leite, de cayapó, gentio, de João-paes	Roots and seeds purgative	1874	Laxative (Paganotte et al., 2016; Michelin and Salgado, 2004)
<b>Crassulaceae</b> <i>Kalanchoe crenata</i> (Andrews) Haw. <sup>c</sup>	sayão	Leaves as wound healing	1864	Antiinflammatory (Costa et al., 2006; Ibrahim et al., 2002)
<b>Dilleniaceae</b> <i>Curatella americana</i> L. <sup>c,d,e</sup>	sambaiba	Barks astringent, skin ulcers	1874	Anti-ulcerogenic (Hiruma-Lima et al., 2009)
<b>Euphorbiaceae</b> <i>Joannesia princeps</i> Vell. <sup>a,e</sup>	anda-açu, purga-de-gentio, paulistas, coco-de-purga, fruta-de-arara	Purgative	1864	Episodes of diarrhoea (Nishioka and Escalante, 1997)
<i>Croton antisyphiliticus</i> Mart. <sup>c,e</sup>	herva-mular, alcamporeira, curraleira, pé-de-perdiz	Leaves sudorific, skin ulcers, stimulant	1874	Antiinflammatory (Reis et al., 2014)
<b>Fabaceae</b> <i>Bowdichia virgilioides</i> Kunth <sup>e,f</sup>	sebipira, sucopira	Bark tonic and diaphoretic, to treat skin diseases	1874	Sport resistance (Santos et al., 2014), skin disease (Agra et al., 2013); antiinflammatory (Barros et al., 2010; Thomazzi et al., 2010)
<i>Copaifera</i> spp. <sup>a,d,e,f</sup>	copahiba	Astringent, blennorrhagy and other venereal diseases	1864	Wound healing (Paiva et al., 2002); Antiinflammatory (Vargas et al., 2015; Gelmini et al., 2013); Antimicrobial (Souza et al., 2011; Santos et al., 2008)

<i>Dahlstedtia pinnata</i> (Benth.) Malme	timbó boticário	Narcotic, liver disorders	1888	Sedative effect (Della Loggia et al., 1981)
<i>Erythrina</i> spp. <sup>f</sup>	mulungú, crista-de-galo	Bark sedative, seeds are poison	1874	Anxiolytic (Santos Rosa et al., 2012; Raupp et al., 2008)
<i>Mimosa tenuiflora</i> (Willd.) Poir. <sup>e</sup>	jurema	Narcotic, skin ulcers	1874	Wound healing (Zippel et al., 2009; Rivera-Arce et al., 2007)
<i>Parapiptadenia rigida</i> (Benth.) Brenan <sup>e</sup>	angico	Bronchitis, liver disorders	1874	Antimicrobial, analgesic, anti-inflammatory (Araujo et al., 2014)
<i>Stryphnodendron adstringens</i> (Mart.) Coville <sup>c,e,f</sup>	barbatimão	Barks astringent, venereal disease, wound healing	1874	Wound healing (Pinto et al., 2015; Coelho et al., 2010), candidiasis (Morey et al., 2015; Luiz et al., 2015; Ishida et al., 2006)
<b>Hypericaceae</b>				
<i>Hypericum brasiliense</i> Choisy <sup>e,f</sup>	alecrim-bravo	Snake bites, aromatic baths	1920	Snake bites (Dal Belo et al., 2013)
<i>Hypericum connatum</i> Lam. <sup>e</sup>	orelha-de-gato	Astringent, throat inflammation	1874	Oral lesions (Fritz et al., 2007), antibacterial (Fratianni et al., 2013)
<b>Lauraceae</b>				
<i>Licaria puchury-major</i> (Mart.) Kosterm. <sup>e</sup>	puchury, pichurim	Seeds stimulant, tonic, dyspepsy, leucorrhea	1874	Psychopharmacological (Carlini et al., 1983)
<i>Ocotea odorifera</i> (Vell.) Rohwer <sup>e</sup>	pereiorá, casca-preciosa	Nervous system, leucorrhea, oedema, antidiarrheal	1874	Antifungal (Yamaguchi et al., 2011)
<b>Lecythidaceae</b>				
<i>Bertholletia excelsa</i> Bonpl. <sup>e</sup>	castanha-do-maranhão, do pará	Barks jaundice, intermittent fever, renal calculi	1892	Antiplasmodial (Oliveira et al., 2015)
<b>Loganiaceae</b>				
<i>Spigelia laurina</i> Cham. & Schldt. <sup>e</sup>	espigelia, arapabaca	Vermifuge	1892	Anthelmintic (Ademola et al., 2007; Jegede et al., 2006)
<i>Strychnos pseudoquina</i> A.St.-Hil. <sup>c,d,e,f</sup>	quina-do-campo	Bark intermittent fevers	1874	Antimalarial (Andrade-Neto et al., 2003)
<b>Loranthaceae</b>				
<i>Struthanthus marginatus</i> (Desr.) Blume <sup>f</sup>	hera-de-passarinho, enxerto-de-passarinho	Leaves to treat lung diseases	1888	Antimicrobacterial (Leitão et al., 2013)
<b>Malvaceae</b>				
<i>Gossypium</i> spp. <sup>e,f</sup>	algodoeiro	Wounds, erysipelas	1864	Wound healing (Annan and Houghton, 2008)
<b>Meliaceae</b>				
<i>Cabralea canjerana</i> (Vell.) Mart. <sup>e,f</sup>	canjerana	Oil prevent insect bites, bark purgative and vomitive	1874	Insect repellent (Magrini et al., 2014)
<i>Carapa guanensis</i> Aubl. <sup>e</sup>	andiroba, carapa	Bark febrifuge and vermifuge, skin ulcers, insect repellent	1874	Antiplasmodial (Pereira et al., 2014; Miranda Júnior et al., 2012); vermifuge (Sarría et al., 2011); wound healing (Nayak et al., 2010, 2011); antimicrobial (Meccia et al., 2013); antiinflammatory (Henriques and Penido, 2014); insect repellent (Miot et al., 2004). Antiprotozoal (Weniger et al., 2001)
<i>Guarea guidonia</i> (L.) Sleumer <sup>e</sup>	marinheiro, gitó	Bark purgative and vermifuge	1874	
<i>Trichilia</i> sp. <sup>e</sup>	marinheiro-de-folha-miúda	Roots to treat intermittent fevers	1874	Antimalarial (Castro et al., 1996)
<b>Menispermaceae</b>				
<i>Cissampelos ovalifolia</i> DC. <sup>b,c,d,e</sup>	orelha-de-onça	Roots to treat snake bites and intermittent fevers	1874	Antimalarial (Fischer et al., 2004)
<b>Myrtaceae</b>				
<i>Psidium pomiferum</i> L., <i>P. guajava</i> L. <sup>a,e,f</sup>	goiabeira	Leaves and barks antidiarrheal, leg oedema	1874	Antidiarrheal (Birdi et al., 2010, 2014; Ojewole et al., 2008); anti-inflammatory (Araujo et al., 2014; Jang et al., 2014)
<b>Passifloraceae</b>				
<i>Passiflora maliformis</i> L. <sup>c,e</sup>	maracujá	Convalescences	1920	Nutritive (Devi Ramaiya et al., 2013)
<b>Phyllanthaceae</b>				
<i>Phyllanthus microphyllus</i> Kunth, <i>P. niruri</i> L. <sup>e</sup>	hera-pombinha	Diuretic	1864	Kidney troubles (Giribabu et al., 2014; Micali et al., 2006)
<b>Phytolaccaeeae</b>				
<i>Petiveria alliacea</i> L., <i>Seguieria floribunda</i> Benth. <sup>e</sup>	pau-de-alho, cipó, guararema, ybirarema.	Baths for rheumatic pain, hemorrhoid and dropsy	1874	Antinociceptive (Gomes et al., 2005), anti-inflammatory (Lopes-Martins et al., 2002)
<b>Piperaceae</b>				
<i>Piper mikianium</i> (Kunth) Steud., <i>P. peltatum</i> L., <i>P. umbellatum</i> L. <sup>a,b,c,e</sup>	periparoba, aguaxima, caapeba	Leaves rheumatism <sup>a</sup> and to treat ulcers <sup>a</sup> ; roots as stomachic, sudorific, intermittent fevers	1864	Anti-inflammatory (Iwamoto et al., 2015; Roersch, 2010). Antimalarial (Rocha e Silva et al., 2015)
<b>Plantaginaceae</b>				
<i>Scoparia dulcis</i> L. <sup>c</sup>	vassorinha, tupeçava	Bronchitis	1874	Antiinflammatory (Tsai et al., 2011)
<b>Rubiaceae</b>				
<i>Carapichea ipecacuanha</i> (Brot.) L.Andersson <sup>a,b,c,d,e</sup>	ipecacuanha, poaya, ipéca	Roots vomitive <sup>a</sup> , tonic, expectorant, antidiarrheal	1864	Several studies
<i>Palicourea rigida</i> Kunth <sup>c,d,e</sup>	hera-de-rato, don-bernardo, douradinha-de-campo, gritadeira	Poison	1874	Toxic (Cook et al., 2014)

<i>Remijia ferruginea</i> (A.St.-Hil.) DC. <sup>c,e,f</sup>	quina-da-serra, remijio, do campo	Barks bitter, to treat intermittent fevers	1864	Antimalarial (Andrade-Neto et al., 2003)
Rutaceae				
<i>Zanthoxylum fagara</i> (L.) Sarg. <sup>c,e</sup>	coentrilho	Ear ache	1920	Antinociceptive, antiinflammatory (Villalba et al., 2007)
Sapindaceae				
<i>Paulinia cupana</i> Kunth <sup>e,f</sup>	guaraná	Tonic, antidiarrheal	1864	Improves fatigue (Oliveira Campos et al., 2011)
Smilacaceae				
<i>Smilax salsaparrilha</i> L., <i>S. syphilitica</i> Humb. & Bonpl. ex Willd. <sup>e,f</sup>	salsaparrilha, japecanga, salsaparrilha-do-brasil	Antisyphilitic, skin disease, rheumatism and gout	1864	Several studies with <i>Smilax</i> spp.
Simaroubaceae				
<i>Simaba ferruginea</i> A.St.-Hil. <sup>e</sup>	calunga	Dyspepsy, intermittent fevers	1874	Antiulcer (Souza-Almeida et al., 2011; Noldin et al., 2005)
<i>Simarouba amara</i> Aubl. <sup>e,f</sup>	simaruba	Bitter, febrifuge, antidiarrheal	1864	Hepatoprotective (Maranhão et al., 2014); malaria (Franssen et al., 1997); gastrointestinal disorders (Caceres et al., 1990)
Solanaceae				
<i>Cestrum parqui</i> L'Hér. <sup>e</sup>	coerana	Leaves stimulant, carminative	1874	Psychosis (Siskind et al., 2014)
<i>Physalis angulata</i> L. <sup>c,e</sup>	camapá, juápóca	Ear ache, tonic, liver disorders	1874	Antinociceptive (Bastos et al., 2006; Choi and Hwang, 2003)
<i>Solanum paniculatum</i> L. <sup>a,b,c,e,f</sup>	jurubeba, juripeba, jupeba	Roots liver disorders, leaves as wound healing	1874	Digestive (Mesia-Vela et al., 2002)
Verbenaceae				
<i>Lantana camara</i> L. <sup>e,f</sup>	camará, cambará	Baths for rheumatism	1874	Anti-inflammatory (Ghosh et al., 2010)
Other historical references.				
<sup>a</sup> Cited by Piso (1648) (based in popular name).				
<sup>b</sup> Cited in <i>Triaga Brasilica</i> (Pereira et al., 1996).				
<sup>c</sup> Cited by Saint-Hilaire in his field book (Brandão et al., 2012).				
<sup>d</sup> Cited by Gardner in his manuscripts (Fagg et al., 2015).				
<sup>e</sup> Cited by Von Martius in <i>Materiae Medicae</i> (Martius, 1843).				
<sup>f</sup> Cited in 1st edition of Brazilian Official Pharmacopoeia (Brandão et al., 2009).				

and to treat skin ulcers (13), to treat liver disorders, skin diseases and as vermifuge (11), to treat bronchitis, snake bites and as sudorific (10), as antisyphilitic, emollient and to treat rheumatism (9), as bitter, to treat dropsy and wound healing (8), as emetic and to treat jaundice (7), and as emmenagogue and stomachic (6). Other 90 indications were attributed to five or less plants.

Most plants cited by Chernoviz have been already used in Brazil in the previous century, confirming their importance in traditional secular medicine. Informations on some species were already been compiled by the Portuguese priests in the early colonization of the continent. The *Triaga* (Teriac), for example, was a Roman ancient remedy used to treat fevers and poisoning, and had part of the components of the original European recipe gradually substituted with plants native to Brazil in 16th century (Pereira et al., 1996). Fourteen plants from the *Triaga Brasilica* were cited in his book: *Cissampelos* sp. and *Chondodendron platyphyllum*, Menispermaceae; *Aristolochia* sp., Aristolochiaceae; *Piper peltatum* and *Piper anisum*, Piperaceae; *Solanum paniculatum*, Solanaceae; *Senna occidentalis* and *Myroxylon balsamum*, Fabaceae; *Carapichea ipecacuanha*, Rubiaceae; *Dorstenia* sp., Moraceae; *Dicypellium caryophyllum*, Lauraceae; *Pradosia lactescens*, Sapotaceae; and *Bixa orellana*, Bixaceae. In the 17th century, the Dutch G. Piso lived for eight years in the northeastern coast and recorded his observations in the book *Historiae Naturalis & Medicae*, published in 1648 (Pisonis, 1648). This work describes the plants used by the Amerindians at the time and was the only source of information on the biodiversity of South America until the late 18th century. Plants registered by Guilherme Piso in the 17th century were also identified in the Chernoviz books (by popular names): *Anacardium occidentale* and *Schinus terebinthifolius*, Anacardiaceae; *Hancornia speciosa*, Apocynaceae; *Bixa orellana*, Bixaceae; *Protium icariba*, Burseraceae; *Joannesia princeps*, Euphorbiaceae; *Andira fraxinifolia*, *Copaifera* spp. and *Hymenaea* spp., Fabaceae; *Sassafras albidum*, Lauraceae; *Eugenia ayacuchae* and *Psidium guajava*, Myrtaceae; *Piper* sp., Piperaceae; *Pilocarpus pennatifolius*, Rutaceae; *Solanum paniculatum*, Solanaceae; and

*Cecropia palmate*, Urticaceae. In 19th century, Portuguese crown opened the borders to the scientific expeditions of naturalists from other European countries. The pioneer was the German Alexander von Humboldt, who explored the area now occupied by Venezuela, Guyana, and the Brazilian states of Amapá and Roraima, from 1799 to 1804. In the 19th century, dozens of other scientists from different parts of Europe travelled to South America, especially Brazil, describing the flora, fauna, mineral wealth and local customs. The contribution of these naturalists to the knowledge of South American biodiversity is incalculable – thousands of plants were brought to the light of science and thousands of new genera and species have been described, based on the materials they collected. From the works of the 19th century's European naturalists, 192 species (80.1%) were also cited by von Martius, 59 species (24.8%) by A. de Saint-Hilaire, and 24 (10%) by G. Gardner. The same traditional was observed for 65% of the species cited by von Martius and 43% of the species cited by Saint-Hilaire. Eleven species cited by Chernoviz were cited by all the three European naturalists: *Gomphrena arborescens*, Amaranthaceae; *Schinus terebinthifolius*, Anacardiaceae; *Hancornia speciosa*, Apocynaceae; *Ilex paraguayensis*, Aquifoliaceae; *Hymenaea courbaril*; Fabaceae; *Deianira* sp., Gentianaceae; *Strychnos pseudoquina*, Loganiaceae; *Cissampelos ovalifolia*, Menispermaceae; *Chiococca alba*, Palicourea rigida, Rubiaceae; and *Simarouba versicolor*, Simaroubaceae. This result shows the relevance of the use of such species in the Brazilian traditional medicine on the past. In addition, 51 species were included in the 1st Edition of the Brazilian Official Pharmacopoeia showing their importance also in conventional medicine (Boxes 1 and 2).

It is interesting to note that, on the other side, 34 plants cited by Chernoviz in his work had not been published previously in the consulted bibliography, and these data were probably collected by his own experience as medical doctor in Rio de Janeiro. In fact, Chernoviz's interest in Brazilian medicinal plants was high, since he has incorporated several species along the subsequent editions. While sixty-four plant species (26.9% of the total) were referred as "plants

**Box 2: Plants from the Formulary and Medical Guide, their uses and first editions of publication.**

Family/scientific name	Popular name	Part/indication	Edition
Adoxaceae			
<i>Sambucus australis</i> Cham. & Schltld. <sup>e,f</sup>	sabugueiro-do-brasil	Flowers sudorific, roots purgative	1874
Amaranthaceae			
<i>Gomphrena arborescens</i> L.f. <sup>c,d,e</sup>	paratudo	Bitter, aromatic, debility, diarrhoea, intermittent fevers, snake bites	1874
Apiaceae			
<i>Eryngium pristic</i> Cham. & Schltld. <sup>e</sup>	língua-de-tucano	Diuretic, throat inflammation	1874
Apocynaceae			
<i>Allamanda cathartica</i> L. <sup>e</sup>	allamanda cathartica	Cathartic	1920
<i>Hancornia speciosa</i> Gomes <sup>a,c,d,e</sup>	mangabeira	Antituberculosis	1888
<i>Himatanthus drasticus</i> (Mart.) Plumel <sup>c,e</sup>	tiborna, raivosa	Juice drastic, intermittent fevers, jaundice	1874
<i>Himatanthus phagedaenicus</i> (Mart.) Woodson <sup>e</sup>	sucuúba, sebuu-uva	Juice vermifuge, skin ulcers	1874
<i>Mandevilla alexicaca</i> (Mart. ex Stadelm.) M.F.Sales <sup>e</sup>	purga-do-campo	Roots purgative, jaundice, oedema of abdominal viscera	1874
<i>Mandevilla longiflora</i> (Desf.) Pichon <sup>e</sup>	flor-de-babado, flor-de-babeiro	Roots purgative, used in veterinary	1874
<i>Mandevilla tenuifolia</i> (J.C.Mikan) Woodson <sup>d,e</sup>	purga-de-pastor	Roots purgative	1874
<i>Odontadenia punctulosa</i> (Rich.) Pulle <sup>e</sup>	cipó-cururú	Purgative	1874
Araceae			
<i>Caladium bicolor</i> (Aiton) Vent. <sup>e</sup>	tinhorão, papagaio, bezerro	Leaves for treat tonsilitis	1864
<i>Monstera adansonii</i> Schott <sup>e</sup>	pau-de-cobra	Stimulant, narcotic, diuretic, purgative, emmenagogue	1897
<i>Philodendron imbe</i> Schott ex Kunth <sup>e</sup>	imbé, tracuans	Skin ulcers, roots purgative	1874
<i>Pistia stratiotes</i> L. <sup>e</sup>	flor-d'água, lentilha-d'água	Leaves to treat abscess and other skin diseases	1874
Araliaceae			
<i>Hydrocotyle bonariensis</i> Lam. <sup>e</sup>	erva-capitão, erva-do-capitão, acariçoba	Diuretic, liver disorders	1874
Arecaceae			
<i>Copernicia prunifera</i> (Mill.) H.E.Moore <sup>d,f</sup>	carnaúba	Roots diuretic, syphilis, rheumatism	1892
Asparagaceae			
<i>Herreria salsaparrilha</i> Mart. <sup>e</sup>	salsaparrilha, japecanga	Syphilis	1864
Asteraceae			
<i>Acmella oleracea</i> (L.) R.K.Jansen <sup>e</sup>	agrião-do-pará, jambú, nhambú, jambú-açú	Excitant, antiescorbutic	1864
<i>Baccharis articulata</i> (Lam.) Pers. <sup>e</sup>	carqueja-doce	Tonic, febrifuge and for aromatic baths	1874
<i>Baccharis ochracea</i> Spreng. <sup>e</sup>	erva-santa	Stomachic	1874
<i>Baccharis</i> spp.	alecrim-selvagem, alecrim-do-mato	Stimulant, aromatic baths	1864
<i>Conoclinium prasiifolia</i> (DC.) R.M.King & H.Rob. <sup>e</sup>	maria-preta	Stimulant	1874
<i>Eclipta erecta</i> L. <sup>e</sup>	tangaracá	Antidiarrheal	1874
<i>Elephantopus mollis</i> Kunth <sup>c,e</sup>	erva-collegio, fumo-bravo, erva-grossa, suçuáya	Leaves emollient, roots to treat bronchitis and fevers	1864
<i>Mikania cordifolia</i> (L.f.) Willd. <sup>e</sup>	erva-de-cobra	Snake bites	1874
<i>Mikania guaco</i> Kunth	guaco	Snake bites, cholera, respiratory diseases	1874
<i>Mikania officinalis</i> Mart. <sup>e</sup>	coração-de-jesú	Tonic, stimulant and intermittent fevers	1874
<i>Sonchus levis</i> Vell.	serralha	Desobstruent and depurative	1874
Begoniaceae			
<i>Begonia hirtella</i> Link <sup>e</sup>	surucura	Astringent, antidiarrheal	1864
<i>Begonia</i> spp. <sup>e</sup>	azedinha-do-brejo, do-sapo	Astringent, antidiarrheal	1874
Bignoniaceae			
<i>Anemopaegma arvense</i> (Vell.) Stelfeld ex de Souza	catuaba	Aphrodisiac	1920
<i>Crescentia cujete</i> L. <sup>e</sup>	cabacinha	Barks antidiarrheal, fruits laxative and expectorant	1897
<i>Handroanthus serratifolius</i> (Vahl) S.Grose <sup>e</sup>	ipeuva, cinco-folhas	Diuretic, depurative, to treat syphilis and rheumatism	1897
<i>Jacaranda caroba</i> (Vell.) DC. <sup>c,f</sup>	caroba	Leaves against syphilis	1874
<i>Jacaranda procera</i> (Willd.) Spreng. <sup>c</sup>	caroba	Antisyphilitic	1864
Boraginaceae			
<i>Echium plantagineum</i> L. <sup>e</sup>	borracha-chimarona	Leaves emollient	1874
<i>Heliotropium elongatum</i> (Lehm.) I.M.Johnst. <sup>e</sup>	crista-de-galo	Respiratory disease	1874
Brassicaceae			
<i>Coronopus didymus</i> (L.) Sm. <sup>e</sup>	mastruço	Antiescorbutic	1864
Bromeliaceae			
<i>Tillandsia usneoides</i> (L.) L. <sup>d</sup>	barba-de-velho	Antihemorrhoidal	1888
Burseraceae			
<i>Protium icariba</i> (DC.) Marchand <sup>a,e,f</sup>	elemi	Skin diseases	1864

Cactaceae	<i>Hylocereus setaceus</i> (Salm-Dyck) R.Bauer <sup>o</sup>	jamacurú, cumbéba, mandacarú, urumbéba	Fruits antiescorbutic, fevers, gastritis, pulmonar and skin disease	1874
Calophyllaceae	<i>Kielmeyera speciosa</i> A.St.-Hil. <sup>c,e</sup>	malva-do-campo, folha-santa, pinhão	Leaves emollient	1874
Cannaceae	<i>Canna glauca</i> L. <sup>e</sup>	imberi, albará, erva-dos-feridos	Rheumatic pain, wound healing and skin ulcers	1874
Caricaceae	<i>Jacaratia spinosa</i> (Aubl.) A.DC.	jaracatiá	Juice of fruit is vermifuge	1874
Celastraceae	<i>Hippocratea volubilis</i> L.	amendoeira-do-mato	Febrifuge, snake bites, expectorant	1920
Clusiaceae	<i>Clusia insignis</i> Mart. <sup>e</sup>	quapoy, aqui	Flowers for dry skin	1888
Combretaceae	<i>Terminalia argentea</i> Mart. <sup>e</sup>	caxaporra-do-gentio	Resin purgative	1874
Commelinaceae	<i>Commelina erecta</i> L. <sup>c,e</sup>	trapoeraba-rana, marianinha	Diuretics, dropsy, baths for rheumatism	1874
	<i>Tripogandra diuretica</i> (Mart.) Handlos <sup>e,f</sup>	trapoeraba	Diuretics, dropsy	1864
Convolvulaceae	<i>Cuscuta umbellata</i> Kunth <sup>c,e,f</sup>	cipó-de-chumbo	Juice as wound healing	1864
Costaceae	<i>Costus spiralis</i> (Jacq.) Roscoe	canna-do-brejo, macaco, matto, pacocaatinga, uacayá	Leucorrhoea	1874
Cucurbitaceae	<i>Cayaponia espelina</i> (Silva Manso) Cogn. <sup>f</sup>	cerejeira-de-purga, espelina, tomba	Tonic, stomachic, purgative, emetic, liver disorders	1874
	<i>Cayaponia pilosa</i> (Vell.) Cogn. <sup>e</sup>	cayapó, anna-pinta	Seeds purgative, depurative, skin disease, emmenagogue	1874
	<i>Cayaponia martiana</i> (Cogn.) Cogn. <sup>e</sup>	tayuyá, abóbora-do-mato,	Fruits dropsy, purgative, amenorrhoea, leaves to treat ulcers	1864
	<i>Fevillea cordifolia</i> L. <sup>e</sup>	nhandiroba	stomachic, purgative, emetic, liver disorders	1874
	<i>Luffa operculata</i> (L.) Cogn. <sup>e</sup>	bucha-dos-paulistas, purga-de-joão-paes, buchinha	Purgative	1874
Cyatheaceae	<i>Cyathea microdonta</i> (Desv.) Domin <sup>o</sup>	rabo-de-bugio	Bronchitis	1874
Cyperaceae	<i>Kyllinga odorata</i> Vahl <sup>o</sup>	capim-cheiroso, cidreira, marinho, acapé, jarapé	Carminative, antispasmodic, sudorific, diuretic	1874
Dilleniaceae	<i>Davilla rugosa</i> Poir. <sup>c,e,f</sup>	sambaibinha, cipó-de-carijó, cipó-de-caboclo	Leaves to treat oedema of legs and testicles	1874
Droseraceae	<i>Drosera</i> spp. <sup>c</sup>	drosera	Antitussigen	1920
Euphorbiaceae	<i>Cnidocolus urens</i> (L.) Arthur var. <i>urens</i> <sup>o</sup>	queimadeira, pinha	Impingen	1888
	<i>Croton campestris</i> A.St.-Hil., <i>C. fulvus</i> Mart. <sup>c,e</sup>	velame-do-campo	Roots purgative	1874
	<i>Euphorbia hyssopifolia</i> L. <sup>c,e</sup>	erva-de-santa-luzia	Eyes disorders, skin ulcers	1864
	<i>Euphorbia papillosa</i> A.St.-Hil. <sup>o</sup>	maleiteira, leiteira	Purgative	1874
	<i>Euphorbia potentilloides</i> Boiss. <sup>o</sup>	andorinha, erva-de-passarinho	Skin and eyes ulcers	1874
	<i>Hevea guianensis</i> Aubl. <sup>o</sup>	borracha, cautchuc, goma elástica, seringa	Tuberculosis	1874
	<i>Hura crepitans</i> L. <sup>o</sup>	assacú	Leprosy	1864
	<i>Jatropha elliptica</i> (Pohl) Oken <sup>c,e</sup>	jalapão, tiú, raiz-de-lagarto	Roots purgative, jaundice, dropsy	1874
Fabaceae	<i>Andira fraxinifolia</i> Benth. <sup>a,c,e</sup>	angelim	Vermifuge	1864
	<i>Andira inermis</i> (W.Wright) DC.	andira inermis	Bark vermifuge and purgative	1897
	<i>Arachis hypogaea</i> L. <sup>e,f</sup>	mandobi, amendoim	Aphrodisiac	1874
	<i>Dipteryx odorata</i> (Aubl.) Willd. <sup>o</sup>	cumarú, fava-tonka	Tonic	1874
	<i>Hymenaea stigonocarpa</i> Mart., <i>Hymenaea martiana</i> Hayne, <i>Hymenaea courbaril</i> L. <sup>a,c,d,e</sup>	jatahy, jatahyba, jetehy, jatobá	Resin hemoptysis	1874
	<i>Leptolobium elegans</i> Vogel	perobinha-do-campo	To treat epilepsy, antisiphilitic	1920
	<i>Myroxylon balsamum</i> (L.) Harms <sup>b,f</sup>	bálsamo-de-tolú	Bronchitis	1864
	<i>Pachyrrhizus erosus</i> (L.) Urb.	jacatupé	Antidiarrheal, antihemorrhoidal	1888
	<i>Senna occidentalis</i> (L.) Link <sup>b,e,f</sup>	fedegoso, pajámariobá, pajomarioba	Roots diuretic, tonic, dropsy	1864
	<i>Senna rugosa</i> (G.Don) H.S.Irwin & Barneby <sup>o</sup>	amendoirana, alcaçuz bravo, bico-de-corvo, boi gordo, paratudo	Vermifuge	1874
Gentianaceae	<i>Calolisianthus pendulus</i> (Mart.) Gilg, <i>Calolisianthus amplissimus</i> (Mart.) Gilg <sup>o</sup>	genciana-brasileira	Roots febrifuge	1874

<i>Deianira</i> sp. <sup>c,d,e</sup>	centáurea-menor-do-brasil	Bitter flowers sell as centaurea in Europe	1892
<i>Potalia resinifera</i> Mart. <sup>o</sup>	anabi	Leaves astringent, to treat ophtalmia	1874
<b>Humiriaceae</b>			
<i>Endopleura uchi</i> (Huber) Cuatrec.	uxi	Seeds hemostatic	1874
<b>Hypericaceae</b>			
<i>Vismia guianensis</i> (Aubl.) Choisy <sup>o</sup>	caaopiá, pau-de-lacre	Purgative	1874
<b>Iridaceae</b>			
<i>Trimezia galaxioides</i> (Gomes) Ravenna <sup>o</sup>	baririçó, maririçó	Roots purgative	1864
<i>Trimezia juncifolia</i> (Klatt) Benth. & Hook.f. <sup>d,e</sup>	ruibarbo-do-campo, pireto	Roots purgative	1920
<b>Krameriaceae</b>			
<i>Krameria argentea</i> Mart. ex Spreng. <sup>o,f</sup>	ratânia-do-brasil, da-terra	Astringent	1888
<b>Lamiaceae</b>			
<i>Hyptis radicans</i> (Pohl) Harley & J.F.B.Pastore <sup>o,f</sup>	paracary, hortelã-brava, mentrasto, meladinha	Asthma and snake bites	1874
<i>Leonotis nepetifolia</i> (L.) R.Br. <sup>o,f</sup>	cordão-de-frade, cordão-de-são-francisco, leonuro	Excitant, baths for children	1864
<i>Ocimum americanum</i> L. <sup>o</sup>	alfavaca-do-campo, remedio-do-vaqueiro	Excitant, sudorific, constipation	1864
<i>Vitex megapotamica</i> (Spreng.) Moldenke <sup>o</sup>	tarumá	Baths for rheumatism	1874
<b>Lauraceae</b>			
<i>Aniba puchury-minor</i> (Mart.) Mez <sup>o</sup>	puchury-miri	Same as Puchury	1874
<i>Cinnamomum verum</i> J.Presl <sup>o</sup>	canela	Dyspepsy, antidiarrheal	1920
<i>Dicypellium caryophyllaceum</i> (Mart.) Nees <sup>b,e,f</sup>	pau-de-cravo, cravo-maranhão, imyráquiynhá	Aromatic	1874
<i>Ocotea cujumary</i> Mart. <sup>o</sup>	cujumary	Seeds for dyspepsy	1874
<i>Ocotea cymbarum</i> Kunth <sup>o</sup>	sassafrás-do-brasil, pau-sassafrás	Barks tonic	1874
<i>Ocotea longifolia</i> Kunth <sup>o</sup>	canela-de-cheiro	Oil for rheumatic pain and spasm of muscle	1874
<i>Nectandra reticulata</i> (Ruiz & Pav.) Mez <sup>o</sup>		Aromatic, emmenagogue and stomachic	1874
<i>Sassafráz albidum</i> (Nutt.) Nees <sup>a</sup>	sassafrás	Syphylis, wound healing, rheumatism	1864
<b>Lecythidaceae</b>			
<i>Cariniana legalis</i> (Mart.) Kuntze	jequitibá	Astringent, antidiarrheal	1864
<i>Eschweilera grandiflora</i> (Aubl.) Sandwith <sup>o</sup>	sapucaieira	Diuretic, jaundice, hepatites, intermittent fevers	1874
<i>Gustavia hexapetala</i> (Aubl.) Sm. <sup>o</sup>	janiparindiba	Leaves for liver disorders	1874
<b>Linderniaceae</b>			
<i>Lindernia difusa</i> (L.) Wettst. <sup>o</sup>	caa-ataya, erva-de-ferro, mata cana, orelha de rato, purga de João Paes	Emetic	1874
<b>Loganiaceae</b>			
<i>Strychnos toxifera</i> R.H.Schomb. ex Benth. <sup>o</sup>	curare, ervadura, uiráry, ticúna, woorara	Muscle relaxant	1874
<b>Malvaceae</b>			
<i>Guazuma ulmifolia</i> Lam. <sup>c,e</sup>	mutamba, guazuma	Astringent, skin/scalp disease	1897
<i>Helicteres sacarolha</i> A. St.-Hil. <sup>c,o</sup>	sacarroilha, rosea-para-mulas	Veneral disease, emollient	1874
<i>Pavonia sidifolia</i> Kunth <sup>o</sup>	malva diurética	Emollient, diuretic, dysuria	1888
<i>Sida planicaulis</i> Cav. <sup>o</sup>	vassoura	Emollient	1864
<i>Sphaeralcea bonariensis</i> (Cav.) Griseb <sup>o</sup>	malvaisco	Emollient against cough	1888
<i>Triumfetta eriocarpa</i> A.St.-Hil., <i>T. semitriloba</i> Jacq., <i>T. sepium</i> A.St.-Hil., Juss. & Cambess. <sup>o</sup>	carrapicho de calçada	Blennorrhoea	1874
<i>Urena lobata</i> L. <sup>c,e,f</sup>	guaxima, malvaisco	Emollient	1864
<i>Urena sinuata</i> L. <sup>o</sup>	carrapicho	Flowers emollient against cough	1874
<i>Waltheria communis</i> A.St.-Hil. <sup>c,e,f</sup>	douradinha	Emollient against cough	1874
<b>Melastomaceae</b>			
<i>Miconia cinnamomifolia</i> (DC.) Naudin	erva dutra	Leaves antidiarrheal	1874
<b>Meliaceae</b>			
<i>Guarea macrophylla</i> ssp. <i>spicaeflora</i> (A.Juss.) T.D.Penn. <sup>o</sup>	marinheiro de folha larga, tuaiussú, utuapoca	Bark and roots purgative	1874
<b>Menispermaceae</b>			
<i>Chondrodendron platyphyllum</i> (A.St.-Hil.) Miers	abutua, butua, parreira brava	Roots for intermittent fevers	1864
<i>Cissampelos glaberrima</i> A.St.-Hil. <sup>b,o</sup>	cipó de cobra, caapeba, erva-de-nossa-senhora	Snake bites	1874
<b>Moraceae</b>			
<i>Dorstenia arifolia</i> Lam., <i>D. brasiliensis</i> Lam. <sup>b,c,e,f</sup>	contraerva, caapiá, carapiá, caxapiá, cayapiá	Roots excitant, fevers, emmenagogue	1874
<i>Ficus adhatodifolia</i> Schott ex Spreng. <sup>o</sup>	coajinguva, cuáxinguba	Vermifuge	1874
<i>Ficus gomelleira</i> Kunth & C.D.Bouché <sup>o</sup>	gameleira, figueira-branca	Vermifuge, purgative	1888
<b>Myristicaceae</b>			
<i>Virola bicuhyba</i> (Schott ex Spreng.) Warb. <sup>o</sup>	bicuiba, bucuúba, moscadeira-do-brasil	Seeds to treat rheumatic pain	1874
<i>Virola sebifera</i> Aubl. <sup>o</sup>	ucuuba	Rheumatism	1874



Myrtaceae				
<i>Blepharocalyx salicifolius</i> (Kunth) O.Berg,	guabiroba	Leaves antidiarrheal, leucorrhea	1874	
<i>Campomanesia pubescens</i> (Mart. ex DC.) O.Berg <sup>c,e</sup>				
<i>Eugenia ayacuchae</i> Steyerl. <sup>a,d,f</sup>	jaboticaba	Astringent, fruit for treat tonsillitis	1864	
<i>Eugenia pyriformis</i> Cambess. <sup>e</sup>	uvalheira	Refreshing	1874	
Nyctaginaceae				
<i>Boerhavia coccinea</i> Mill. <sup>c,f</sup>	erva-tostão, tangaraca	Diuretic, liver disorders	1864	
Ochnaceae				
<i>Ouratea</i> sp. <sup>c</sup>	batiputá	Oil from seeds to treat rheumatism	1888	
Orchidaceae				
<i>Vanilla planifolia</i> Jacq. ex Andrews <sup>e,f</sup>	baunilha	Stimulant, aphrodisiac, emmenagogue, diuretic	1864	
Phyllanthaceae				
<i>Phyllanthus brasiliensis</i> (Aubl.) Poir. <sup>e</sup>	conabi	Leaves emetic	1874	
Phytolaccaceae				
<i>Petiveria alliacea</i> L. <sup>e,f</sup>	pipi, raiz-de-guiné	Stimulant	1864	
Piperaceae				
<i>Piper anisum</i> (Spreng.) Angely <sup>b,c,e</sup>	jaborandi	Aromatic, sialagogue, odontalgic	1874	
Plumbaginaceae				
<i>Limonium brasiliense</i> (Boiss.) Kuntze <sup>f</sup>	guaycuru, baycuru	Roots astringent	1897	
<i>Plumbago scandens</i> L. <sup>d,e</sup>	queimadeira, loco, caa-pomonga	Vesicant, ear ache	1888	
Polygalaceae				
<i>Acantocladus brasiliensis</i> Klotzsch ex Hassk.	laranjeirinha-do-mato	Cholics	1874	
Poaceae				
<i>Andropogon bicornis</i> L. <sup>e</sup>	sapé	Diuretic	1864	
<i>Stenotaphrum secundatum</i> (Walter) Kuntze <sup>e</sup>	grama-da-praia	Roots emollient, diuretic, to treat inflammation	1874	
Polygonaceae				
<i>Polygonum punctatum</i> Elliott, <i>Muehlenbeckia sagittifolia</i> (Ortega) Meisn. <sup>c,e</sup>	erva-de-bicho, acataya, capeticova, cataya, persicaria, pimenta-d'agua	Stimulant, diuretic, emmenagogue, antihemorrhoidal	1864	
Rosaceae				
<i>Prunus myrtifolia</i> (L.) Urb. <sup>e</sup>	cerejeira, gingeira-brava	Stimulant, neuralgia, liver disorders, antiemetic	1874	
Rubiaceae				
<i>Chiococca alba</i> (L.) Hitchc. <sup>c,d,e</sup>	cainca, cainana, cipó-cruz, cruzeirinha, fedorenta, raiz-de-frade, preta	Roots diuretic, purgative, dropsy, snake bites	1864	
<i>Coutarea hexandra</i> (Jacq.) K.Schum. <sup>d,e</sup>	quina-do-brasil, quina-de-pernambuco	Bark intermittent fevers	1864	
<i>Ladenbergia cujabensis</i> Klotzsch	quina-de-cuiabá	Barks bitter, to treat intermittent fevers	1864	
<i>Ladenbergia hexandra</i> (Pohl) Klotzsch	quina-do-rio-de-janeiro	Bark intermittent fevers	1874	
<i>Ladenbergia lambertiana</i> (Mart.) Klotzsch <sup>e</sup>	quina-do-brasil	Barks bitter, to treat intermittent fevers	1864	
<i>Remijia firmula</i> (Mart.) Wedd. <sup>e</sup>	quina-do-brasil	Barks bitter, to treat intermittent fevers	1864	
<i>Remijia macrocnemia</i> (Mart.) Wedd. <sup>e</sup>	quina-do-brasil	Barks bitter, to treat intermittent fevers	1864	
<i>Rustia formosa</i> (Cham. & Schltdl. ex DC.) Klotzsch <sup>e</sup>	quina-do-brasil	Bark intermittent fevers	1864	
<i>Schizocalyx cuspidatus</i> (A.St.-Hil.) Kainul. & B.Bremer <sup>e</sup>	quina-do-brasil, quina-do-mato	Bark intermittent fevers	1864	
Rutaceae				
<i>Angostura trifoliata</i> (Willd.) T.S.Elias	angostura	Tonic, antidiarrheal, diaphoretic, sudorific, bronchitis	1874	
<i>Esenbeckia febrifuga</i> (A.St.-Hil.) A.Juss. ex Mart. <sup>c,e</sup>	três-folhas-vermelhas, laranjeira-do-mato, quina	Barks as febrifuge	1874	
<i>Galipea jasminiflora</i> (A.St.-Hil.) Engl. <sup>c,e</sup>	três-folhas-brancas, quina-falsa	Barks for treat intermittent fevers	1874	
<i>Pilocarpus pennatifolius</i> Lem. <sup>a</sup>	jaborandi	Sudorific, sialagogue, bronchitis, hydropsy, fevers	1874	
<i>Zanthoxylum tingoassuiba</i> A.St.-Hil. <sup>c,f</sup>	tinguaciba	Intermittent fevers	1888	
Sapindaceae				
<i>Cupania vernalis</i> A.St.-Hil.	caboatan-de-capoeira	Barks for asthma and cough	1888	
<i>Paullinia pinnata</i> L. <sup>e</sup>	timbó, cururu-apé	Narcotic, sedative	1864	
Sapotaceae				
<i>Manilkara excelsa</i> (Ducke) Standl.	massaranduba	Respiratory disorders	1874	
<i>Pouteria caimito</i> (Ruiz & Pav.) Radlk. <sup>e</sup>	abiaba	Antidiarrheal, intermittent fevers	1897	
<i>Pradosia lactescens</i> (Vell.) Radlk. <sup>b,f</sup>	monésia, buranhém, guaranhém	Baths to treat erysipela	1864	
Scrophulariaceae				
<i>Buddleja stachyoides</i> Cham. & Schltdl. <sup>c,e,f</sup>	barbasco, verbasco, calção-de-velho	Leaves and flowers emollient	1874	
Simaroubaceae				
<i>Simarouba versicolor</i> A.St.-Hil. <sup>c,d,e</sup>	parahyba	Bark against head lice	1874	
Siparunaceae				
<i>Siparuna brasiliensis</i> (Spreng.) A.DC.	limoeiro-bravo	Leaves for contusion, respiratory disease	1874	

<b>Solanaceae</b>			
<i>Brunfelsia uniflora</i> (Pohl) D.Don <sup>d,e</sup>	manacá, camgabá, geratcacaca, jeretaca	Roots purgative, antisyphilitic	1874
<i>Solanum aculeatissimum</i> Jacq.	arrebenta-cavalo	Digestive disorders, skin diseases	1888
<i>Solanum americanum</i> Mill. <sup>c,e</sup>	giquirioba, jiquirioba	Skin disease	1892
<i>Solanum cernuum</i> Vell. <sup>c,e</sup>	velame-do-mato, braço-de-preguiça	Leaves liver disorders	1874
<i>Solanum pseudoquina</i> A. St.-Hil. <sup>c,e</sup>	quina-de-são-paulo	Bark intermittent fevers	1874
<b>Styracaceae</b>			
<i>Styrax maninul</i> B.Walln., <i>S. ferrugineus</i> Nees & Mart. <sup>e</sup>	estoraque-do-brasil	Stimulant	1897
<b>Urticaceae</b>			
<i>Bohemeria caudata</i> Sw. <sup>e</sup>	asa-peixe	Baths antihemorrhoidal and diuretic	1874
<i>Cecropia palmata</i> Willd. <sup>a,c,e</sup>	ambayba, imbayba, umbauba, árvore-da-preguiça	Skin disease, venereal disease	1864
<b>Verbenaceae</b>			
<i>Glandularia microphylla</i> (Kunth) Cabrera <sup>e</sup>	alecrim-do-campo	Aromatic baths	1892
<i>Lippia brasiliensis</i> (Link) T.R.S.Silva <sup>e</sup>	camará, erva-sagrada	Febrifuge	1897
<i>Lippia pseudothea</i> (A.St.-Hil.) Schauer <sup>c,e,f</sup>	chá-de-pedestre, chá-de-frade	Stimulant	1874
<i>Stachytarpheta jamaicensis</i> (L.) Vahl <sup>e</sup>	gervao, orgibão, urgevão	Leaves sudorific and stimulant	1864
<b>Violaceae</b>			
<i>Anchietea pyrifolia</i> (Mart.) G.Don <sup>c,e,f</sup>	cipó-sumá, piragaia	Roots purgative	1874
<b>Winteraceae</b>			
<i>Drimys brasiliensis</i> Miers <sup>c,e</sup>	casca-de-anta, paratudo	Antispasmodic	1874
<b>Zingiberaceae</b>			
<i>Renalmia aromatica</i> (Aubl.) Griseb., <i>Renalmia alpinia</i> (Rottb.) Maas <sup>e</sup>	pacová, cuité-açú, paco-seroca	Roots stomachic, to treat skin ulcers	1874
<sup>a</sup> Cited by Piso (1648) (based in popular name).			
<sup>b</sup> Cited in Triaga Brasilica (Pereira et al., 1996).			
<sup>c</sup> Cited by Saint-Hilaire in his field book (Brandão et al., 2012).			
<sup>d</sup> Cited by Gardner in his manuscripts (Fagg et al., 2015).			
<sup>e</sup> Cited by Von Martius in <i>Materiae Medicae</i> (Martius, 1843).			
<sup>f</sup> Cited in 1st edition of Brazilian Official Pharmacopoeia (Brandão et al., 2009).			

from Brazil” in the 6th edition from 1864, higher numbers were observed in subsequent editions, reaching a total of 238 in the last edition, from 1920.

Among the traditional uses, purgative plants were the most cited by the author (30 species), being 21 new species included in the edition of 1874. Purgatives were widely used in the 19th century due to the belief that diseases were caused by a “dirty body” and it was necessary to “purge”, for cleansing. Purgatives from plants are no longer used in the medical practice, and this fact can explain the existence of few data about them in the medical literature – only a report for *J. princeps* was found, describing episodes of diarrhoea after its use (Nishioka and Escalante, 1997), and two studies showing the laxative effect of *Operculina macrocarpa* in mice (Michelin and Salgado, 2004; Paganotte et al., 2016). On the other side, plants used to treat diarrhoea were also very important in the 19th century and the most known and used preparation was made of ipecacuanha root, *Carapichea ipecacuanha*, Rubiaceae. The beneficial effect of this plant described as early as the 16th century is due to the presence of the alkaloids emetine and cepheline. These substances act specifically on *Entamoeba* parasites that cause diarrhoea, which were prevalent and often fatal in Chernoviz’s time. Although eighteen Brazilian plants were cited as anti-diarrheal, besides *C. ipecacuanha*, only *Psidium guajava* had this property evaluated (Ojewole et al., 2008; Birdi et al., 2010, 2014). *Cacalia mentrasto* and *Simarouba amara* were evaluated as antimicrobial (Caceres et al., 1990; Adetutu et al., 2012; Singh et al., 2013), which can be related to an anti-diarrheal function.

A total of 55 species were cited as useful to treat general skin diseases in the six studied editions, including lupus, acne, eczema, psoriasis, leprosy, astringent, emollient, as wound healing, to treat skin ulcers, abscess, burns, dry skin, erysipela and impingem. From these, eighteen studies were performed to date in order to verify the efficacy of these plants (Box 1). Other 21 plants were registered as diuretics, nine being cited already in the first edition (*Tripogandra diuretica*, *Senna occidentalis*, *Boerhavia hirsuta*, *Phyllanthus* spp.,

*Andropogon bicornis* and *Polygonum* spp., *Acanthospermum australe*, *Chiococca alba* and *Vanilla planifolia*). Despite the higher number of species used and their old use, only *Phyllanthus niruri* has been submitted to pharmacological studies, in order to verify its diuretic activity (Micali et al., 2006; Giribabu et al., 2014). Fever was a very common health problem at that time, but the most feared was the intermittent fever, showing typical symptoms of malaria. The medical cure for malaria originated in the 17th century when the Spaniards learned, from the Native Americans living in Peru, the use of the bark from *Cinchona* spp., especially *Cinchona succirubra* Pav. ex Klotzch (Rubiaceae), known as “china” or “quina”. In the 19th century, the Portuguese stimulated the search for substitutes for *Cinchona* and many species were named “quina” (Cosenza et al., 2013). Among the 39 plants registered in the books to treat fevers, 26 species were pointed by Chernoviz as useful to treat intermittent fevers, among them seven species of Brazilian quinas (*Strychnos pseudoquina*, *Ladenbergia hexandra*, *Remijia ferruginea*, *Schizocalyx cuspidatus*, *Esenbeckia febrifuga*, *Galipea jasminiflora*, and *Solanum pseudoquina*). From these, only *Strychnos pseudoquina* and *R. ferruginea* were evaluated to date as antimalarial and they showed a moderated activity (Andrade-Neto et al., 2003).

Until the first years of the 20th century, the Pharmacopoeia General from Portugal published in 1794, was the official medical reference used in Brazil. In this Pharmacopoeia, few Brazilian species were officialized, among them abutua (*Chondrodendron platyphyllum*, Menispermaceae), copahyba balsam (*Copaifera* spp., Fabaceae), contraherva (*Dorstenia* spp, Moraceae), Elemi or Almacega from Brazil (*Protium icariba*, Proteaceae), ipecacuanha (*Carapichea ipecacuanha*, Rubiaceae), ipecacuanha branca (*Pombalia calceolaria*, Violaceae) and *Smilax salsaparrilha*, Smilacaceae. The Portuguese Pharmacopoeia was replaced by the Chernoviz’s *Formulary and Medical Guide* and this book was then required in all Pharmacies in Brazil. This occurred until the publication of the first edition of the Brazilian Pharmacopoeia (FBRAS), in 1926. Fifty-one native plant species previously described by Chernoviz were then

formalized in the conventional medicine by their inclusion in the first edition of FBRAS (Brandão et al., 2009). The Brazilian plants, cited by Chernoviz, and included in the 1st edition of FBRAS, are examples of American medicinal plants used both in traditional and conventional medicine.

It is unquestionable that the rational use of medicinal plants should be supported by proper laboratorial investigations and clinical trials (Cravotto et al., 2010; Atanasov et al., 2015). Sixty-one species cited by Chernoviz (25.6%) have been submitted to *in vitro* and pre-clinical studies and their traditional uses were confirmed. We argue that these plants must be prioritized in development of medicines, submitting them to clinical studies or by considering their traditionality, as established by WHO. It is also very important to define strategies for the protection of the biodiversity and the Native American traditional heritage.

### Authors' contributions

All authors contributed to the revision and writing of the manuscript. JPS reviewed and updated the botanical names. The results presented here are part of the PhD thesis or LMR.

### Conflicts of interest

The authors declare no conflicts of interest.

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