

Articoli/Articles

EXOTIC PLANTS IN ITALIAN PHARMACOPOEIA
(16TH -17TH CENTURIES)

FEDERICA ROTELLI

Società Botanica Italiana – Florence, I

SUMMARY

In the 16th century the arrival of new exotic plants from the Americas and the Orient enriched the panorama of medicines that were sold by the Italian pharmacies. The increase of knowledge on the therapeutic virtues of new foreign plants suggested to the contemporaries great caution before adding them to the classical texts of Dioscorides, Pliny, Galen and the Arab medieval authors. In the 17th century we witnessed a further increase in the use of these plants and the pharmacopoeias, which contained many medicinal preparations based on exotic plants, absent in the classical texts. However, the scientific paradigm in which European medicine operated remained throughout this period linked to the classic environment, and thus, medicine was unable to face the causes of major epidemics that afflicted the populations in those two centuries. The plague, syphilis, pneumonia, smallpox and infections were to go on being the scourges that could not be fought other than in a marginal way. Only for malaria, a new plant arriving from South America had an important impact: the Cinchona tree. Too little for a period that was full of progress in science.

The arrival of exotic plants in Italian medical culture

When asked what progress there had been in pharmaceutical science before the 2nd half of the 19th century, i.e. before the birth of biochemistry and pharmaceutical chemistry, the Swiss historian of pharmacy François Ledermann replied that “le progrès en pharmacie est lié à l’arrivée de nouveaux produits, aux bouleversements de la matière

Key words: Exotic medicinal plants - Biodiversity - Italian pharmacopoeias -
Pharmacology

médicale par des drogues venues d'ailleurs, de loin [...] L'exotisme [...] c'est là le moteur majeur de l'innovation pharmaceutique, ceci à toutes les époques"¹. This is an important assertion substantiated by the history of Italian pharmacopoeia, when, from the 16th century onwards, some exotic medicinal plants introduced into Europe a few decades before, were included in the *Antidotaria*.

In fact, between the end of the 15th century and the beginning of the 16th the era of the great explorations began, which had a deep influence on European history. While the Spanish were engaged in the conquest of the West Indies, the Portuguese obtained the monopoly on the commerce of the East Indies, which had been under the control of the Arabs until then². After having conquered Goa in 1510 where they established a base, in 1511 the Portuguese reached Malacca and the Molucca Islands, where they took over the trade of camphor, nutmeg, cloves and above all pepper, for which Portugal became the most important collection point in Europe throughout the 16th century. With the occupation of the Island of Ceylon in 1518, the Portuguese secured an exclusive control over the cinnamon trade, turning Lisbon into the main emporium for spices³.

From 1492 onwards, with the first expeditions to the islands and lands of the West Indies promoted by the Spanish Crown, the first medicinal plants from the American continent reached Europe. While Seville, together with Cadiz and Sanlucar de Barrameda, constituted the terminal to which the products from the New World arrived⁴, thanks to the monopoly on the trade with the West Indies assigned with a Royal Decree in 1495 and held by the Casa de Contratación until 1529, Italy also had an important role in the introduction and diffusion of known and unknown exotic medicinals. Thanks to the wealth of the Italian merchants and bankers who equipped ships flying Portuguese and Spanish flags, information about the new exotic plants reached Italy directly. The presence of Genoese and Florentine merchants in Seville and Lisbon also made it possible to speed up

the importation and distribution of the new products among Italian physicians and apothecaries⁵. What is more, the well-established tradition of medical studies in Italy encouraged the earliest attempts to cultivate and acclimatise the new plants⁶.

In Italy, throughout the 16th century, with the arrival of the first American medicinal plants, a series of reports by travellers and chroniclers from the Indies started to circulate on the therapeutic treatments extolling the medicinal properties of native plants and roots in addition to actual medicine treatises describing the new medicines⁷. Their printing allowed for the spreading of the knowledge and use of the new medicinal preparations⁸.

One of the first and foremost sources of information about the overseas novelties was the Spanish naturalist Gonzalo Fernández de Oviedo (1478-1557). In his *Sumario* and the 1st part of *Historia natural y general de las Indias*, printed in Italy 1534 and 1556 respectively, a few years after the two Spanish *editiones principes*⁹, was the first to deal with guaiacum and its two species *Guaiacum officinale* L. (*guayacan*) and *Guaiacum sanctum* L. (*palo santo*), and with tobacco, called *tabaco* (*Nicotiana* spp.). These two plants were quite successful in European pharmacopoeia, because they were used to treat syphilis¹⁰. In *Primera parte della Cronica del Perù*¹¹ printed in Italy from the 2nd half of the 16th century onwards¹², the Spanish chronicler Pedro Cieza de León (ca. 1521-1554) pointed out another plant of American origin against syphilis: sarsaparilla (*Smilax officinalis* H.B.K. or *Smilax siphilitica* Humb.)¹³. In *De Orbe Novo Decades*, the historian Pietro Martire d'Anghiera (1457-1526), mentioned the *goaconax* tree (*Croton* sp.), the bark of which was used by the colonisers of the *Hispaniola* Island as a succedaneum of Oriental Balm (*Commiphora opobalsamum* (L.) Engl.) for treating wounds¹⁴. However, the work with the strongest impact on the European botanical culture and on the diffusion of the American pharmacopoeia was the treatise by the Spanish physician Nicolas Monardes (1493-

1588), written between 1565 and 1574 and translated into Latin (1574)¹⁵ by the physician Charles de l'Ecluse (1526-1609) and into Italian (1575)¹⁶. Many plants from the New World mentioned in this work were introduced into the Italian pharmacopoeias and included by Italian physicians in their treatises¹⁷. Besides, guaiacum, sarsaparilla, which he divided into several species (*Smilax medica* L., *Smilax utilis* Hemsl. and *Smilax officinalis* H.B.K.), and tobacco (*Nicotiana tabacum* L.), there also appeared *liquidambar*, a resin obtained from *Liquidambar styraciflua* L., *tacamahaca*, another resin obtained from the plant *Elaphrium tecomaca* (D.C.) Standl., Balsam of Peru (*Myroxylon balsamum* (L.) Harms. var. *pereirae* Harms.), Balsam of Tolu (*Myroxylon balsamum* (L.) Harms. var. *balsamum* Harms.), *mechoacan* root (*Convolvulus mechoacan* Vandelli), prescribed as a purgative, *sassafras* (*Sassafras albidum* (Nutt.) Nees), and China, probably an American species (*Smilax pseudo-china* L.), used as a substitute of the oriental China root (*Smilax china* L.)¹⁸.

Charles de l'Ecluse also supervised the Latin edition of the work by the Spanish-Portuguese physician Garcia da Orta (ca. 1500-1568), printed in 1567¹⁹, four years after its first edition in Portuguese²⁰. Together with that of the Portuguese physician Cristóvão da Costa (ca. 1525-1594)²¹, also summarised and translated into Latin by l'Ecluse, Orta's work was included in the 1593 edition²². Both were the result of several years of study in India and of observations carried out on the medicinal plants of that land, and became the main sources through which an improved knowledge of the therapeutic properties of the oriental flora disseminated in Italy²³. Some of these plants were already known, also thanks to their diffusion via Arab medicine: e.g. camphor, of which Orta mentioned two species (*Dryobalanops aromatica* Gaertn. and *Cinnamomum camphora* (L.) J.S. Presl.), cubeb (*Piper cubeba* L.), ginger (*Zingiber officinale* Rosc.), nutmeg (*Myristica fragans* Houtt.), and aloe wood (*Aquilaria agallocha* Roxb.). Another plant that was mentioned was

raiz da China, i.e. China root (*Smilax china* L.), used for several years to treat syphilis²⁴.

In most cases, the chroniclers or merchants' decision to include certain therapeutic species in their description of the new medicinal plants depended chiefly on the fact that they were already known by the native populations, who had 'tested' them, and were not available in Italian medicine, and were suitable for treating the diseases newly spread in Europe. As someone has asserted, "no new medicinal plants were discovered by European physicians among the new exotic species"²⁵.

In Italy, the new exotic plant species found a favourable environment in the private gardens of princely courts and in the palaces of local lords, where they were cultivated for decorative purposes or just for curiosity and also tested. The private gardens, real forerunners of university botanical gardens, contributed to the introduction, acclimatation and diffusion of the exotic food and officinal plants²⁶. In the course of the 16th and 17th centuries many private gardens established in the cities of Venice, Padua, Florence, Genoa, Naples and Rome²⁷. And in Venice, always alerted to the introduction of exotic plants, a group of scholars were interested in natural and botanical history and eager to collect documents on the novelties from the Indies²⁸. One of them was the historian Andrea Navagero (1483-1529), who visited Spain on diplomatic mission for the Republic of Venice between 1524 and 1528: there he had the chance to see many specimens of plants from America and to bring them back for his own private museum in Venice, in addition to the plants and flowers that enriched his gardens in Selva of Montello and Murano²⁹.

The first botanical gardens appeared from the 1550s onwards in such Italian cities as Pisa, Padua, Florence, and Bologna: there, together with European and oriental plants, several American plants, introduced into Europe a few decades before, began to be cultivated³⁰. Public gardens took on a crucial role in the diffusion and inclusion

of exotic herbs into the Italian pharmacopoeia. Gardens were an inexhaustible source for therapeutic products and a place where physicians and apothecaries could study the new plants and test them for the preparation of their remedies, obtaining them directly from the gardens, if necessary³¹. Some catalogues of botanical gardens, manuscripts, and medical works contain several references to the exotic plants grown in the university gardens during the 16th century. As we shall see further on, a botanical garden famous at that time for its wealth of plants was that of Bologna, the establishment of which in 1568 was the result of the work of the physician and naturalist Ulisse Aldrovandi (1522-1605), and of his great interest in the study of medicinal plants.

The years in which the first botanical gardens arose were also the period in which the first herbaria, i.e. collections of dried plant specimens, began to be prepared: they chiefly contained plants grown in botanical gardens. The new collections, or *horti sicci*, became an important botanical research instrument allowing to study plants regardless of their place and period of growth³². An important source for actual knowledge of foreign plants was the earliest herbaria that have been preserved: they were made by three pupils (Gherardo Cibo, Ulisse Aldrovandi and Andrea Cesalpino) of the physician and naturalist Luca Ghini (ca.1490-1556), whose lessons they followed in Bologna and Pisa³³. The first of the two herbaria by the scholar Gherardo Cibo (1512-1600), started in 1532, while the second, in four books, probably was collected in the period 1549-1553³⁴. The former, in addition to several oriental plants such as *Jasminum officinale* L. and *Impatiens balsamina* L., also contains a sample of *Zea mays* L., maybe the earliest specimen to reach Europe³⁵.

Ulisse Aldrovandi's herbarium, probably started in 1551 and made of 16 books containing more than 4,000 species, included many exotic plants: some received from Luca Ghini came from the bo-

tanical garden of Pisa, and were grown by Aldrovandi in the botanical garden of Bologna³⁶. Among the American plants, besides food species as sunflower (*Helianthus annuus* L.), tomato (*Lycopersicon esculentum* Mill.), prickly pear (*Opuntia ficus-indica* (L.) Mill.) and avocado (*Persea gratissima* Gaertn.), there were medicinal plants as sarsaparilla, tobacco and jalap (*Ipomoea jalapa* (L.) Pursh. or *Ipomoea purga* Wend.), with the latter sent by the two prefects of the botanical garden of Padua, Pietro Antonio Michiel and Giacomo Antonio Cortuso³⁷. As some of Aldrovandi's manuscripts show, his museum contained some specimens of arboreal species as *Sassafras albidum* (Nutt.) Nees and *Sassafras officinale* Nees, and *Guaiacum officinale* L.³⁸. The third herbarium (1563) is that of the physician Andrea Cesalpino (1519-1603)³⁹, the prefect of Pisa botanical garden from 1555 to 1583. Most of the 768 specimens in his herbarium come from Pisa botanical garden in its second location, starting from 1563⁴⁰. Many Asian and African plants were included: for instance Indian lilac (*Melia azedarach* L.) and cherry laurel (*Prunus laurocerasus* L.); among the American plants, Western cashew (*Ipomoea quamoclit* L.) and ivy-leaved morning glory (*Ipomoea Nil* (L.) Roth.)⁴¹.

Ulisse Aldrovandi and the first Bolognese Antidotarium, 1574

The *Antidotarium Bononiense*, one of the first official European pharmacopoeias⁴², was first printed in 1574⁴³. Though presented as the work of the *Collegio dei Medici e Filosofi* of Bologna, the *Antidotarium* had mostly been compiled by the physician Ulisse Aldrovandi⁴⁴. A manuscript by Aldrovandi himself is identical to the first edition⁴⁵. One of the main reasons that led the Bolognese scholar and the *Collegio dei Medici e Filosofi* to compile an official pharmacopoeia was undoubtedly the great uncertainty and confusion of pharmaceutics at that time⁴⁶. Numerous pharmaceutical digests were circulating, each of which with a different approach, differ-

ences in nomenclature and in the description of the preparation and composition of medicines, particularly with regard to the quality and weight of the ingredients, in addition to the lack of official regulations, which was not preventing the proliferation of frauds and (often ineffective) imitations of remedies⁴⁷.

The contentious medical and sanitary situation in Italy is best represented by the hotly polemical statement by the canon Tomaso Garzoni (1549-1589). In his *Piazza universale* (1585), appealing to the *Protomedicato*, he accused apothecaries of mistakes and frauds in the preparation of the medicines sold in pharmacies⁴⁸. Garzoni defined the activities of the apothecaries and the quality of their medicines, which often turned out to be harmful to the patients' health as follows:

[...] componendo alle volte medicine mortifere col ministrare una cosa per una altra o col meschiare ne i calici delle bevande robba marcia, vecchia, stentita et fracida quando dir si possa, la quale alle volte (the apothecaries) conoscono, ed alle volte ancora con disconcia ignoranza hanno comprata da barbari levantini a buon mercato per levar su bottega alla meglio che succeda⁴⁹.

Moreover, until the 16th century, it was quite unusual to find *albarelli* with the indication of their medicinal content: in most cases, the jars were decorated with plant motifs, figures of saints, heraldic devices and sometimes inscriptions with the names of their producers. The jars were seldom made to order, and their vast majority were meant for an extensive market, being purchased by apothecaries without specification of the simple or compound medicine they would contain⁵⁰. On this, Garzoni wrote:

Ci sono ancora fra loro di molte fraudi, & inganni non solamente di apparenza ridicolosa, come quei bussoloti, quegli albarelli, & quelle scatole, che con lettere maiuscole, & grosse & alludono talhora a mille unguenti, o confettioni, o aromati pretiosi, & nondimeno son vacui di dentro [...].⁵¹

In addition, the Florentine *Ricettario* (1550), dealing with the exotic plants not available in Italy, urged the apothecaries to preserve only those that had not “patito per il tempo, o luogo, o viaggio incomodo alcuno, & tutto si comprende per l’odore, sapore, & colore di dette, & di più se si veggono le foglie, & i fiori appiccati a gambi dell’herbe loro”⁵². This recommendation was followed by a careful description of the various simple medicines that made it possible for the apothecaries to recognise falsified essences. For instance, *Legno Guaiacoco* of which “hoggi che s’usa separatamente la scorza, interviene che e adulterata con le scorze del frassino, ò altre simili, le quali si conoscono dal sapore, & odore proprio”⁵³.

For several years, the *Protomedicato* Bolognese and Aldrovandi, Prior of the institute since 1554, had been trying to remedy this situation, both through direct control in apothecary’s shops in the city, with a quantitative and qualitative analysis of the composition of the medicines and an examination of their modes of preservation, and by compiling medicinal plant catalogues that the shops were supposed to possess and consult when needed⁵⁴. Aldrovandi himself compiled an *Index universalis omnium plantarum fossilium ac aliarum rerum naturalium quae apud pharmacopeas mediocriter existentes in usu medico habere debent* that included *Guaiacum lignum* (*Guaiacum officinale* L.) and *Salsa periglia* (*Smilax* sp.)⁵⁵, of American origin. In another manuscript of Aldrovandi’s dated to 1557, under the heading *Tassa delli pretii quali vendere si debbano le robbe medicinali, simplici e compositae*, we find the *Decottion de legno santo fatto con lib. una de legno al commun uso per syr. (lib. 1 sol. 2 d. 6)*⁵⁶ and the prices of *legno santo limato (lib. 1 sol. 8)*, *intiero (lib. 1 sol. 8)* and *limato messo decottione (lib. 1 sol. 6.9 d. 10)*⁵⁷. *Guaiacum* appears also in *Elenchus rerum naturalium tam animatarum quam inanimatarum quae ad pharmacopeam mediocriter instructa compones exiguntur* under the heading *Guaiaci lignum*⁵⁸. The same manuscript also mentions another American plant, *Herba Regina seu Nicotiana*

or just *Nicotiana* (*Nicotiana tabacum* L.), that is tobacco⁵⁹. There are also some Asian plants, as *Nux indica* (*Cocos nucifera* L.), *Grana paradisi* (*Aframomum melegueta* (Rosc.) K. Schum.), and *Cubeba* (*Piper cubeba* L.)⁶⁰.

During the years from 1568 to 1605, the Botanical Garden was managed jointly by Aldrovandi and Cesare Odone (1500-1571). After Odone's death, it was under Aldrovandi's supervision. During this period, its collection of new species grew from 800 in 1573 to 3,000 in 1595⁶¹. The necessity to directly observe the plants to be used in medicine and the usefulness to know their natural habitat was explicitly stated by Aldrovandi in a manuscript in which he asserted

*quanto utile ne rechi questa pubblica lettura delle piante, che di poi oculatamente a ciascuno si mostra nell'orto medico, sendo questa facultà, si come la cognizione anatomica, tanto necessaria, che dai libri non possono apprendersi senza la viva voce del precettore che col dito glielie mostri e ponga avanti agli' occhi*⁶².

In a letter to Cardinal Paleotti written in August 1564, when the garden was still a project, Aldrovandi showed his deep interest in the cultivation of new exotic plants, particularly American ones, which could be directly observed and studied in the Botanical Garden⁶³. Two manuscripts of the Bolognese scholar contained a list of the plants to be cultivated in Bologna Botanical Garden from its foundation to 1582. The first, titled *Elenchus plantarum omnium quae in studiosorum horto publico, cui ipse praeest, terrae gremio fuere commisa ab anno 1568, quo primum fuit extractus, usque ad 1582*, mentions, among the species present in the garden, some plants of American origin: *Pomo d'oro* or *Tumatli* (*Lycopersicum esculentum* Mill.), *Capsicum brasilianum* (*Capsicum annuum* L.), *Nicotiana seu tabaco* (*Nicotiana tabacum* L.), *Planta maxima* (*Helianthus annuus* L.), *Melo pepo* (*Cucurbita pepo* L.), *Garofoli turchi* (*Tagetes erecta* L. or *T. patula* L.), *Ficus indica seu Opuntia* (*Opuntia ficus-indica*

(L.) Mill.), *Nil Avicenna*, *Nil* (*Ipomoea hederacea* Jacq./*Ipomoea nil* (L.) Roth.), *Nux metella seu stramonia* (*Datura innoxia* Mill.), *Nasturtium indicum* (*Tropaeolum majus* L.), *Aloe spinosa* (*Agave Americana* L.), *Arbor vitae* (*Thuya occidentalis* L.), *Cassia solutiva* (*Cassia occidentalis* L.), *Maraviglia/Gelsominum indicum* (*Mirabilis jalapa* L.), and *Ligni sancti* (*Guaiacum officinale* L.). There are also several plants of Oriental origin: *Indaco* (*Indigofera tinctoria* L.), *Acacia prima gummi arabicum* (*Acacia Senegal* (L.) Willd.), *Kali arabum* (*Salsola kali* L.), *Tamariscus* (*Tamarix* sp.), *Colocynthis aegyptiaco* (*Citrullus colocynthis* Schrad.), *Tulipanum turcarum* (*Hyacinthus orientalis* L.), and *Turbit* (*Ipomoea turpethum* R.Br.)⁶⁴. In the other manuscript, *Index herbarum omnium tam vulgarium quam exoticarum, in hoc anno 1582 in studiosorum horto publico Bononiae coluntur*, mentions *Fasiolus Indicus* (*Phaseolus vulgaris* L.) among the new American species⁶⁵.

Among the formularies still used by the apothecary of Bologna in the 16th century, there were the *Antidotarium Nicolai* attributed to Nicolò Preposito or Salernitano (11th-12th centuries), printed in Bologna in 1471⁶⁶, and the *Antidotarium Nicolai* by Nicolò Alessandrino, also known as Myrepsos (13th century), a Byzantine work much used in many schools of medicine until the 17th century⁶⁷. These two antidotaria, together with the work of the Arab physician Mesue, were the chief references for the classification and preparation of remedies in the Bolognese *Antidotarium*.

The 1st part of the Bolognese *Antidotarium* describes 547 compound medicines with their therapeutic properties and doses, while the second part provides the weight, period of validity, succedanea, and synonyms. Most of the medicinal plants belonged to the European and Asian flora, and many of the oriental plants had been introduced into Western medicine during the Middle Ages. Among the latter, we will mention only three: *Spica indica* (*Nardostachys jatamansi* (D. Don) D.C.), *Granorum paradisi* (*Aframomum melegueta* (Rosc.)

K. Schum.), and *Cubebae* (*Piper cubeba* L.)⁶⁸. Among the 89 *Olij* (oils), there is *Oleum ex Ligno Guaiaco*, that is, the oil exuded by guaiacum wood, which was prescribed against “tumores gallicos, et gallica ulcera”, the different forms in which syphilis appeared⁶⁹.

The 16th century Florentine Ricettari

The 4th edition of the *Ricettario* was published in Florence the same year as the Bolognese *Antidotarium*⁷⁰. This edition, like the previous of 1567⁷¹, contained several new entries (exotic medicinal plants). It is important to stress that the 1st edition of the Florentine *Receptario* (1498) was the first public pharmacopoeia in Europe⁷². Its title, *Nuovo Receptario* does not refer to previous editions, but emphasizes its novelty in comparison with the formularies of that period⁷³. However, most of its remedies drew on Arab sources, still considered as “classics”⁷⁴: cinnamon, sandal, cloves, camphor, tamarind, turmeric, galangal, which were all exotic plants of Oriental origin, were the main ingredients used in the preparation and composition of medicines according to the Galenic-Arab tradition, still influential at the end of the 15th century⁷⁵. No American plant appears in the prescribed medicines. Between the 1st edition of the Florentine *Receptario* and the 3rd (1567) and 4th (1573-1574) there actually was a 1550 edition that did not introduce great changes in comparison with the 1498 edition: the medicinal plants, totaling ca. 120, were practically identical to those of the first edition⁷⁶. One of the few novelties was the introduction of guaiacum, described as follows: “Il legno guaiacco, detto altrimenti legno santo, è tenuto una spetie di Ebano. El migliore è quello, che è grave, denso, che ha la parte di dentro ben nera, et quella datorno, che volge al giallo”⁷⁷. Moreover, under the title *Del trarre gl’Olij*, the *Receptario* described the procedure for the distillation of guaiacum wood oil⁷⁸. For the first time, the *Ricettario* included a list of substitutes, i.e. plants that apothecaries, when preparing medicines, could use to replace “quelle medicine semplici, le quali al

presente è impossibile provvedere, ò vero in queste parti molto difficile”. If *Aspalato* was unavailable, *Legno Aloe* was suggested; if one could not find *Balsamo liquore*, he could use *Therebentina stillata*, or *Olio di Gherofani*, or oil of *Noce moscade*, or *Balsamo, che vien dell’India* (*Myroxylon balsamum* (L.) Harms.), an American plant; and one could use *Cannella fine* if *Casia* was not available⁷⁹.

As we have said, the 1567 and 1573-1574 editions of the Florentine *Ricettario*, which present only minor formal or typographical differences, contain the highest number of important novelties⁸⁰. Among its 547 medicines, the 1567 edition included only 262 preparations mentioned in the 1498 edition, adding 285 new ones. The 1550 edition introduced only 60 new medicines. The four editions of the *Ricettario* gradually relinquished Arabic medicines and preferred preparations from the Graeco-Roman tradition⁸¹. Moreover, the 1567 and 1573 editions witness to a considerable increase in medical prescriptions referring to Florentine and Italian physicians of the 12th, 14th, 15th and 16th centuries: while the 1498 edition contained 69 *prescrizioni magistrali*, in the following editions their total rose to 123, becoming the highest percentage of sources from which the medicines were obtained⁸². Among the various factors that contributed to this change there probably was the influence of the new medical knowledge resulting from travels to new worlds⁸³.

A chapter of the 1567 edition of the *Ricettario* deals with the “*piante forestiere, che non nascono ne i nostri paesi*” and “*si conoscono per i detti de gli scrittori [...]*”⁸⁴. And among the *piante forestiere* there is *Balsamo Occidentale* or *dell’Indie Occidentali*, which “*si cava d’una pianta di quel paese, chiamata Coagonaz [...] bollendo in acqua i rami tagliati in pezzi, ò veramente intaccando l’arbore, e ricogliendo il liquore, che ne distilla*”. The 2nd part mentions the *Balsamo delle Indie Occidentali* among the simple medicines as a substitute when *Balsamo liquore* cannot be found⁸⁵. There are also *Bengiui* (*Styrax benzoin* Dryand.), which “*è una gomma di un’arbore forestiero*”⁸⁶;

Cina, which “è una radice di una pianta forestiera così chiamata per portarsi (come vogliono alcuni) dalla regione della China”⁸⁷; and *legno guaiaco, detto altrimenti legno santo*⁸⁸. Under the title *Del trarre gli Olij*, there is a description of the procedure for the extraction of oil from several types of wood, including guaiacum. Another plant that appears is *Salsapariglia*, which “è una radice di una pianta, portata dall’Indie Occidentali, lunga due ò tre braccia incirca [...]”⁸⁹. Lastly, the chapter about *Infusioni et decozzioni*, mentions some types of decoctions made of guaiacum, sarsaparilla and China root⁹⁰.

The copy of the 1567 edition of the *Ricettario* preserved at the Biblioteca Nazionale Centrale of Rome is particularly interesting, because it contains 15 sheets with handwritten notes and recipes, some of which refer to the preparation of remedies mostly made of American plants used to treat *mal francese*. In addition to the recipe of *Polvere per il mal francese*, and that *Per le ulcere della bocca per il mal francese* made of “vin bianco, noci di cipresso, centaurea minore, bucce di melarancie, balausti, salvia” and “foglie d’incenso”, there was the *modo solito da ordinare la salsa pariglia*; furthermore, there were the *modo di fare il decotto del legno* with “legno santo, salsapariglia, scorza di legno santo, acqua di betonica, acqua di piantagine, acqua di cardo santo, betonica pimpinella” and “cardo santo”, and the recipe of *Salsa pariglia in polvere*, made with “salsa pariglia, scorza di legno santo, sena orientale, eleboro nero” and “cinamomo”⁹¹.

The 16th century pharmacopoeia in Lombardy and Rome The Mantuan Antidotarium of 1558

A common characteristic of not only the 1550 and 1567/73 editions of the Florentine *Ricettario*, but also the Mantuan *Antidotarium*, was the progressive relinquishment of Arabic medical material and the adoption of a research method based on the direct experience of contemporary physicians⁹². The Mantuan *Antidotarium*, printed

in 1558 and reprinted by the same publisher the following year, is the first pharmacopoeia in Lombardy⁹³. Most of the remedies are of vegetable origin and derive from the Galeno-Arabic tradition that is also the source of the medical material of the 16th century Florentine *Ricettari*⁹⁴. Although both compound and simple medicines (in the 1st and 2nd part, respectively) are included in the 1550 edition of the Florentine *Ricettario*, albeit in a very small number, no American plants are mentioned. However, during those decades medicines made of exotic plants were being used in Mantua: this is testified by a note by the apothecary Vincenzo Andreasi in 1587. Among the medicines prepared for the Gonzaga court, there are prescriptions for one ounce of tobacco pills⁹⁵ and for medicines made with oriental exotic plants, such as “miscela di cannella, garofani, zenzero, noce moscata, cannella e pepe”⁹⁶.

The Pharmacopoeia of Bergamo of 1580 and 1581

Another important book to detect the presence of American plants in Italy is the pharmacopoeia compiled by Bergamo *Collegio dei Medici*, above all by the physicians Paolo Lanci and by Gianpaolo Mapelli, to remedy the situation of great confusion characterizing the pharmacy in their city⁹⁷. Printed in 1580 with the title *Pharmacopoea, seu de usitatorum medicamentorum componendorum ratione Liber Collegij Medicorum Bergomensium opera nunc primum in lucem editus*⁹⁸, the Bergamo Pharmacopoeia is divided into 11 sections, the first 10 of which deal with the preparation of approximately 580 compound medicines: their materia medica is chiefly drawn from the Galenic-Arabian tradition (Mesue and the Antidotaria of the two Niccolòs). The eleventh section, titled *Medicamentorum praesertim simplicium delectus et praeparatio*, contains an alphabetically arranged list of simple medicines⁹⁹, including China root¹⁰⁰, sarsaparilla¹⁰¹ and guaiacum; great attention is paid to the latter, because it was already quite popular in medicine in Italy at that time¹⁰².

The edition of the Bergamo Pharmacopoeia printed the following year is not only more correct than the previous one, but also enriched with some medicines made of American plants not been mentioned in the 1580 edition or in any other 16th century formulary¹⁰³. Among the approximately 200 new simple medicines included in the 11th edition of the pharmacopoeia, there are *Liquidambar* (*Liquidambar styraciflua* L.)¹⁰⁴, *Mechoacan* (*Convolvulus mechoacan* Vandelli)¹⁰⁵, *Sassafras* (*Sassafras albidum* (Nutt.) Nees)¹⁰⁶, *Tabacum* (*Nicotiana tabacum* L.)¹⁰⁷, *Betre* (*Piper betle* L.)¹⁰⁸, in addition to the previously mentioned *China*, *Guaiacum*, *Lignus, aut palus sanctus*, and *Zarza*¹⁰⁹. Lastly, among the *Olij* there are “*Olea Ligni Fraxini*, *Guaiaci*, *Iuniperi*”¹¹⁰. This edition was rather successful, as demonstrated by the fact that it was translated into Italian and printed in Venice in 1597¹¹¹.

Suggestions for the Roman Antidotarium of 1583

The last 16th century *Antidotarium* was printed shortly afterwards under the *Antidotarii Romani seu De modo Componendi Medicamenta quae sunt in usu, opus pharmacopolis, medicisque non minus utile quam necessarium*¹¹². Medicines are mostly drawn from the Florentine *Ricettario* (1550), the 1st edition of the Bolognese *Antidotarium*, and the Bergamo Pharmacopoeia; from the latter, however, it does not take the use of sarsaparilla and China root¹¹³. Some compound remedies included in the Roman *Antidotarium* were not present in the Bolognese one: for instance *Trochisci cyperis sine moscho* made out of oriental plants, including *cinnamomum* (*Cinnamomum zeylanicum* Nees), *gummi arabicum* (*Acacia Senegal* (L.) Willd.), *mastiche* (*Pistacia lentiscus* L.), *cardamomum maioris* (*Elettaria cardamomum* (L.) Maton), *zingiberis* (*Zingiber officinale* Rosc.), *nux moschata* (*Myristica fragrans* Houtt.), and *Pilulae ad pestem* prepared with *aloe*, *gummi ammoniaci* and *myrrha*¹¹⁴. The only American plants is guaiacum, prescribed as one of the *oli per ema-*

nationem, together with *cornus*, *fraxinus*, *iuniperus* and *gagathe*¹¹⁵. American simple appear under the heading *Medicamenta substituta*: *Agallocum* or *Lignum Guaiacum* in replacement of *Aspalathum*, and *Oleum ex seminib. Citri* and *Balsamum occidentis* to be used in case of lack of *Opobalsamum*¹¹⁶.

Exotic plants in the 16th century botanical studies in Ferrara, Bologna and Parma

As we have seen, one of the American medicinal plants most popular in 16th century Italian pharmacopoeias was guaiacum. It had been imported from the Antilles to Spain by Consalvo Ferrand in 1508, as reported by the Spanish priest Francisco Delicado (ca. 1480-1535)¹¹⁷, and was already being used as a decoction by the natives of Central America. Most physicians of that period regarded it as the most suitable essence for treating syphilis, which was spreading through the Old Continent at the end of the 15th century¹¹⁸. The adoption of guaiacum was chiefly due to the belief that, if there was a centre of infection, God would create a remedy for it in the same lands. As early as the first decades of the 16th century, several physicians maintained that syphilis came from America¹¹⁹. One of them was the physician from Verona Gerolamo Fracastoro (1476-1553), who, in his poem *Syphilis, sive morbo gallico* (1530), asserted that syphilis had been brought into Italy by the French troops fighting in both Spain and Italy being called *morbo gallico* or *mal français*¹²⁰. According to Delicado, guaiacum was introduced into Italy in 1517, the year in which one of the earliest preserved documents on the use of guaiacum for the treatment of syphilis was published: *De cura morbi gallici per lignum guaycanum*, by the physician Nicolaus Poll (ca. 1470-1532)¹²¹. Two years later, as a result of the publication of *De Guaiaci medicina et morbo gallico* by the German humanist Ulrich van Hutten (1488-1523)¹²² and of its various translations, guaiacum began to be regarded as an important medicinal plant and

became a part of a very profitable international trade network¹²³. It is no coincidence that the Fugger bankers entered into an agreement with Charles V (1500-1558) granting them the monopoly on the importation and distribution of guaiacum in exchange for a loan to the Spanish Crown. The German bankers attached to the contract a document written by some influential physicians, who recommended guaiacum as a therapeutic remedy against syphilis¹²⁴.

The importance of the use of guaiacum in Italian 16th century medicine is revealed also by the private documents and specific studies on the therapeutic qualities of guaiacum¹²⁵ carried out by some physicians in the apothecary's shop of the D'Este Ducal Court during the period 1551-1598. They deal with *le robbe da medicinale de spetieria* delivered by the apothecary Alberto Signa to the D'Este family and to the Ducal Court in Ferrara¹²⁶. Among the various medicines, such as syrups, electuaries, juices, oils and ointments, there are "lavanda usa con libre 2 de legno santo" and a decoction made of "legno santo, epitimo, polipodi, ermodatali, acqua comune, siena e fior cordiale"¹²⁷. One of the physicians mentioned in this text is Antonio Musa Brasavola (1500-1555), physician to Duke Alfonso I d'Este (1476-1534) and to his son Ercole II (1508-1559). Brasavola was a frequent visitor of the Ducal apothecary's shop, where he had his medicines prepared and ordered for the production of theriac. He was the founder of the Belvedere Botanic Garden (1536), situated on a small island on the River Po and rich in exotic plants. He was deeply interested in medical botany, which he fostered with his studies¹²⁸. In his best-known work, *Examen omnium simplicium medicamentorum*, he stated: "Certum vero est centesimam partem herbarum in universo orbe constantium, non esse descriptam a Dioscoride, nec plantarum a Theophrasto aut Plinio sed in dies addiscimus et crescit ars medica"¹²⁹. Awareness about the existence of a broad range of new exotic plants, yet to be classified and used, emerges also from Brasavola's studies dealing with the analysis of the therapeutic

qualities of the recently-introduced American plants. Among these studies, we will mention *De radice chinae usu, cum quaestionibus de ligno sancto* and *De morbo gallico tractatus*¹³⁰. Brasavola also compiled several treatises on officinal preparations that used exotic plants such as guaiacum and China root. His *Examen omnium Loch* contains an important section on syphilis and its treatment with guaiacum and China root decoctions¹³¹.

A contemporary of Brasavola, the Bolognese physician Leonardo Fioravanti (1517-1588), also dealt with syphilis and the ways of treating it by means of American plants. In his *Capricci medicinali*¹³², he pointed out sarsaparilla as one of the medicinal plants used by the American Indians and later by the Spanish against this venereal disease¹³³. After having stated that “il mal francese è un morbo contagioso, putrido, et corrotto, et fa diversi cattivi effetti”, he described a treatment based on “scorza di legno santo” and other vegetable essences, from which a syrup is made, that the patient must drink following certain prescriptions¹³⁴. Lastly Fioravanti described a “modo di fare l’acqua del legno santo, molto saluifera per mal francese”, indicating a new method¹³⁵.

Brasavola and Fioravanti’s medical prescriptions were taken up again in *Trattato del mal francese*, by the physician Pietro Rostinio (b. ca.1500)¹³⁶. This treatise is entirely devoted to the study of syphilis and its treatments. Rostinio began his discussion with a long reflection on the name given to syphilis by the French and the Italians, thus creating a concise history of the disease¹³⁷. Then he listed the various types of guaiacum, describing their morphological characteristics¹³⁸. A part of the treatise, in the vernacular, deals with Musa Brasavola’s previously-mentioned *De morbo gallico*, developing it in the form of a dialogue between Brasavola and Alessandro Fontana, a medicine scholar and personal friend of his¹³⁹. About guaiacum, Brasavola expresses himself as follows: “[...] questo legno nasce in diversi luoghi, ma nell’Isola di S. Giovanni del Mar oceano si giudica che il

guaiaco sia più eletto, ch'in tutta l'India [...] l'uso di questo contra el mal francese dimostra che vale a molti mali, massime contra gli contagios;¹⁴⁰; he explains that this plant is effective also in the treatment of other diseases, “[...] et io ho provato, che vale alle gotte dei piedi, et delle mani, et delle dita, al dolore di stomacho, al dolore di fianco, et dico, a gli thisici, et ad ogni male frigido, et humido, al dolor antico del capo, alla hemicrania, alla cefalea, a i dolori de gl'intestini [...]”¹⁴¹. The statement of the many therapeutic properties of guaiacum shows that, beyond the official pharmacopoeia of that period, the American plant was prescribed not only to treat syphilis, but also for several other diseases. Lastly, Brasavola deals with China root, stating that “da India in Italia si porta una radice chiamata, china, qual è simile alle radici della nostra canna, anzi tengo sia radice di canna indica”¹⁴². Rostinio too asserts that China root is therapeutic also for other diseases¹⁴³.

In 1587 a pupil of Aldrovandi, Antonio Anguissola published a formulary that was fairly successful among contemporary apothecaries¹⁴⁴. It was clear and complete: its 1st part was about *simplicium medicamentorum, quae sunt in usu medico apud Pharmacopolas nomenclationibus, naturis, locis, et bonitatis nota* and listed the simple medicines in alphabetic order, describing their characteristics. Among them there were *Balsamum*¹⁴⁵ and *Belzoinum*¹⁴⁶. The American plants included *Lignum guaiacum, Indum, et Sanctum*¹⁴⁷, *Piper saracenicum (Capsicum annuum L.)*¹⁴⁸, and lastly *Salsaperilia, vocatur ad Hispanis, zarzaparilla*¹⁴⁹.

In the 2nd half of the 16th century, another private pharmacopoeia was compiled by Gerolamo Calestani (1510-1582), an apothecary from Parma renowned among contemporary physicians and apothecaries, whose fame persisted in the subsequent centuries¹⁵⁰. The first edition was published in 1564¹⁵¹, but unlike the ones that followed, it was incomplete, because a *Parte Prima nella quale s'insegna diligentemente l'Arte della Spetieria secondo che da' Scrittori Medici è stata mostrata*¹⁵²

was added to it. In this section the *medicamenti necessari alla Speciaria* appear, with information about the various names of the plants, their origin and their description. It is drawn from Greek and Arabic texts. Among the simple medicines of American origin, guaiacum¹⁵³ is mentioned, and also *salsaperilla*, the only information about which is that “vogliono alcuni, che sia la smilace aspera”¹⁵⁴. Among the simple medicines of Oriental origin, there are *Faufel*, i.e. *Avellana indica* (*Areca catechu* L.)¹⁵⁵, *Gelsomini* that “chiamano gli Arabi iasmen, zambracan, over sambac, et di questi si fa l’olio sambocino” (*Jasminum sambac* (L.) Ait.), *Giunco odorato* (*Andropogon schoenanthus* L.) that “nasce in Arabia, in Africa, et in quella regione chiamata Nabathea, donde si porta il migliore, prossimo a quello dell’Arabia”, and China root¹⁵⁶.

*The diffusion of exotic medicinal plants in the 17th century
Bolognese and Florentine pharmacopoeias*

Bologna

The 2nd edition of the Bolognese *Antidotarium* was published 33 years after the 1st, again by the *Collegio Medico* of Bologna¹⁵⁷. In spite of Aldrovandi’s death the previous year, the *Antidotarium* contains about 30 pages drawn up by him: they should have been included in the 1st edition but, as a result of a disagreement between Aldrovandi and the *Collegio Medico*, they were added only from the 2nd edition onwards¹⁵⁸. The new edition included 77 new medicinal preparations mainly drawing from classical Greek and Arabic medicine and from the Salernitan School. This edition opens with an *Index morborum quibus praesidia in hoc volumine contenta conveniunt*, i.e. a list of the most frequent diseases, with related therapeutic prescriptions. Under the heading *Gallicis doloribus sunt adiumenta*, *Oleum ex Sabina* and *Oleum ex Ligno guaiaco* are prescribed besides *Pillulae Alexandri*¹⁵⁹. Further on, in the part that deals with oils, *Oleum guaiaci* is recommended in cases of “ulcera, et dolores ex morbo gal-

lico ortos valet”¹⁶⁰; but no type of guaiacum or sarsaparilla decoction is prescribed against venereal diseases. Among the new medicines, some are drawn from Arabic authors, for instance *Electuarium de scoria ferri Rasis*, which contains oriental plants from *Myrobalanus indorum*, *Myrobalanus emblicorum*, *Myrobalanus bellicorum* (*Terminalia citrina* (Gaertn.) Roxb., *Terminalia chebula* Retz. and *Terminalia bellerica* Roxb.) to *Spicae india* (*Nardostachys jatamansi* (D.Don.) D.C.), and from *Gingiberis* (*Zingiber officinale* Rosc.) to *Piperis nigris* (*Piper nigrum* L.). The electuary was recommended against “hemoroidarum, et menstruorum sanguinem immodice fluent constringit; fluxui ventris succurrit”¹⁶¹. In addition, among the new compound medicines, there were *Pillulae Imperialis* made with *Nucis moschatae* (*Myristica fragrans* Houtt.), *Caryophyllorum* (*Syzygium aromaticum* (L.) Merr. et L.M. Perry), *Cubeborum Piper cubeba* L.), *Turbith* (*Ipomoea turpethum* R.Br.), and *Zedoaria* (*Curcuma zedoaria* (Bergius) Rosc.). This medicine was recommended because “parum admodum purgant, sed plurimum roborant ventriculum, et omnia viscera refrigerata, conservant naturales facultates sanguinem, et spiritus purificat”¹⁶².

The 3rd edition of the Bolognese *Antidotarium* was published in 1615¹⁶³. Its only difference with the 1606 edition is the *selectorum quorundam medicamentorum additio* at the end, which lists 14 new medicines. Among them, the *unguentum de Nicotiana, sive tabac, quae dicitur herba Regina* was an absolute novelty. This was the first time that *Nicotiana tabacum* L. entered into the Bolognese *Antidotaria*¹⁶⁴. The tobacco ointment was prescribed against “ulcera chironia, depascentia, antiqua, et mali modi curat potentet”, and “durat per annum”¹⁶⁵. However, the edition that contained the most important innovations in comparison with the previous ones was the 4th, published in 1641¹⁶⁶. First of all, the diseases and relative remedies are no longer listed in alphabetic order but they are grouped according to their “place”, from local to general affections¹⁶⁷. Under the

title *Index praesidiorum in hoc Antidotario descriptorum ad varios morbos in genere*, the *Antidotarium* begins with *Dolori capitis conferunt* and reaches *Vertigini, Epilepsiae*, ending with *Genitalium, et sedis morbis* and *Gallico morbo*. For the latter, once again one of the remedies is *Oleum Guaiaci*¹⁶⁸. This edition includes 40 new preparations divided into various categories, that do not follow the order or number of the previous edition; moreover they include a new category: *Acqua e Decotti*. In the category of the *Syrupi*, one of the new preparations is the *Syrupus de Peto Quercetani, Italice herba regina*, in cases of “fluxionibus serosis, et frigidis cerebrum liberat, sed in asthmaticis accessionibus ad humoribus viscidis suffocationem minantibus mira praestat”¹⁶⁹. Among the new preparations made of oriental plants, there is *Oleum iasminum, sive de zambach*, made of *Jasminum sambac* (L.) Ait. and prescribed because “cale facit et dolores levat”¹⁷⁰. An important novelty is the *Appendix de chymicis remediis aliquot cum necessarijs ad eadem praeceptis*, in which medicines of chemical origin, obtained through distillation and sublimation, are officially recognised for the first time¹⁷¹. There are some *extracti* prepared with exotic plants: for instance *Extractum Chinae*, “quod proderit in morbo Gallico, in Phtisi, et ubi opus est exiccatione, absquae; mordacitate”; *Extractum Guaiaci*, recommended “ad morbum gallicum et catarrhos siccandos”; *Extractum Mechoacanae*, which “purgat ad humorem serosum superfluum”; and lastly *Extractum Salsae Parillae*, which “estq; exiccans remedium, et exhibetur in morbo gallico”¹⁷². A long list of succedaneous medicines appears under the heading *Substituta, et aliqua dubia declarata*; it includes the *Balsamum indicum verum ex Peru, vel regione Tolu*, both of which are the first choice for replacing *Opobalsamum*¹⁷³. The 5th and last 17th century edition of the Bolognese *Antidotarium* was printed 33 years later¹⁷⁴. The 1674 edition did not contain the list of diseases at the beginning and differed from the previous editions by including several additional medicines, such as *Oleum opobal-*

samum vulcerarium and *Ceratum capitale*, chiefly made of oriental medicinal plants¹⁷⁵.

Florence

Although there exists a last 16th century edition of the Florentine *Ricettario*¹⁷⁶, the subsequent one, printed in 1623, does not differ significantly¹⁷⁷. Like the previous, this edition is divided into 3 parts, with the first dealing with the simple medicines and containing descriptions of *Balsamo Occidentale*, *Bengiui*, *Canfora* (*Cinnamomum camphora* (L.) J.S. Presl.)¹⁷⁸, *Cinnamomo* (*Cinnamomum zeylanicum* Nees), and *Cassia dei Greci*¹⁷⁹, *Cina*, *Cubebe*, *Curcuma* (*Curcuma longa* L.), *Gherofani* (*Syzygium aromaticum* (L.) Merr. et L.M. Perry), *Legno guaiaco*, *Salsapariglia*, and *Spodio* (*Bambusa arundinacea* (Retz.) Willd.), which “si è visto venuto da Goa dell’Indie Orientali il vero spodio detto la tabaxir”¹⁸⁰. The 3rd part, listing 563 medicines, contains 16 new ones, including a *Sciroppo di Messer Agostino*, which contains *Mirabolani*, *Rhabbarbaro*, and also *Legno santo*, besides the *Rapontico*¹⁸¹. The 1670 edition contains several novelties, with the introduction of American plants¹⁸². The text is no longer divided into 3 parts, because the 2nd part is incorporated in the 1st. This part contains a great number of changes in the description of the simple medicines. *Bengiui*¹⁸³ has been modified and *Cinnamomo*, *della Cannella*, *della Cassia o Casia de’ Greci*¹⁸⁴ is abridged. But the real novelty consists in the inclusion of 3 completely new simple medicines of American origin: *Mecioacan* (*Convolvulus mechoacan* Vandelli), *Sciarappa* or *Gialappa* (*Ipomoea purga* Wend.), and *Sassafras* (*Sassafras albidum* (Nutt.) Nees). *Mecioacan* is described together with *Gialappa* because both plants have purgative properties, albeit to different degrees¹⁸⁵. The other medicinal plant, *Sassafras*, is “un arbore, che nasce nell’Indie Occidentale...Viene a noi portato dalla Florida, ed è molto noto. La parte migliore di esso è la radice [...]”¹⁸⁶. The last 17th century edition was printed in 1696, without any significant variation¹⁸⁷.

Exotic medicines in 17th century Roman and Milanese pharmacopoeias

Rome

The Roman *Antidotarium* went through several editions and reprints, particularly during the 17th century. The first 17th century edition was still in Latin¹⁸⁸, but from 1613 onwards the *Antidotarium* was the vernacular version by the Roman apothecary Ippolito Ceccarelli¹⁸⁹. At the end of the text, it added new recipes and new chapters, including the *Siroppo di Libisco semplice*, *Confettione di iacinto*, and *Oglio de cedro*¹⁹⁰. The 2nd edition, in the translation by Ceccarelli, was published in 1619¹⁹¹. Besides some new medicinal preparations¹⁹², it also contained a translation of the *Trattato della Teriaca Egittia, scritta in forma di dialogo da Prospero Alpino*. Under the title *Sommario dell'elettione de semplici, e del modo da tenersi in haverli à metter in opera*, it lists *Agallocco* (*Aquilaria agallocha* Roxb.), *Anima* and *Copal* (*Hymenaea courbaril* L.), *Bengiuino*, *Charagna* (*Icica caranana* L.), *Tacamacca* (*Elaphrium tecomaca* (D.C.) Standl.)¹⁹³, *Cina*, and *Guaiaco*. And there are also *legno per il mal de reni, e d'orina* (*Mimosa* sp.) *altramente detto palo de rognone*, *Liquidambar*, *Mechiocan*, and lastly *Sassifrasso*¹⁹⁴. As the description of the plants in the *Antidotarium* indicates, exotic flora played an important role in 17th century Roman medicine, although the formulary does not add any information about the therapeutic properties in addition to place of origin, morphology, and therapeutic uses.

The subsequent edition (1624) differs only by its dedication¹⁹⁵. The 4th (1635) does not differ either, except for the addition of *Avvertenze et osservazioni appartenenti alla compositione dei medicamenti tradotte dal nono Libro delle Osservationi del sig. Lodovico Settala*¹⁹⁶. In 1637 Pietro Castelli published a new edition of the Roman *Antidotarium*¹⁹⁷. At the end, there was a list of 14 new recipes prepared by the *Collegio dei Medici* of Rome, including *Ceratum capitale Montagnana* and *Compositio de Hispani*¹⁹⁸. These preparations

were already present in the Florentine and Bolognese pharmacopoeias. The last edition of the Roman *Antidotarium* was printed in 1675¹⁹⁹. It contained some new prescriptions at the end, including *Pulveri per il mal Francese*, made of sarsaparilla, guaiacum, cream of tartar, diagridium, nutmeg, cloves, cinnamon and fennel²⁰⁰. Moreover, the last part of the *Antidotarium* had been enriched with the addition of *Memoriale per lo spetiale romano*, *Calendario che insegna alli Spetiali quello, ch'ogni mese essi debbano fare per servito delle loro spetiarie*, and *Lista rerum patendarum*, which contained 35 simple medicines and 93 compound ones that the apothecary shops were required to have in stock. *Scialappa*, i.e. jalap, was introduced into this edition²⁰¹.

Milan

The 1st Milanese Pharmacopoeia was published by the Chief Physician, Giovanni Onorato Castiglioni, in 1668. Castiglioni obtained that the title of Chief Physician be transmitted to his son, who edited the 2nd edition of the Milanese *Antidotarium*, and to his grandson, who in turn edited its 3rd and final edition²⁰². The 1st edition was in Latin (the *Proemio* and the medical formulas included in each chapter) and in the vernacular (the method for the preparation of the medicines). At the beginning of the text, Castiglioni stated that the theory for the preparation of the medicines had been drawn entirely from the Arabic author Mesue²⁰³. This statement was followed by a part containing *ad medicamentorum compositiones*, with several medicines made of American plants. Among the syrups, there were *Syrupus de Ligno Sancto*, prepared with “Ligni sancti limati corticum eiusdem sacchari albi”; *Syrupus de Peto simplex Quercetani*, recommended because “Praestantissimus existiti adversus affectus est”; *Syrupus de Peto compositus Quercetani*; and, lastly, *Syrupus Salsae Pariliae solutivus Thomae de Laudae*, against “Gallicus affectus”²⁰⁴. Among the medicated waters, the book mentioned *Aqua*

Neapolitana solutiva, made of “salsapariliae, ligni sancti limati, radicum assari, corticum ligni sancti, chinae electae, foliorum sennae orientalis, cinnamomo” and *Aqua Salsae Magistralis vulgo chiari-glio*²⁰⁵. Among the wines, there were *Vinum de Ligno Sancto* and *Vino de Salsa pariliae solutivum*, which “...Gallico affectui opitulatur, roxios enim humores expurgat”²⁰⁶. Among the electuaries, there were *Electuarium Salsa Pariliae solutivum*²⁰⁷, and among the powders *Pulvis Purgans Salsaparillae Magistralis*²⁰⁸.

The 2nd edition curated by Castiglioni’s son, Branda Francesco (1698)²⁰⁹, was considerably increased. Made of 3 parts, it contained many novelties and a great number of exotic plants mentioned for the first time in an official pharmacopoeia. The 2nd part was made of the translation into Italian of *Cours de Chymie* by Nicolas Lemery (1645-1715), a work that had been highly successful in the 17th century because of its description of chemical medicinal preparations. The 3rd part, too, is quite interesting, because it was completed with some chapters about drugs introduced into European medicine precisely during that period²¹⁰. Under the title *Tractatus de tinctura Corallorum, de Alkaest, Et Auro potabile, de China Chinae, de Herba Thè, de Cocholate, et de Caphè continens*, the author begins by dealing with Peruvian bark (*Cinchona* sp.)²¹¹, then he deals with *Herba Thè* or *Chià* (*Camelia senensis* (L.) Kuntze), pointing out the therapeutic properties of both²¹². The subsequent chapter dealt with the preparation and therapeutic properties of *Ciocolate* (*Theobroma cacao* L.)²¹³. *Caffè* (*Coffea arabica* L.), whose geographic origin and medical uses are specified, concluded the work²¹⁴.

Pharmaceutical research in the Studio Bolognese during the 17th century

Emilian physicians authored and published multiple formularies and therapeutic compendia in the 17th century, as in the 16th. Among them, we should mention Antonio Felice Boldini’s work, in which

the author recommended a medicine made of *Salsa Periglia*, *Senna Orientale*, *Zenzero*, *Cinnamomo*, and *Canella* under the heading *Secreto sopra tutti i secreti per il morbo gallico o sia mal Francese, Catarro fabo e ostruzioni di milza*²¹⁵. In his *Stupendi et meravigliosi secreti*, Giovan Battista Pigozzi recommended a preparation of *Sassufra*²¹⁶ for an aching spleen. Fedele Honofri, as for him, suggested: “piglia tabacco, detto Herba Regina, ò la foglia, ò il sugo, ò la polvere, e mettila su la piaga, che sana” “Per guarire una piaga incancherita”²¹⁷.

Aldrovandi’s students kept up their teacher’s interest in the botanical novelties introduced into Europe from overseas and included in Italian medicine. Bartolomeo Ambrosini (1588-1657) stood out among them. He succeeded Aldrovandi in the *Cattedra dei Semplici*, and, from 1620 until his death, in the management of the Bologna Botanical Garden. He also was the superintendent of Aldrovandi’s Museum from 1632 to 1657, and he was entrusted by the Senate with the editing of some of Aldrovandi’s unfinished works²¹⁸. During the years in which Bologna was hit by the plague (1629-1630), Ambrosini compiled a work on the way to be safe from the epidemic: *Panacea ex herbis quae à sanctis denominantur*²¹⁹. He examined 35 plant species credited with salvific properties, each being linked with a part of the body. This work called itself a real *panacea* for all known diseases²²⁰. Each of the plants was named after a saint, for instance *Herba S. Crucis* being the tobacco plant²²¹. The other American plant mentioned by Ambrosini was the *Herba S. Passionis*, i.e. the *Passiflora coerulea* L.²²². The treatise went on with a part titled *De Capsicorum varietate. Brevis historia*, which contained a description of the various species²²³.

The Bolognese Ovidio Montalbani (1601-1671) was a student of Ambrosini, under whose guidance he studied philosophy and medicine. He held the chair of theoretic medicine from 1628 to 1632, that of mathematics from 1633 to 1651, and lastly taught moral philoso-

phy until 1665. He was the doyen of the *Collegio Medico* of Bologna and its prior from 1664 onwards. From 1657 onwards he was the superintendent of the Aldrovandi Museum and edited Aldrovandi's last work²²⁴. In his *Index omnium plantarum* (1624)²²⁵, he pointed out some American species, including *Petum herba, seu tabacco nostras, vulgo herba Regina* (*Nicotiana tabacum* L.), *Chrysanthemum peruvianum* (*Helianthus annuus* L.), and *Caryophyllis indicus, seu flos aphricanus* (*Tagete* spp.); he also mentioned many plants coming from the East, such as *Ficus aegyptia falsa, pseudo sycomorus, azadarach Avicenna* (*Melia azedarach* L.), *Mala insana, pomum amoris, solanum pomiferum fructu oblongo* (*Solanum melongena* L.), and *Tulipa orientalis rubro flore* (*Hyacinthus orientalis* L.)²²⁶. Giacomo Zanoni (1615-1682) was another of Ambrosini's students. He was the head of Bologna Botanical Garden from 1642 to 1682. His *Istoria botanica*²²⁷ was quite successful at the time of its publication: it contained descriptions of many exotic medicinal plants cultivated during those years in Bologna Botanical Garden. A scholar very interested in the botanical novelties coming from the East and the Americas, obtained specimens from missionaries who travelled to India. He cultivated them in Bologna Botanical Garden and in his own private garden. Besides being interested in botany, he also was strongly inclined to the study of medicine, so much so that in 1668 he obtained from the Bolognese Senate the permission to open an apothecary in the city. It was managed for two centuries by his descendants, under the name *Farmacia degli Zanoni*, until the 1920s²²⁸. Among the numerous new exotic plants described by Zanoni are *Acetosa dentata di Tanger* (*Rumex tingitanus* L.), *Astero Aizoide del Capo di Buona Speranza* (*Conicosia pugioniformis* (L.) N.E. Br.)²²⁹, *Bambagia arborea di Pernambuco* (*Gossypium vitifolium* Lam.), *Clematide Tetraphylla Americana* (*Passiflora caerulea* L.)²³⁰, *Mimosa di Iamaica*, and *Sesamo perenne Indiano*, "pianta Frumentacea, e specie di sesame" (*Eleusine indica* (L.) Gaertn.)²³¹.

In 1694, Carlo Ricani published in Parma the Italian translation of a treatise on the therapeutic properties of Peruvian bark (*Cinchona* sp.), which was rather successful in the medical circles of the time²³². The book was entitled *La Kinakina e le di lei stupende qualità*²³³ and its author was the Dutch physician Jean Adrien Helvetius (1664-1727), who had collected all possible information on the medical properties of this plant. To begin with, Helvetius asserts that *Kinakina* is “un rimedio specifico per ogni sorte di Febbri [...]”²³⁴; then he expounds the therapeutic qualities discovered by an Englishman, Talbot, who had said: “La Kinakina è un febrifugo si sovrano, ch’essa viene al presente adoprata per tutte le Febbri intermitenti di qualunque natura esse sieno, ò Cotidiane, Terzane doppie, Terzane, Quartane, doppie, e Triplici quartane [...]”²³⁵. Helvetius’s text closes with his *Metodo per guarire ogni sorte di Febbri, senza nulla prendere per bocca*, revealing that “Altra non è questa maniera, che il darlo in Clisterj”²³⁶.

A source for the knowledge of the diffusion of exotic medicinal plants in the Bolognese pharmacies during the 17th century

The “prezziari” issued by the *Collegio di Medicina* of Bologna, which specified the “taxes” that apothecaries were supposed to charge in the sale of medicines, allow to trace the exotic medicinal plants introduced in the Bolognese pharmacies during the 17th century. In 1601 the *Nuova tassa, et dichiarazione del prezzo delle cose medicinali*²³⁷ included *Bolo arminio Orientale rosso fin.*, and *Bolo armeno orientale giallo*²³⁸; there were also *Decotto di legno santo fatta con lib. una di legno al commun’uso per sirop*, *Legno santo limato*, and *Legno santo intiero*²³⁹. About 30 years later, another *Tassa de’ medicinali ultimamente stabilita dall’Eccellentissimo Collegio di medicina, et Honoranda Compagnia de’ Spetiali della Città di Bologna*²⁴⁰ was issued: besides the previously mentioned *Legno santo limato* and *intiero* and the *Decotto di Legno Santo fatto per siropo*²⁴¹, there are *China eletta, salsa periglia eletta* and *Salsa periglia meza-*

na, *Sasafrasso preparato*, and *Scorza di legno santo*²⁴². The same booklet also contains a part titled *Tassa di Robbe diverse spagiriche, molte delle quali si sono descritte non per approvarle, ma solo perché non siano da chi le fabbrica poste à prezzo eccessivo* that includes *Estratto di China*, *Estratto di Salsa periglia*, *Estratto di Legno Santo* and *Olio di Legno Santo*, *Sale di Legno Santo* and *Sale di tabacco*²⁴³. Approximately 50 years later, *Tassa de' medicinali semplici, composti, e spagirici, disposta con l'ordine dell'Alfabeto*²⁴⁴ listed more new medical preparations, among the simple ones of which there were *Balsamo Indiano duro*, *Balsamo del Peru*, *Belgioino in lagrima detto in pane*; and furthermore, *China China ò Scorza del Peru* (*Cinchona* sp.), *Contrerva*²⁴⁵ (*Dorstenia contrayerva* L.), *Cerotto di gomma taccamacca*, *Estratto di guaiaco*, *Estratto di mechioacan*, *Estratto di salsa parilla*, *Estratto di sassafrasso*²⁴⁶ and *Estratto di scialappa*, *Gomma caragna* and *Gomma copale*, *Legno santo limato* and *Legno sassafrasso tagliato*, *Mechiocan eletto*²⁴⁷ and *Magistero di mechioacan*, *Oglio di Legno santo*, *Radici di mechioacan*, *Radici di scialappa*, *Scorza di Legno santo*²⁴⁸, and lastly *Sale di legno santo*²⁴⁹ and *Sale di tabacco*²⁵⁰.

Finally, in 1693 another “prezziario” was printed, *Tassa de' medicinali semplici, composti, e spagirici disposta con l'ordine dell'Alfabeto*²⁵¹. Among the novelties, it pointed out *Contraerba polverizzata*, *Erba thè*, *Gomma tacamacca*, *Magistero di scialappa*²⁵², *Scialappa polverizzata*, *Sciroppo di contraerba*, and *Sciroppo di Peto, ò erba regina*²⁵³. In comparison with the medicines included in 1601 *Tassa*, i.e. approximately a century before, the number of exotic plants mentioned seems to be considerably greater.

Using the 1641 Bolognese *Antidotarium* as a reference for the medicines indicated for some treatments (particularly for the treatment of syphilis, for which the prescriptions included medicinal mixtures made out of American plants), and analysing the prices of the pharmaceutical products listed in the 1637 edition of the *Tasse de' medici-*

nali, we can deduce that the prices of the medicines made of American plants were decidedly higher than those of the medicines made of European plants or than the price of the *Theriaca Andromachi*, a celebrated panacea prescribed for a great number of diseases, including *pestifera lue*²⁵⁴. While *Extractum Chinae* “quod proderit in morbo Gallico” cost 40 *solidi* per dracma, *Extractum Guaiaci* prescribed “ad morbum Gallicum” cost 3 *solidi* ½ per dracma, and *Extractum Salsa parillae* “exhibetur in morbo Gallico” cost 25 *solidi* per dracma²⁵⁵, the price of *Theriaca Andromachi* was 3 *solidi* per dracma. Prices were even lower for *Aqua aluminosa Magistralis Gabr. Falloppij*, which contained *Aqua Plantaginis*, *Aqua Rosarum*, *Argentum sublimatum* and *Aluminis Rochae vivi*, which was prescribed for “eius vires sunt exsiccandi, extirpandi, et delenda ulcera, pustulas, aphtas, atq; thymos gallicos” and cost only 1 *solidus* per dracma²⁵⁶. (It is interesting to stress that this chemical preparation made of silver and alum was one of the first remedies resulting from the distillation of metals to be included in the 16th century Italian pharmacopoeias)²⁵⁷. Prices were much higher for *Balsamo bianco vero*, which cost 100 *solidi* per dracma, in comparison with *Balsamo Indiano duro*, which cost 20 *solidi* per dracma, and *Balsamo del Perù*, which was even less expensive: 10 *solidi* per dracma. In the 1693 *Tassa* the prices of *Balsamo Orientale* and *Balsamo Occidentale* were lower: for *Balsamo vero, o Opobalsamo* the price was 30 *solidi* per dracma, and for *Balsamo Indiano duro* 10 *solidi* per dracma. But the prices of most of the American exotic plants were still high: *China eletta* cost 20 *solidi* per dracma, and the price of *China China, ò Scorza del Peru* was also 20 *solidi* per dracma. Different prices were charged for local plants such as *Brassica marina*, which cost 1 *solidus* per dracma. It is evident that remedies made of exotic plants were affordable only for the wealthy classes, while the remedies for the poorer classes (whose situation worsened with the European crisis of the 1620s with a “re-feudalisation” process, population increase, price rise, wars, epidem-

ics and famine), were made of inexpensive materials such as garlic, cassia, brandy, *et similia*, and still influenced by a medicine of a magical-traditional type²⁵⁸.

Conclusions

Interest in the American plant species recently introduced into the Italian flora was high in the 16th century, as their inclusion in the major herbals of that century indicates, as does also their cultivation in the private gardens of scholars who were passionately fond of the diversity of nature. These plants also entered the botanical gardens, which acted as experimental containers to meet the botanical interests of that-time scientists. However, at the end of the 16th century not many American medicinal plants were actually used to treat diseases. They were not included among the medicines listed in the pharmacopoeias. To better understand this situation, we must consider the natural sciences in the Renaissance, when the scholars with medical and natural history interests had only recently gained access to classical culture. The research methods of the 16th century naturalists mainly consisted in identifying the nature objects handed down by the classical texts and, if necessary, checking, correcting, and completing through direct observation the great many pieces of information about the plants of the European flora or introduced from Asia or Africa. Nature was geographically distant in some cases; but, in any case, its knowledge had been acquired through the descriptions of Theophrastus, Dioscorides, Pliny, and Galen who were regarded throughout the century as the main references. The scholars felt that the recently-discovered American plants were plants without a history, since they had not been taken into consideration by the classics. They were objects of great interest for scholars such as Aldrovandi and all those naturalists who wished to include and classify in their *systema naturae* everything that was known in the plant world, but it was not easy to include those plants in classification systems that

had been firmly consolidated by that time. It has been pointed out that “fully accepting the new natural reality that had come to light beyond the Ocean ‘meant’ reopening the whole question of the cultural system and methodological structure on which naturalistic research was based”²⁵⁹. In all likelihood, the scientific tools available to the scholars did not allow them to carry out a radical revision. As the 16th century Italian pharmacopoeias has shown, inclusion into pharmacology of new American species already been described in European herbals or cultivated, was quite limited apart from plants as guaiacum, China root, sarsaparilla and tobacco, which were prescribed almost exclusively for treating a disease of ‘American’ origin (syphilis), that was the sole justification for their introduction. Physicians chose to perpetuate the use of vegetable species from Europe and Asia that were linked to the classical tradition handed down by Arabic medicine. In pharmacology as in natural sciences, apothecaries had trouble in adding the American medicinal plants (and the remedies supplied by the natives) to the Galenic pharmacological system, that had dominated medical thought throughout the Renaissance²⁶⁰. In spite of the arrival of much information about many new medicinal plants, physicians and apothecaries chose to ignore them, since they were not directly acquainted with their properties. They regarded them as unnecessary, or not indispensable, for treating diseases the remedies of which were already known and included in the existing pharmacopoeias.

This study, carried out on Italian 16th- and 17th century pharmacopoeias, medical texts and price lists, shows that during the 17th century, the physicians’ studies and experiences led to an increase in the use of the plants coming from the New World, i.e. edible and medicinal plants that were beginning to appear on the tables and in the apothecary shops of Italy²⁶¹.

The medicinal compounds prepared with the new plants, sometimes mixed with the plants of the ancient Greek, Roman, and Arabic tra-

dition, though provoking many qualms to the physicians imbued with the tenets of the classical tradition, chiefly resulted in a rise in prices. The only American plant adopted throughout the 16th century as the main remedy against syphilis was guaiacum, because it gave good results when used by the Caribbean populations, and above all because of the selling value it acquired on the European market of that period. In effect this plant, which was duly processed in the apothecaries' laboratories, probably was not more effective as a treatment than any other botanical product, as Fracastoro asserted. Unfortunately syphilis went on affecting European populations until the middle of the 20th century, when antibiotics were discovered.

The Cinchona tree from South American, from the bark of which quinine was extracted in the 19th century, was successful: from the 17th century onwards it was included, together with other therapeutic remedies, among the treatments for quartan fever, i.e. malaria. The Peruvian bark was adopted in many places in Europe, the Americas and China.

The plants coming from the East Indies, Africa, and the Middle East were received in a very different way. The millennium-old tradition started with the Greeks and Romans was perpetuated during the Middle Ages with Arabic scientists which had entrenched the belief in the effectiveness of their therapeutic properties in Europe. Although the medicines obtained from American plants were included in the pharmacopoeias and formularies all over Italy, their comparative expensiveness discouraged most of the population from using them. The fate of the remedies coming from the New World from the beginning of the 16th century onwards turned out to be less "revolutionary" than the exchange of food plants, which, on the contrary, gave rise to a deep change in the agriculture and rural landscapes of most of the regions of the Eurasian and American continents; their inclusion in the pharmacopoeias of that period did not have any significant impact on the theories of medicine, which turned out to be not ready yet to change the Galenic paradigm that had been universally accepted for centuries.

BIBLIOGRAPHY AND NOTES

General Bibliography

Acta 34° Congressus internationalis Historiae Pharmaciae. Belluno: Tipografia Piave; 2001.

Atti del Congresso Internazionale di Storia della farmacia. Le piante medicinali e il loro impiego in farmacia nel corso del tempo. Conselve (Padova): Tipografia Regionale Veneta; 1989.

Bellorini C, *The World of Plants in Renaissance Tuscany: Medicine and Botany*. Farnham: Ashgate; 2006.

Cingolani E, Colapinto L, *Dagli antidotari alle moderne farmacopee*. Roma: Di Renzo Editore; 2000.

Corradi A, *Le prime farmacopee italiane*. Milano: Fratelli Rechiedei Editore; 1887.

Corvi A (ed.), *La farmacia italiana dalle origini all'età moderna*. Pisa: Pacini; 1997.

Cunico MP, *Il giardino veneziano: la storia, l'architettura e la botanica*. Venezia: Albrizzi; 1989.

Godinho VM, *Os descobrimentos e a economia mundial*. Lisboa: Editorial Presença; 1982-1987.

López Piñero HM, Febrer Fresquet JM, López Terrada ML, Pardo Tomás J (eds), *Medicinas, drogas y alimentos vegetales del Nuevo mundo: textos y imagenes españolas que los introdujeron en Europa*. Madrid: Ministerio de Sanidad y Consumo; 1992.

López Piñero JM, López Terrada ML, *La influencia española en la introducción en Europa de las plantas americanas (1493-1623)*. Valencia: Universitat de Valencia-CSIC; 1997.

Mendes Ferrão JE, *L'aventure des plantes et les découvertes portugaises*. Lisboa: Instituto de Investigação Científica Tropical; 1994.

Ogilvie BO, *The Science of Describing: Natural History in Renaissance Europe*. Chicago: The University of Chicago Press; 2006.

Raimondi E, Guicciardi L, Masino C, *Per una storia della farmacia e del farmacista in Italia: Emilia-Romagna*. Bologna: Skema; 1986.

Riva E, *Le prime farmacopee ufficiali europee: dalle origini al XIX secolo*. Ariccia: Aracne; 2015.

1. Ledermann F, *L'assimilation des drogues exotiques en Europe: l'exemple des pharmacopées*. In: *Acta 34° Congressus internationalis Historiae Pharmaciae*: Firenze, 20-23 ottobre 1999. Belluno: Tipografia Piave; 2001. pp. 75-79.

Exotic plants in Italian pharmacopoeia

2. Godinho VM, *Historia Economica e Social da Expansão Portuguesa*. Lisboa: Terra Editora; 1947; Godinho VM, *Os descobrimentos e a economia mundial*. Lisboa: Editorial Presenca; 1982-1987.
3. Bouchon G, *L'Asie du Sud à l'époque des grandes découvertes*. London: Variorum reprints, 1987; Bouchon G, *Inde découverte Inde retrouvée: 1498-1630: études d'histoire indo-portugaise*. Lisbon: Fundação Calouste Gulbenkian; 1999; Mendes Ferrão JE, *L'aventure des plantes et les découvertes portugaises*. Lisboa: Instituto de Investigação Científica Tropical; 1994.
4. Morales Padrón F, *Historia de Sevilla: la ciudad del quinientos*. Sevilla: Universidad de Sevilla; 1977; Valdés B, Diaz Lifante Z, Martin Cacao M, *The Introduction of American Species through Seville. Past and Present*. *Museologia scientifica* 1992;9:277-298.
5. Huguet-Termes T, *New World Materia Medica in Spanish Renaissance Medicine: From Scholarly Reception to Practical Impact*. *Med Hist.* 2001;45(3):359-376.
6. Morton AG, *History of Botanical Science: An Account of the Development of Botany from Ancient Times to the Present Day*. London: Academic Press; 1981. pp. 118-119.
7. López Piñero HM, Febrer Fresquet JM, López Terrada ML, Pardo Tomás J (ed.), *Medicinas, drogas y alimentos vegetales del Nuevo mundo: textos y imagenes españolas que los introdujeron en Europa*. Madrid: Ministerio de Sanidad y Consumo; 1992; Pardo Tomás J, López Terrada ML, *Las primeras noticias sobre plantas americanas en las relaciones de viajes y cronica de Indias (1493-1553)*. Valencia: Universitat de Valencia-CSIC; 1993.
8. Pardo Tomás J, *Obras españolas sobre historia natural y materia médica americanas en la Italia del siglo XVI*. *Asclepio* 1991;43(1):51-94; López Piñero JM, López Terrada ML, *La influencia española en la introducción en Europa de las plantas americanas (1493-1623)*. Valencia: Universitat de Valencia-CSIC; 1997.
9. Oviedo De Fernández G, *Libro secondo delle Indie Occidentali*. Vinegia: Niccolò Zoppino; 1534; Oviedo De Fernández G, *Sommario della naturale et generale Historia dell'Indie Occidentali*. In: Ramusio GB, *Terzo volume delle navigationi et viaggi*. Venetia: Giunta; 1556-1565. pp. 44r.-74v.
10. Oviedo De, Fernández G, *Sumario de la natural historia de las Indias*. Toledo: Ramon de Petras; 1526. p. 42r.; Oviedo De Fernández G, *La historia general de las Indias*. Sevilla: Juan Cromberger; 1535. pp. 91v.-93r. and 127v.-128r.
11. Cieza De León P, *Parte primera dela Chronica del Peru que tracta la demarcación de sus provincias: la descripción dellas*. *Las fundaciones de las nuevas*

- ciudades. Los ritos y costumbres de los indios y otras cosas estrañas dignas de ser sabidas. Sevilla: Martin de Montedoca; 1553.
12. Seven italian editons were published between Venice and Rome: one in Rome under the title: *La prima parte de la Cronica del grandissimo Regno del Peru* [...] et tradotta pur hora nella nostra lingua italiana per Augustino de Cravaliz. Roma, Valerio e Luigi Dorici, 1555, and in Venice in 1556 under the title: *La prima Parte dell'Istorie del Peru* [...] Vinegia, Andrea Arrivabene, 1556. Another in Venice in 1557 and other two in Venice in 1560, in 1564 and 1576.
 13. Cieza De León P, *La crónica del Perú*. In: Saenz De Santamaria C. (ed.), *Obras completas*. Madrid: CSIC Instituto Gonzalo Fernández de Oviedo; 1984-1985 (1). pp . 78-79.
 14. Anghiera Pietro M, *De orbe novo decades*. Alcalà de Henares: apud Michaellem de Eguia. Septime Decadis, Caput octavum; 1530, p. XCVv.
 15. Monardes N, *De simplicibus medicamentis ex Occidentali India delatis, quorum in medicina usus est*. Auctore D. Nicolao Monardis Hispalensi medico, interprete Carolo Clusio Atrebate. Antverpen: ex officina Christophori Plantini; 1574.
 16. Monardes N, *Delle cose che vengono portate dall'Indie Occidentali pertinenti all'uso della medicina*. Raccolte, & trattate dal dottor Nicolò Monardes, medico in Siviglia, parte prima. Novamente recata dalla spagnola nella nostra lingua italiana. Venetia: Giordano Ziletti; 1575.
 17. López Piñero JM, *Las 'nuevas medicinas' americanas en la obra (1565-1574) de Nicolás Monardes*. *Asclepio* 1990;42(1):1-69; López Piñero JM, López Terrada ML, ref. 8.
 18. Monardes N, *Primera y segunda y tercera partes de la Historia medicinal de las cosas que se traen de nuestras Indias Occidentales, que sirven en medicina*. Sevilla: A. Escribano; 1574 respectively, pp. 12v.-16r., 18v.-22v., 41r.-50v., 7v.-9r., 3v.-5r., 121r.-123v., 28v.-37v., 51r.-64r., 16r.-18v.
 19. Orta Garcia Da, *Aromatum et simplicium aliquot medicamentorum apud Indos nascentium historia, antem biennium quidem Lusitanica lingua per dialogos conscripta, D. Garcia ad Horto* [...] Nunc verò primum Latina facta, & in epitomen contracta à Carolo Clusio Atrebate. Antverpiae: ex officina Christophori Plantini; 1567.
 20. Orta Garcia Da, *Coloquios dos simples, e drogas e cousas mediçinais da India, e assi dalgũas frutas achadas nella onde se tratam algũas cousas tocantes amediçina pratica*. Goa: por Ioannes de Endem; 1563.
 21. Costa Cristóvão Da, *Tractado delas drogas, y medicinas de las Indias Orientales con sus plantas debuxadas al bivo*. Burgos: por Martin de Victoria; 1578.

Exotic plants in Italian pharmacopoeia

22. Orta Garcia Da, *Aromatum, et simplicium aliquot medicamentorum apud Indos nascentium historia*. Antverpiae: ex Officina Plantiniana, apud viduam, et Ioannem Moretum; 1593.
23. Nozal R, Gonzalez B, *El tratado de las drogas de Cristobal Acosta (Burgos, 1578). Utilidad comercial y materia medica de las Indias Orientales en la Europa renascentista*. Madrid: Ediciones de Cultura Hispánica; 2000.
24. Orta Garcia Da, ref. 20, pp. 39r., 78r.-78v., 115v., 129r.-131v., 128r.-130r., 177r.-178v.
25. Bellorini C, *The World of Plants in Renaissance Tuscany: Medicine and Botany*. Farnham, Surrey: Ashgate; 2006. p.126.
26. Morton AG, ref. 6; Raimondo FM, Garbari F, *Gli orti botanici in Italia*. In: Montacchini F (ed.), *Erbari e iconografia botanica: storia delle collezioni dell'Orto Botanico dell'Università di Torino*. Torino: Allemandi; 1986. pp. 15-23.
27. Cunico MP, *Il giardino veneziano: la storia, l'architettura e la botanica*. Venezia: Albrizzi; 1989.
28. Giulini P, *Il giardino e la botanica*. In: Azzi Visentini M (ed.), *Il giardino veneto: dal tardo Medioevo al Novecento*. Milano: Electa; 1988. pp. 243-279; Pardo Tomás J, ref. 8.
29. Bussatori P, *Gli orti botanici privati padovani*. In: AAVV, *Di sana pianta: erbari e taccuini di sanità: le radici storiche della nuova farmacologia*. Modena: Panini; 1988. pp. 47-53; Cunico MP, ref. 27, p. 15.
30. Chiarugi A, *Le date di fondazione dei primi orti botanici del mondo: Pisa (estate 1543), Padova (7 luglio 1545), Firenze (1 dicembre 1545)*. *Nuovo giornale botanico italiano* 1953;60:785-839; Garbari F, Raimondo M, *Botanical Gardens in Italy: Their History, Scientific Role and Future*. *Museologia scientifica* 1986;3(1-2):57-81.
31. Olmi G, *Farmacopea antica e medicina moderna. La disputa sulla Teriaca nel Cinquecento bolognese*. *Physis* 1977;19(1-4):197-246.
32. Ogilvie BO, *The Science of Describing: Natural History in Renaissance Europe*. Chicago, London: The University of Chicago Press; 2006.
33. Sabbatani L, *La cattedra dei semplici fondata a Bologna da Luca Ghini*. *Studi e memorie per la storia dell'Università di Bologna* 1926;9:13-53; Galassi N, Luca Ghini, *una vita per la scienza*. *Museologia scientifica* 1991-92;8:187-206; Bellorini C, ref. 25, pp. 58-67 and 96-97.
34. Celani E, *Sopra un Erbario di Gherardo Cibo conservato nella R. Biblioteca Angelica di Roma*. *Malpighia* 1902;16:181-226; Penzig O, *Contribuzioni alla storia della Botanica: illustrazione degli Erbari di Gherardo Cibo*. *Sopra*

- un Codice miniato della Materia Medica di Dioscoride, conservato a Roma. Milano: Ulrico Hoepli; 1905. Celani E, Penzig O, Ancora sugli Erbari conservati nella Biblioteca Angelica. *Malpighia* 1907;21:153-174.
35. Cibo's herbarium is preserved in the Biblioteca Angelica of Rome.
 36. Mattiolo O, Illustrazione del primo volume dell'Erbario di Ulisse Aldrovandi. *Malpighia* 1898;12:241-384; Ubrizsy-Savoia A, Le piante pisane nei manoscritti di Aldrovandi. *Museologia scientifica* 1992-93;9:363-380.
 37. Museo Botanico dell'Università, Bologna, Herbarium, respectively vol. 13, c. 226, vol. 1, c. 523, vol. 5, cc. 200, 201, vol. 11, c. 116, vol. 14, c. 33, vol. 4, c. 330, vol. 11, c. 71, vol. 12, c. 4, vol. 12, c. 198, vol. 13, c. 228, vol. 14, cc. 12-13, vol. 15, c. 142, vol. 13, c. 228, vol. 14, c. 243. Ubrizsy-Savoia A, La biodiversità americana nell'opera di Aldrovandi. In: Maiorino A, Minelli M, Monti AL, Negroni B (eds.), *L'erbario dipinto di Ulisse Aldrovandi: un capolavoro del Rinascimento*. Molteno: Ace International; 1993. pp. 75-104.
 38. Ubrizsy-Savoia A, Le piante americane nell'erbario di Ulisse Aldrovandi. *Webbia* 1993;48:579-598; Tugnoli Pattaro S, Filosofia e storia della natura in Ulisse Aldrovandi. In: Simili R (ed.), *Il teatro della natura di Ulisse Aldrovandi*. Bologna: Compositori; 2001. pp. 9-19.
 39. Cesalpino's herbarium is preserved in the Museo di Storia Naturale dell'Università (Sezione botanica) of Florence.
 40. Garbari F, Nasce presso lo Studio pisano, nel XVI secolo, la botanica moderna. In: *Livorno e Pisa: due città e un territorio nella politica dei Medici: Pisa e contado*. Pisa: Nistri-Lischi e Pacini; 1980. pp. 527-568. Moggi G, Andrea Cesalpino botanico. *Atti e memorie dell'Accademia Petrarca di lettere, scienze ed arti di Arezzo* 1981;42:235-249. Moggi G, *L'Erbario di Andrea Cesalpino*. In: Raffaelli M (ed.), *Il Museo di storia naturale dell'Università di Firenze*. Firenze: Firenze University press; 2009. pp. 66-71.
 41. Caruel T, *Illustratio in hortum siccum Andreae Caesalpini: Rudimentum ex plantis libro Agglutinatis vigere scio in testimonium eorum, quae in hoc volumine a me dicuntur*. Florentiae: Le Monnier; 1858. pp. 19, 78, 56.
 42. The first English national pharmacopoeia, *Pharmacopoea Collegii regalis medicorum Londinensis*, was published in 1618, and a few years later, in 1636, the first official prescription book, titled *Codex Medicamentarius seu Pharmacopoea Parisiensis*, was printed in Paris; it became obligatory only in 1718. For a brief but detailed excursus on the official pharmacopoeias of the world, see Cingolani E, Colapinto L, *Dagli antidotari alle moderne farmacopoee*. Roma: Di Renzo Editore; 2000. pp. 3-43; Riva E, *Le prime farmacopoee ufficiali europee: dalle origini al XIX secolo*. Ariccia: Aracne; 2015.

Exotic plants in Italian pharmacopoeia

43. Antidotarii Bononiensis, sive de usitata ratione componendorum, miscendorumque medicamentorum, epitome. Bononiae: Ioannem Rossium; 1574.
44. For a history of the long, difficult preparation of the Bolognese Antidotarium, see Corradi A, *Le prime farmacopee italiane*. Milano: Fratelli Rechiedei Editore; 1887. pp. 95-97. See also Bianchi V, *Farmacopee emiliane: L'antidotario bolognese*. *Farmaci e farmacie* 1958;8(2):45-50.
45. Biblioteca Universitaria, Bologna (BUB), Ms Aldrovandi 596, EE, 5, Antidotarium simplicium medicamentorum cum explicatione vocabulorum.
46. Baldacci A, *Prime ricerche intorno all'opera compiuta da Ulisse Aldrovandi per il Protomedicato e l'Antidotario*. Bologna: Tipografia Gamberini e Parmeggiani; 1913.
47. Raimondi E, Guicciardi L, Masino C, *Per una storia della farmacia e del farmacista in Italia: Emilia-Romagna*. Bologna: Skema; 1986; Bernabeo RA, Ulisse Aldrovandi e l'Antidotario bolognese. *Med. Secoli* 1993;1:51-62; Catellani P, *Farmacopee e trattati: la tecnica farmaceutica attraverso i secoli*. In: Corvi A (ed.), *La farmacia italiana dalle origini all'età moderna*. Pisa: Pacini; 1997. pp. 87-105.
48. Garzoni T, *La piazza universale di tutte le professioni del mondo, e gnobili et ignobili*. Venetia: appresso Gio. Battista Somascho; 1585.
49. *Ibid.*, p. 665.
50. *Atti del XLI Convegno Internazionale della ceramica, Savona-Albisola Superiore, 30-31 maggio 2008. Unguenta solis. Ceramica da farmacia tra Medioevo ed Età Moderna*. Borgo S. Lorenzo (Firenze): All'insegna del giglio; 2009.
51. Garzoni T, ref. 48, p. 664.
52. *El Ricettario dell'Arte, et Università de Medici, et Spetiali della Città di Firenze*. Riveduto dal Collegio de medici per ordine dello Illustrissimo et Eccellentissimo Signore Duca di Firenze. Fiorenza: Lorenzo Torrentino; 1550. p. 7.
53. *Ibid.*, pp. 25-26.
54. Baldacci A, ref. 46.
55. Archivio Arcivescovile, Bologna, Collegio di Medicina e di Arti, *Libro segreto del Collegio*, vol. 3, c. 153 ff. The date of the manuscript is 28 September 1568.
56. *Bub*, Ms Aldrovandi 21, vol. 4, *Tassa delli pretii quali vendere si debbano le robbe medicinali semplici et compositae, nel exercitio nostro della speciarina nella città et Conta di Bologna novamente reformata per gli Assonti di detta Compagnia*, 1557, c. 424r.

57. Ibid., c. 426v.
58. Bub, Ms Aldrovandi 67, Elenchus rerum naturalium tam animatarum quam inanimatarum quae ad pharmacopeam mediocriter instructa compones existuntur, cc. 26, 27.
59. Ibid., cc. 11, 12.
60. Ibid., cc. 19, 21, 22.
61. Tugnoli Pattaro S, Ulisse Aldrovandi e l'impianto dell'orto botanico bolognese. Bologna Incontri 1974;7-8:141-145; Cristofolini G, Conte L, L'Orto botanico. In: Tega W (a cura di), Storia illustrata di Bologna. Repubblica di San Marino: AIEP; 1989(7). pp. 41-60; Findlen P, Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy. Berkeley: University of California Press; 1994. Cristofolini G, Hortus vivus e hortus siccus. In: Simili R (ed.), Il teatro della natura di Ulisse Aldrovandi. Bologna: Compositori; 2001. pp. 51-94.
62. Bub, Ms Aldrovandi 21, vol. 4, Trattato della utilità et eccellenza della lettura dell'istoria naturale sensata delle piante, animali e cose inanimate e sotterranee prima introdotta nell'Accademia di Bologna, cc. 51r.-52v.
63. Ibid., cc. 36r.-72.
64. Bub, Ms Aldrovandi 136 (7), cc. 79v.-83r.
65. Bub, Ms Aldrovandi 136 (9), c. 263v.
66. Niccolò Salernitano, Incipit Antidotarium Nicolai. Venetiis, Nicolaum Ienson Gallicum. 1471.
67. Corvi A, Origini delle farmacopee ed evoluzione storica del modello e della funzione delle farmacopee. Le Costituzioni di Federico II. Atti Mem Acc Ital Stor Farm 1990;8 (3):219-228; Cingolani E, Colapinto L, Le Farmacopee in Italia. Med. Secoli 1992;1(4): 1-222. The two antidotaria, both issued by the Schola Medica Salernitana, are the first official pharmaceutical treatises. The Antidotarium by Niccolò Mirepso, for instance, was adopted officially and made compulsory to apothecaries in Paris in the 14th century. Compendium aromatariorum, by Saladino d'Ascoli, was written in 1447 and is considered the first practical pharmaceutical text: it was published for the first time in Bologna in 1488 with the title Domini Saladini de Esculo Serenitatis Principis Tarenti phisici principalis Aromatariorum compendium feliciter incipit.
68. Antidotarii Bononiensis, op. cit. note 43, respectively pp. 16, 33.
69. 'Oleum ex Ligno Guaiaco. Paratur elambico eleganter, ita ut non uratur. Optimum est quod est simile terebentinae. Ad tumores gallicos, et gallica ulcera optimum est', Ibid., p. 372.
70. Il Ricettario medicinale necessario à tutti i medici, et spetiali, nel quale con bellissimo ordine si insegna tutto quello, che si può desiderare intorno alla

- cognizione del provvedere, eleggere, conservare...qual si voglia sorte di medicamento. Fiorenza: Giunti; 1574.
71. Il Ricettario medicinale necessario à tutti i medici, et spetiali. Nel quale con bellissimo ordine si insegna tutto quello che si può desiderare intorno alla cognizione del provvedere, eleggere, conservare, preparare, et comporre qual si voglia sorte di medicamento; secondo l'uso de' migliori e più eccellenti medici. Fiorenza: Heredi di Bernardo Giunti; 1567.
 72. Nuovo Receptario composto dal Famosissimo Chollegio degli eximii Doctori della Arte et Medicina della inclita Ciptà di Firenze. Firenze: per la compagnia del Drago; 1498. Corradi A, ref. 44, p. 3; Colapinto L, The Beginning of the Pharmacopoeia between 15th and 17th Centuries from the Ricettario fiorentino to the Pharmacopea Bergamensis and the Antidotaria. *Med. Secoli* 1993;5(1):39-50.
 73. Colapinto L, ref. 72; Corvi A, Origini delle farmacopee ed evoluzione storica del modello e della funzione delle farmacopee. *Le Corporazioni degli speziali e il Ricettario fiorentino. Atti Mem Accad Ital Stor Farm* 1999;8(1):47-51. Among the latter, the following deserve to be mentioned: *Luminae Maius*, by Manlio del Bosco, *Thesaurus aromatariorum*, by Paolo Suardo, and *Lumen apotecariorum*, by Quirico de Augustis da Tortona.
 74. Cingolani E, Colapinto L, ref. 42, p. 27.
 75. Riva E, La tecnica farmaceutica e la materia medica nel Ricettario fiorentino. In: *Le piante medicinali e il loro impiego in farmacia nel corso del tempo. Atti del Congresso Internazionale di Storia della farmacia, 23-25 settembre 1988. Piacenza: Conselve (Padova) Tipografia Regionale Veneta; 1989. pp. 133-144; Colapinto L, ref. 72, p. 45.*
 76. El Ricettario dell'Arte, ref. 52. This edition was followed by other two, printed in Venice respectively in 1556 and 1560/1562. In 1561 the Ricettario was translated into Latin by Charles de l'Ecluse under the title *Antidotarium, sive De exacta componendorum miscendorumque medicamentorum ratione libri tres. Anverpiae, ex officina Christophori Plantini.*
 77. El Ricettario dell'Arte, ref. 52, pp. 26-27.
 78. *Ibid.*, pp. 67-68.
 79. *Ibid.*, pp. 187-189.
 80. Bergaglio GC, Comparazioni tra i ricettari fiorentini. Edizioni 1498-1567-1696. In: *Acta 34° Congressus internationalis Historiae Pharmaciae. Firenze, 20-23 ottobre 1999. Belluno: Tipografia Piave; 2001. pp. 40-42.*
 81. It is sufficient to mention the fact that in the 1498 edition there were 321 medicinal preparations drawn from the medical work of Mesue, while in the

1567 edition there were only 29 of them. Vice versa, in the 1498 edition there were only 7 medicines drawn from Galen or other Greek physicians, while in the 1567 edition there were no less than 75 of them.

82. Among the authors of medical prescriptions more recent than the 16th century editions, Berengario da Carpi, Giambattista Monti and Gabriele Falloppio are named.
83. Cingolani E, Colapinto L, ref. 42, p. 32.
84. Il Ricettario medicinale, ref. 71, p. 9.
85. Ibid., respectively pp. 19, 113. Please notice, however, that Balsamo dell'Indie Occidentali could replace Balsamo liquore only if it was not possible to find Olio di Noci Moscade lambiccato or Olio di Gherofani, as explicitly recommended in the Ricettario, on page 246.
86. Ibid., p. 21.
87. Ibid., p. 29.
88. Ibid., p. 43.
89. Ibid., respectively pp. 86, 59.
90. Ibid., pp. 125-127.
91. Ricettario fiorentino. Fiorenza: nella stamperia delli heredi di Bernardo Giunti; 1567. Biblioteca Nazionale Centrale of Rome (Shelfmark: 71.3.G.21).
92. Riva E, Confronto tra le prime due edizioni del ricettario fiorentino e l'antidotario mantovano del 1558. Atti Mem Accad Ital Stor Farm 1991;8(2):99-105.
93. Antidotarium ex multis, optimisque authoribus collectum, castigatum, et accurate digestum. Venetiis, Ex officina Erasmiana, apud Vincentium Valgrisius, 1558 e 1559. Zanca A, Rilievi recenti circa l'anno di pubblicazione (1558) ed il carattere di ufficialità delle farmacopee mantovane. In: Mantova e i Gonzaga nella civiltà del Rinascimento. Atti del Convegno, Mantova 6-8 ottobre 1974. Segrate: Edigraf; 1978. pp. 359-362.
94. Bianchi V, Bruno E, Le Farmacopee lombarde. Pisa: Pacini Mariotti; 1956. p. 13.
95. Masino C, Ostino G, Le forniture di medicinali e 'robbe vive' alla Corte di Mantova nel mese di dicembre del 1587. Atti del Convegno Mantova e i Gonzaga nella civiltà del Rinascimento. Segrate: Edigraf; 1978. pp. 375-379.
96. Ibid.
97. Riva E, La farmacopea bergamasca del 1580, un vasto repertorio di ricette a disposizione dello speziale. Atti Mem Accad Ital Stor Farm 1992;9(1):47-54.
98. Pharmacopoea, seu de usitatorum medicamentorum componendorum ratione Liber Collegij Medicorum Bergomensium opera nunc primum in

Exotic plants in Italian pharmacopoeia

- lucem editus. Bergomi, Iosephum Pigoccium bibliopolam: typis Comini Venturae, 1580.
99. Bianchi V, Bruno E, ref. 94, pp. 16-17.
 100. Pharmacopoea, seu de usitatorum medicamentorum, ref. 98, p. 358.
 101. *Ibid.*, p. 422.
 102. *Ibid.*, pp. 372, 382.
 103. Pharmacopoea Collegii Medicorum Bergomi, rationem componendi medicamenta usitatiora complectens, altera editio non solum Pharmacopoeis sed etiam Medicis et Philiatris, aliisque ex usu futura. Bergomi: typjjs Comini Venturae eiusdem Urbis typographi; 1581.
 104. *Ibid.*, p. 408.
 105. *Ibid.*, p. 411.
 106. *Ibid.*, pp. 436-437.
 107. *Ibid.*, p. 439.
 108. *Ibid.*, p. 376.
 109. *Ibid.*, pp. 384, 397, 407, 450.
 110. *Ibid.*, p. 479.
 111. Farmacopea o Antidotario dell'Eccellentissimo Collegio de' Signori Medici di Bergamo, nel quale si contiene il modo di comporre i medicamenti hoggidì più usati nelle spetiarie. Venetia: Nicolò Moretti; 1597.
 112. Antidotarii Romani seu De modo Componendi Medicamenta quae sunt in usu, opus Pharmacopolis, medicisque non minus utile quam necessarium. Romae: Haeredes Antonij Bladij Impressores Camerales; 1583.
 113. Among the medicines drawn from the Bergamo Pharmacopoeia, we wish to point out *Pillulae ex hermodact. Min, Oleum Anguriae, and Oleum melonum.*
 114. Antidotarii Romani, ref. 112, respectively pp. 102r.-102v., 119v.-120r.
 115. *Ibid.*, pp. 179r.-179v.
 116. *Ibid.*, pp. 7r.-9v.
 117. Delicado F, El modo de adoperare el legno de India Occidentale, salutifero remedio a ogni piaga e mal incurabile. Venetia: sumptibus vener. presbiteri Francisci Delicati Hyspani; 1529.
 118. Corradi A, L'acqua del legno e le cure depurative nel Cinquecento. *Annali Universali di Medicina e Chirurgia* 1884;269:49-82; Quétel C, Le mal de Naples: histoire de la syphilis. Paris: Seghers; 1986.
 119. Arrizabalaga J, Henderson J, French RK, The Great Pox: The French Disease in Renaissance Europe. New Haven London: Yale University press; 1997.
 120. Fracastoro Gerolamo, Syphilis sive morbus gallicus. Veronae: Stefano Nicolini da Sabbio; 1530.

121. Poll N, De cura morbi Gallici per lignum guaycanum, libellus. Venetia: Joannem Patavinum & Venturinum de Ruffinellis; 1535.
122. Hutten Ulrich V, De guaiaci medicina et morbo gallico liber unus. Mogutiae: in aedibus Ioannis Scheffer; 1519.
123. Munger RS, Guaiacum, the Holy Wood from the New World. *J. Hist. Med. Allied Sci.* 1949;4 (2):196-229.
124. Álvarez Peláez R, La conquista de la naturaleza americana. Madrid: Consejo superior de investigaciones científicas; 1993; Kellenbenz H, Die Fugger in Spanien und Portugal bis 1560. Munich: Ernst Vögel; 1999.
125. Benvenuto G, Piante medicinali dalle Americhe all'Europa. *Atti Mem Accad It Stor Farm* 1995;12 (3):203- 210.
126. Valenti V, Ordinamento e Farmaci della 'Spiciaria' della Corte Ducale Estense dal 1551 al 1558. *Minerva Farm* 1956;5:127-128; 1956;6:144-150. The manuscripts are preserved in the Archivio di Stato of Modena.
127. Ibid.
128. Russo A, Antonio Musa Brasavola (1500-1555) e la critica botanico-farmacologica. In: *Le piante medicinali e il loro impiego in farmacia nel corso del tempo. Atti del Congresso Internazionale di Storia della farmacia, 23-25 settembre 1988: Piacenza. Conselve (Padova): Tipografia Regionale Veneta; 1989. pp. 71-73.*
129. Brasavola AM, *Examen omnium simplicium medicamentorum quorum in officinis usus est. Roma: impensis et laboribus Antonii Bladi; 1536. pp. 65-66.*
130. Brasavola AM, *De radice Chinae usu, cum quaestionibus de ligno sancto. Venetiis: Iuntas; 1566.*
131. Brasavola AM, *Modus brevior praebandi decoctum ligni vel radices chinae, in Examen omnium Loch, idest: linctuum, Suffuf, id est pulverum, aquarum, decoctionum, oleorum, quorum apud Ferrarienses pharmacopolas usus est, usi de morbo Gallico diligentissime copioseque tractatur. Venetiis: Iuntas; 1573. p. 262v.*
132. Fioravanti L, *De capricci medicinali dell'eccellente medico et cirurgico M. Leonardo Fioravanti bolognese, libri quattro. Venetia: Lodovico Avanzi; 1573.*
133. Ibid., p. 56r.
134. Ibid., pp. 115v.-115r.
135. Ibid., p. 123v.
136. Rostinio P, *Trattato del mal francese dell'eccellente medico et dottore Pietro Rostinio: nel quale si discorre sopra CCXXIII sorti di detto male; e in quanti modi si può prendere, causare, et guarire...Raccolto da quanti n'hanno*

Exotic plants in Italian pharmacopoeia

- scritto, e in particolare dal Brasavola, con nuova aggiunta di molte cose in quest'ultima impressione. Venetia: Giorgio de' Cavalli; 1565.
137. *Ibid.*, pp. 9r.-9v.
 138. *Ibid.*, pp. 58v.-59v.
 139. Brasavola AM, rif, 131, p. 253v.
 140. Rostinio P, rif. 136, pp. 70r.-70v.
 141. *Ibid.*, pp. 72r.-72v.
 142. *Ibid.*, pp. 76r.-76v.
 143. *Ibid.*, p. 77v.
 144. Anguissola A, *Compendium simplicium et compositorum medicamentorum quorum est frequens usus apud medicos et pharmacopolas*. Placentiae: ex typis Io Bazachij; 1587.
 145. *Ibid.*, p. 18.
 146. *Ibid.*, p. 20.
 147. *Ibid.*, p. 80.
 148. *Ibid.*, p. 99.
 149. *Ibid.*, p. 111.
 150. Bianchi V, *Le farmacopee emiliane*. Le 'Osservationi' del farmacista parmigiano Gerolamo Calestani. *Farmaci e Farmacie* 1958;8(8):238-240.
 151. Calestani G, *Delle osservationi di Gerolamo Calestani nel comporre e conservare gli antidoti, et medicamenti che più si costumano in Italia all'uso della medicina, secondo il parere de' medici antichi, e moderni esaminati*. Venetia: Francesco Sanese; 1564.
 152. The subsequent editions were all printed in Venice, respectively in 1575, 1580, and 1597. The 17th century editions were printed in 1600, 1616, 1623, 1655 and 1673.
 153. Calestani G, ref. 151, p. 61.
 154. *Ibid.*, p. 76.
 155. *Ibid.*, p. 47.
 156. *Ibid.*, pp. 52, 53, 36.
 157. *Antidotarium a Bonon. Med. Collegio ampliatur ad ill.mum Senatam Bonon. Cum dupl. Tab. una praesidiorum altera morborum*. Bononiae: Victorium Benacium; 1606.
 158. *Substitutata, et aliqua dubia declarata: Additionibus etiam Excellentissimi Ulyssis Aldrovandi collegae ampliata*, Bononiae: Victorium Benacium; 1606. pp. 499-527.
 159. *Index morborum quibus praesidia in hoc volumine contenta conveniunt*. Bononiae: Victorium Benacium; 1606. p. 33.

160. 'Ligni Guaiaci quantum sufficit, incide in frusta, et imple ollam magnam, vitreatam intus, cuius orificium sit arctum: et fac foueam in terra, et prepara parietes eius cum terra figuli: deinde pone ollam vitreatam in fundo, en directo foueae, habentem orificium magnum, et cooperiatur lamina ferrea subtiliter perforata: deinde praepara ista duo vasa cum terra figuli, ne ex utriusquae; orificijs respiret, deinde cooperi terra, et adde ignem per tres horas, vel amplius demum resudabit oleum ex ligno guaiaco', *Ibid.*, p. 401.
161. *Ibid.*, p. 157.
162. *Ibid.*, pp. 206-207.
163. *Antidotarium Bononiense Medic. Collegii diligenter emendatum et auctum et amplissimo eiusdem civitatis Senatus dicatum cum privilegio Paulo V Pont. Max. Bononiae, Victorium Benacium*, 1615.
164. For a brief history of tobacco, See: Buhler-Oppenheim K, Frey-Wyssling A, Schlittler E., Mamllok G, *Il tabacco in medicina. Rivista Ciba* 1951;29:966-980.
165. *Antidotarium Bononien.*, ref. 163, p. 450.
166. *Antidotarium Bononien. A Medicinae Collegio nuperrime auctum et emendatum et amplissimo eiusdem Civitatis Senatui dicatum. Cum privilegio Urbani VIII Pon. Max. Bononiae: Haeredem Victorii Benacij; 1641.*
167. *Corradi A*, ref. 44, p. 112.
168. *Antidotarium Bononien*, ref. 166, p. 320.
169. *Ibid.*, p. 260.
170. *Ibid.*, p. 322.
171. *Ibid.*, pp. 405-506.
172. *Ibid.*, pp. 499, 500, 501.
173. *Ibid.*, p. 462.
174. *Antidotarium Bononiense novissimum Sapientissimis, ac Illustrissimis DD. Felsinae Patriae Patribus a Iathrophysico eiusdem Collegio Dicatum. Bononiae: Ex typographia Manolessia; 1674.*
175. Under the title *De substitutis et declaratis*, the heading *opobalsamum* is followed by *pro eo Balsamum Indicum verum ex Peru, vel ex regione Tolu, si habeatur, vel oleum Nucis moschata*. *Ibid.*, p. 362.
176. *Ricettario fiorentino di nuovo illustrato. Fiorenza: Giorgio Marescotti; 1597.*
177. *Ricettario fiorentino di nuovo illustrato. Firenze: Pietro Cecconcelli; 1623.*
178. *Ibid.*, pp. 19, 20, 25.
179. *Ibid.*, p. 26 ff.
180. *Ibid.*, pp. 32, 34, 41, 45, 61, 67.
181. *Ibid.*, p. 159.

Exotic plants in Italian pharmacopoeia

182. Ricettario fiorentino di nuovo illustrato. Firenze: Vincenzo Vangelisti e Pietro Matini; 1670.
183. Ibid., p. 20.
184. Ibid., pp. 20, 24-25.
185. Ibid., pp. 41-42.
186. Corradi A, ref. 44, p. 70.
187. Ricettario fiorentino di nuovo illustrato. Firenze: Gio Filippo Cecchi; 1696.
188. Antidotarii Romani seu de modo componendi medicamenta quae sunt in usu, opus pharmacopolis, medicisque non minus utile quam necessarium. Mediolani: Hieronymum Bordonum; 1607.
189. Antidotario romano tradotto da latino in volgare da Ippolito Ceccarelli romano spetiale all'insegna della Vecchia. Con l'aggiunta dell'elettione de' semplici e pratica delle compositioni, et un trattato dell'apparato della teriaca, et ragione de suoi ingredienti. Roma: Bartolomeo Zannetti; 1613.
190. Ibid., p. 179.
191. Antidotario romano da latino in volgare tradotto da Ippolito Ceccarelli Romano spetiale all'insegna della Vecchia, con l'aggiunta dell'elettione de' semplici, e Pratica delle Compositioni, e due Trattati, uno della teriaca romana et ragione de suoi ingredienti. L'altro della teriaca egittia. Roma: Gio. Angelo Ruffinelli et Angelo Manni; 1619.
192. Among the new medicines, there were, for instance, Diamoron magistrale and Diapenta.
193. Ibid., pp. 194, 196, 199, 195.
194. Ibid., pp. 204, 206, 208, 197.
195. Antidotario romano latino, e volgare. Tradotto da Ippolito Ceccarelli Romano speziale all'insegna della Vecchia. Roma: Andrea Ei; 1624.
196. Antidotario romano latino, et volgare tradotto da Ippolito Ceccarelli romano. Aggiuntovi in questa ultima impressione le avvertenze, et osservazioni appartenenti alla Compositione de medicamenti del Sig. Lodovico Settala. Milano: Gio. Battista Bidelli; 1635.
197. Antidotario romano commentato dal dottor Pietro Castelli romano, nobile messinese, già lettore nella patria di filosofia, di medicina, e di semplici, et hora primo lettore di teorica priore, e decano del Collegio de medici. Ove si il primo Autore di ciascheduna compositione, si fa la collatione con l'altre ricette, si dichiarono i semplici, il modo di comporre, e finalmente s'insegna il vero uso, e la conveniente dose di ciascheduno medicamento. Messina: Gio. Francesco Bianco; 1637.
198. Ibid., pp. 352, 356.

199. Antidotario romano latino e volgare. Tradotto da Ippolito Ceccarelli. Li ragionamenti, e le aggiunte dell'elettione de' semplici, e pratica delle compositioni. Roma: Giuseppe Corno e Bartolomeo Lupardi; 1675.
200. *Ibid.*, p. 300.
201. *Ibid.*, p. 333.
202. Prospectus pharmaceuticus, sub quo Antidotarium Mediolanense spectandum proponitur Excell. Mi Senatus Jussu ac Ven. Collegij Nob. Physicorum dictae civitatis spetiali ordine demandatum ordine demandatum Ioanni Honorato Castillioneo. Mediolani: Ioannem Baptistam Ferrarium; 1668. Corvi A, Origini delle farmacopee ed evoluzione storica del modello e della funzione delle farmacopee. I protomedicati e le farmacopee dopo Paracelso. *Atti Mem Accad It Stor Farm* 1991;8(2):107-114.
203. Prospectus Pharmaceuticus, ref. 202, p. 3 ff.
204. *Ibid.*, pp. 67, 78, 79, 132-133.
205. *Ibid.*, pp. 147, 148.
206. *Ibid.*, pp. 160-161.
207. *Ibid.*, p. 203.
208. *Ibid.*, p. 310.
209. Prospectus Pharmaceutici, Editio secunda sub quo Antidotarium Mediolanense, Galeno-Chymicum excellentissimi Senatus iussi...secunda Mantissam Chymicam Spagiricam Nicolai de Lemmery Physici Parisiensis Celaberimi e Gallico in Italicum traductam. Tertia Tractatus de tintura Coralliorum, Alkaest, et Auro potabile, China Chinae, Herba, The, Caphè et Chocolate. Mediolani: Caroli Josephi Quinthe; 1698.
210. Matthee R, Exotic Substances: The Introduction and Global Spread of Tobacco, Coffee, Cocoa, Tea, and Distilled Liquor, Sixteenth to Eighteenth Centuries. In: Porter R, Teich M (eds.), *Drugs and narcotics in history*. Cambridge: Cambridge University Press; 1995. pp. 3-23.
211. Prospectus Pharmaceutici, ref. 209, pp. 20-25.
212. *Ibid.*, pp. 26-31.
213. *Ibid.*, pp. 31-36.
214. *Ibid.*, pp. 37-40.
215. Boldini AF, Il medico de' poveri o sia il gran stupore de' medici, epilogo in diversi segreti naturali, che alcuno no ne fa stima, cavati da quelle herbe, radiche, fronde, fiori e frutti. Venezia: De Bernardino Pomatelli: year not specified, p. 3.
216. Pigozzi G, Stupendi et meravigliosi secreti. Verona, Bologna: Bartolomeo Cochi; 1615. p.1.

Exotic plants in Italian pharmacopoeia

217. Honofri F, Centauria di secreti medicinali e naturali nella quale si contiene 100 secreti, tutti approvati et sperimentati. Bologna: Domenico Barbieri; 1643. p. 5.
218. Among Aldrovandi's works published by Ambrosini there were: De quadrupedibus digitatis viviparis libri tres, et de quadrupedibus digitatis ovipars libri duo. Bononiae: Nicolai Tebaldinum; 1637; Serpentum et draconum historiae libri duo. Bononiae: Clementis Ferronij, 1639; Monstrorum historia cum Paralipomenis historiae omnium animalium. Bononiae; Nicolai Tebaldini; 1642, and Musaeum metallicum in libros cuatro. Bononiae: Baptistae Ferronij; 1648.
219. Ambrosini, Bartolomeo, Panacea ex herbis quae à sanctis denominantur concinnata opus curiosis gratum medicis verò et pharmacopaeis perutile cui accessit capsicorum cum suis iconibus brevis historia. Bononia: apud haeredes Victorij Benatij; 1630.
220. Vecchi T, Erbe con nomi di Santi nella 'Panacea' di B. Ambrosini (1558-1681). Atti Mem Accad Ital Stor Farm 2010;27(3):179-182.
221. Ambrosini B, ref. 219, pp. 4-5.
222. Ibid., pp. 6-7.
223. Ibid., pp. 1-25.
224. Aldrovandi U, Dendrologiae naturalis scilicet arborum historiae libri duo. Bononiae: Baptistae Ferronij; 1667.
225. Montalbani O, Index omnium plantarum quae opera, et studio Ovidij Alicorni Mont'Albani Bonon. Philosophiae, et medicinae doct. Collegiati, exsiccatae et cartis agglutinatae, in proprio musaeo conspiciuntur. Bononiae: Theodori Mascheronij et Clementis Ferronij; 1624.
226. Ibid.
227. Zanoni G, Istoria botanica di Giacomo Zanoni simplicista, e soprintendente all'Horto Publico di Bologna. Nella quale si descrivono alcune piante de gl'Antichi, da moderni con altri nomi proposte; e molt'altre non più osservate, e da varie Reggioni del Mondo venute, con le virtù, e le qualità della maggior parte di esse, et in figure al vivo rappresentate. Bologna: Giosseffo Longhi; 1675.
228. Catellani P, Viaggio nel tempo attraverso le antiche farmacie bolognesi. Atti Mem Accad Ital Stor Farm 2001;19(2):122-156.
229. Zanoni G, ref. 227, pp. 15, 29.
230. Ibid., pp. 41, 74.
231. Ibid., pp. 149, 181.
232. On the history of Peruvian Bark and its importance in medicine, see Guareschi I, Cenni storici sulle chine chine e i loro derivati. In: Nuova Enciclopedia

- di Chimica. Torino: UTET; 1913(6); Russo A, Pietro Paolo Pucciarini (1600-1662) gesuita-speziale e la china. In: *Le piante medicinali e il loro impiego in farmacia nel corso del tempo*. Atti del Congresso Internazionale di Storia della farmacia, 23-25 settembre 1988, Piacenza. Conselve (Padova): Tipografia Regionale Veneta; 1989. pp. 181-183. Delaveau P, *Histoire et renouveau des plantes médicinales*. Paris: A. Michel; 1982. Frances C, Garcia J, Olivares A, Adan F, *Le quinquina: son commerce et son emploi en Espagne au cours de l'histoire*. In: *Le piante medicinali e il loro impiego in farmacia nel corso del tempo*. Atti del Congresso Internazionale di Storia della farmacia, 23-25 settembre 1988: Piacenza. Conselve (Padova): Tipografia Regionale Veneta; 1989.
233. Helvetius Jean A, *La Kinakina e le di lei stupende qualità, con la maniera di servirsene, in tutte le febbri, per ogni sorte d'età, sesso, e complessione*. Parma: Giuseppe dall'Oglio e Francesco Maria Rosati; 1694.
234. *Ibid.*
235. *Ibid.*, pp. 1-2, 14.
236. *Ibid.*, pp. 111-149.
237. *Nuova tassa. Et dichiarazione del prezzo delle cose medicinali, fatta dalli SS. Priore, et Protomedici del Collegio di Bologna, e dal Massaro, et Assonti della Compagnia degli Speciali l'Ano 1601, il dì 15 di Giugno*. Bologna: Gio. Rossi; 1601.
238. *Ibid.*, pp. 4-5.
239. *Ibid.*, pp. 7, 11.
240. *Tassa de' medicinali ultimamente stabilita dall'Eccellentissimo Collegio di medicina, et Honoranda Compagnia de' Spetiali della Città di Bologna*. Bologna: Herede del Benacci; 1637.
241. *Ibid.*, pp. 6, 13.
242. *Ibid.*, pp. 5, 7.
243. *Ibid.*, pp. 26, 27.
244. *Tassa de' medicinali semplici, composti, e spagirici, disposta con l'ordine dell'Alfabetto, e pubblicata dall'Illustrissimo, et Eccellentissimo Collegio di Medicina, et Honoranda Compagnia de'speciali della città di Bologna*. Bologna: Giacomo Monti; 1682.
245. *Ibid.*, pp. 8, 10.
246. *Ibid.*, pp. 16, 17.
247. *Ibid.*, pp. 18, 20.
248. *Ibid.*, pp. 21, 24.
249. *Ibid.*

Exotic plants in Italian pharmacopoeia

250. Ibid.
251. Tassa de' medicinali semplici, composti, e spagirici disposta con l'ordine dell'Alfabeto e pubblicata dall'Illustrissimo, et Eccellentissimo Collegio di Medicina et Onoranda Compagnia degli Speciali della città di Bologna. Bologna: nella stamperia del Longhi; 1693.
252. Ibid., pp. 9, 13, 16.
253. Ibid., pp. 23, 25.
254. Antidotarium Bononiense, ref. 166, p. 116.
255. Ibid., pp. 499, 500.
256. Ibid., p. 280.
257. Falloppio G, De morbo gallico. Opera geniuna omnia. Venetiis: Antonium et Iacobum de Franciscis; 1606(2). p. 195.
258. Geremek B, Les fils de Cain: l'image des pauvres et des vagabonds dans la littérature européenne du XV au XVII siècle. Paris: Flammarion; 1991.
259. Olmi G, Magnus Campus: i naturalisti italiani di fronte all'America nel secolo XVI. In: Prosperi A, Reinhard W (eds.), Il Nuovo Mondo nella coscienza italiana e tedesca del Cinquecento. Bologna: Il Mulino; 1992. pp. 291-329
260. Worth Estes J, The European Reception of the First Drugs from the New World. *Pharm Hist* 1995;37(1):3-23.
261. Having recently come into possession of a 18th century book from a pharmacy in a small village in Romagna, I have started studying it and comparing it with the lists in the antidotaria, in order to find out which medicines were used outside the main medical circles.

Correspondence should be addressed to:

Federica Rotelli, Strada Maggiore 13 - 40125 Bologna Italy

federicarotelli@libero.it

