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Medical Ethnobotany and Ethnopharmacology of Europe

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29.1 Introduction

European medicinal plants have attracted scholars since ancient times and continue to be a central interest of ethnographers, anthropologists, ethnobiologists, pharmacologists and other scholars interested in wider health questions (Kołodziejska-Degórska, 2012; Lardos and Heinrich, 2013; Shikov *et al.*, 2014). Medicinal plant knowledge in Europe is rooted in a long history of health traditions dating back to ancient Greek, Roman and Arabic medical systems and over the centuries has been passed down via both written and oral pathways (see Chapters 28 and 30). Over time, Sumerian, Chinese, Indian or American medicines have entered into the European pharmacopoeia. While some of these traditions have survived throughout the centuries, many others have changed or disappeared, and new uses of plants have emerged either from local experience or imported from other traditions. The result is a very rich pharmacopoeia and a profound local knowledge about medicinal plants. However, in fast-changing environments many traditions are disappearing. An alarming rate of decline of traditional medical knowledge has been highlighted by most European ethnobotanical field studies (Quave *et al.*, 2012b).

While numerous studies address the increasing importance of medicinal plant use in Europe, many of the medicinal plants that are widely used and marketed in Europe today do not belong to its historical medical tradition. The mainstream popularization of complementary and alternative medicines is promoting the use of plants and plants products originating from outside Europe or popularizing others that were previously consumed only in some parts of the continent. These studies show that medicinal plants are being combined with the use

of pharmaceuticals for curing an incredibly wide range of illnesses and medical symptoms. Indeed, this spans simple conditions such as catarrh to the extensively more complex, such as cancer and HIV/AIDS (e.g. Du *et al.*, 2014; Engdal *et al.*, 2008).

This chapter focuses on the local and regional medical traditions in Europe and is based on ethnobotanical studies provided that they adopt a proper botanical methodology and address the ethnographic and anthropological context of human–plant relationships. We have updated and reinterpreted our previous review of recent original medico-ethnobotanical field studies conducted in Europe (Quave *et al.*, 2012b), therefore many pre-2012 references that appeared in this paper have not been included in the chapter. After a brief presentation of the history of ethnobotanical studies in Europe, we present the current state of such studies, highlighting the richness of the European ethnomedicinal flora and its importance for promoting our understanding of traditional healthcare and self-medication practices. Specifically, ethnobiological data are useful to medical practitioners charged with the care of rural, migrant and other populations that still use their own knowledge for curing themselves and other members of the community (Maxia *et al.*, 2014).

29.2 A brief history of European medicinal plants studies

Europe represents a melting pot of cultures and has a long history of medical knowledge transmission across geographic, cultural and linguistic borders. Medical knowledge appears in the earliest written records and fortunately some of these texts have been preserved until today. Greek and Roman authors reported an incredible amount of data about medicinal plants used at their times. Famously, the physician Pedanius Dioscorides (AD 40–90) wrote *De Materia Medica*, which heavily influenced early medicine in Europe and inspired the production of herbal texts, especially during the Middle Ages (AD 500–1400) until the renaissance and can be considered the most important European herbal.

Monasteries became essential during the Middle Ages since monks and nuns wrote herbals and their physic gardens were used to grow medicinal species (Furniss, 1968). Medieval herbals maintained the Greco-Latin tradition by updating and adding new data to the old texts. Arab and Andalusian authors such as Ibn Sina (Avicenna, c. 980–1037) and Ibn Al-Baytar (c. 1180–1248) were also highly influential. Ibn Al-Baytar, for instance, compiled a book of food and medicinal plants based on his own observations and more than 200 sources (including Dioscorides), presenting uses for 1400 simples. The plant materials used were gathered or grown locally while exotic medicines, including spices like black pepper (*Piper nigrum* L.) and nutmeg (*Myristica fragrans* Houtt.), became accessible through trade routes (Pols, 2009).

The invention and diffusion of Gutenberg's printing press in the late 15th century fostered a revolution for the diffusion of written medicinal plant knowledge. For instance, Leonhart Fuchs' herbal *Neu Kreüterbuch* (1543) catalogued more than 400 plants native to what is now known as Germany and Austria, as well as about 100 exotic plants. Other herbals, for example by Henrick Smid (1546), William Turner (1551), Remberd Dodoens (1554), Andrés Laguna (1555), Pietro Andrea Mattioli (1568), Juhász Melius (1578), Marcin z Urzędowa (1595), John Gerard (1597) and Simon Syrennius (1613), were also widely read.

Later, during the mid-1700s, a wealth of data concerning local medicinal plant uses was gathered by Carl Linnaeus and many of his contemporaries. From his travels in Dalecarlia, Linnaeus reported on the long-distance trade in medicinal plants. Bitterwort (*Gentiana*

purpurea L.) roots were imported by peasant peddlers into Sweden from Norway. Harvesting was so intense that the species eventually disappeared from many localities and the trade collapsed. His works inspired a whole generation of scholars. For instance, Peter Kalm (1716–1779) compiled very interesting first-hand data from south-western Sweden (1741), Russia (1744) and North America (1749–1752), while Johan Peter Falck (1732–1774), recorded animal and plant knowledge among several Russian ethnic groups (Svanberg *et al.*, 2011). Other relevant works were those of Jens Christian Svabo (1746–1824) on the Faroes, John Lightfoot (1735–1788) in Scotland, José Quer y Martínez (1695–1764) in Spain, Félix de Avelar Brotero (1744–1828) in Portugal and Andrzej Krzysztof Kluk (1739–1796) in Poland.¹

29.3 Modern European medico-ethnobotanical studies

Europe is a complex continent where over the last century industrialization developed at varying rates and to a varying degree. Transhumance livestock-keeping, gathering wild food and medicinal plants for humans or livestock as well as hand-crafting utensils for the household were common activities in many parts of Europe until only a few decades ago and remain so in some regions (Svanberg *et al.*, 2011), therefore at the beginning of the 21st century a very rich body of traditional knowledge concerning the European flora continues to attract ethnobiologists.

29.3.1 The development of ethnobotanical studies in Europe

Many European scholars have contributed to the field of medicinal plant research. However, ethnobotanical studies in a modern sense, substantiated by clear methods, aims and appropriate documentation, were not introduced in Europe until the mid-19th century, a time of increasing scientific exploration in the world.

An early example is the German doctor Johann Wilhelm Ludwig von Luce (1756–1842), who, after working for several decades as a practicing physician among local peasants, wrote one of the very first systematic medico-ethnobotanical surveys within a specific area in Europe, the Estonian island of Saaremaa. Another relevant author was Leopold Glück (1856–1907), who at the end of the 19th century gathered popular remedies based on 108 taxa in Bosnia and Herzegovina, and recognized the importance of an emic perspective (Svanberg *et al.*, 2011).

The first proper ethnobotanical study in Italy was probably that of Giuseppe Ferraro (1845–1907). His work describes the traditional plant uses of his hometown, Carpeneto d'Acqui (Piedmont), and includes an early attempt to conceptualize the relevance of ethnobotanical studies. However, it lacks a clear indication of the methods used. A few years later the ethnologist Giuseppe Pitrè (1843–1916) described many popular remedies still in use in various areas of Sicily in his *Medicina Popolare Siciliana (Sicilian Popular Medicine)* (1896). His medico-anthropological approach can be considered a further step towards the development of ethnomedical studies despite it being more an overview of information than a proper survey, with methods not being clearly spelled out. In Spain, the botanist José Pardo Sastrón (1822–1909) published a catalogue with the popular names and uses of plants in his hometown (Torrecilla de Alcañiz, Teruel, Aragon) where more than 400 species were identified (Pardo Sastrón, 1895).

Other interesting examples are the Polish authors Oskar Kolberg (1814–1990) and Józef Rostafiński (1850–1928). The former spent his life travelling around Poland recording various

¹ For a thorough overview of the history of medicinal plant use in Europe see Svanberg *et al.* (2011).

aspects of local culture, including many references to medicine. The latter used a 70-question questionnaire about the traditional use of plants through some print media of the period and received a few hundred letters from Poles inhabiting the present area of Poland, Ukraine, Belarus and Lithuania. The results of his research concerning wild food plants have only recently been published (Łuczaj, 2010; Łuczaj *et al.*, 2013).

Over the period 1920–1967, with the help of 1500 correspondents (including pupils), the botanist Gustav Vilbaste (1885–1967) collected more than 100,000 Estonian plant names and 17,000 uses, 10,000 of which pertained to medical uses. He identified plants based on herbarium specimens sent along with the reports and this was complemented by several fieldtrips to collect popular plant names (Kalle and Sõukand, 2014). Only one small part of his collection concerning medicinal plants has been analysed to date (Sõukand and Kalle, 2012; for other similar approaches see Chapter 10).

29.3.2 Recent medico-ethnobotanical studies in Europe

We have updated an exhaustive review (Quave *et al.*, 2012b) of original medico-ethnobotanical field studies conducted in Europe over the period since 1992, incorporating details concerning the popular medicinal uses of plants, written in English (or which have an English abstract) and that have been indexed by Scopus. We did not consider reviews or meta-analyses of pre-existing data nor works conducted on a single species or a group of related species, field market surveys (unless the study involved studies of local or small-scale medicinal plant gathering and trade) or reports on large-scale trade of medicinal plants (i.e. on commodities). Given the importance of review papers, books, papers published in journals not included in Scopus, and less accessible studies such as local publications or unpublished PhD theses (e.g. Mamedov *et al.*, 2004; Aceituno-Mata, 2010; Shikov *et al.*, 2014), some of these studies were also considered, although they were not included in our overall numerical analysis. Over this period a total of 182 references were included (based on Quave *et al.*, 2012b and later studies summarized here, Figure 29.1). Turkey, Italy and Spain clearly dominate in terms of the number of papers (65%). The number of papers (30) concerning south-eastern European

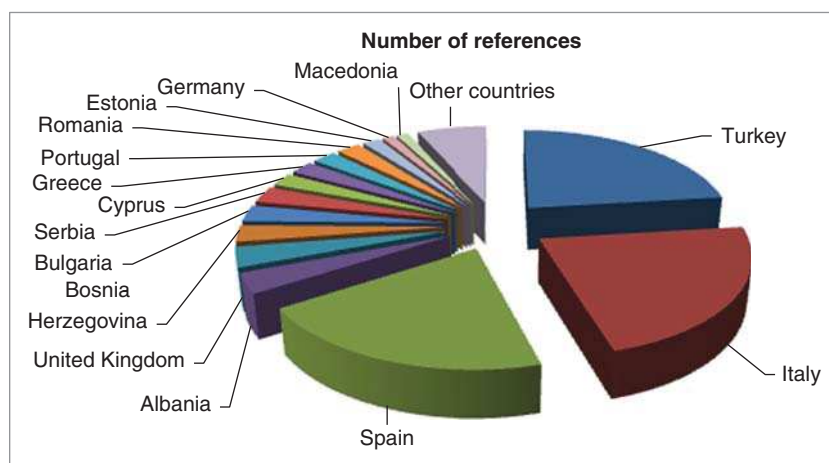


Figure 29.1 Countries where medico-ethnobotanical studies were conducted (1992–2014, based on data retrieved from Scopus, 30 August 2014).

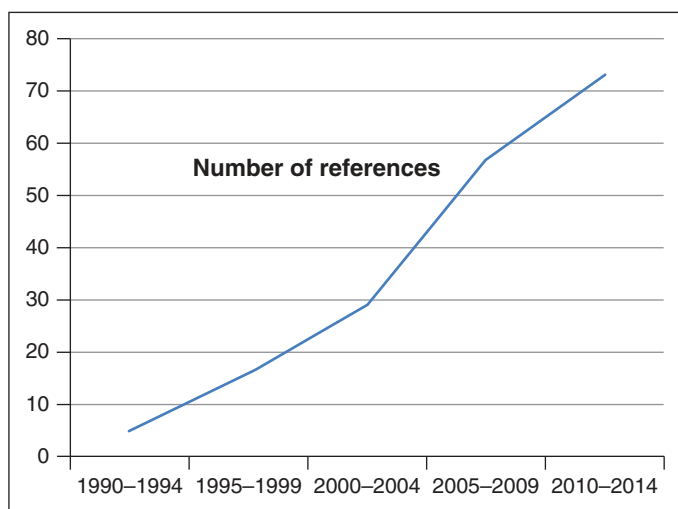


Figure 29.2 Number of papers published annually on medico-ethnobotanical studies in Europe (1992–2014, based on data retrieved from Scopus, 30 August 2014).

countries is also very high, but as the region includes many small countries their importance is not clearly highlighted in Figure 29.1. In the last three years a clear increase is apparent, with 25% of the papers having been published between 2011 and 2014 (Figure 29.2).

While Central Europe has recently gained more attention (Leporatti and Ivancheva, 2003; Grasser *et al.*, 2012), modern medical ethnobotanical studies are still quite rare in northern Europe, the Baltic States, Russia and other former Soviet Bloc countries. The reason for this lies in differences in the disciplinary approach. In north-eastern Europe, data regarding the use of plants and people's perceptions of plants has been mostly studied within the periphery of disciplines in the humanities (e.g. ethnology and folkloristics). A few recent publications from the region mainly concern the historical use of plants and are based on ethnographic and folkloric sources (e.g. Łuczaj, 2010; Sõukand and Kalle, 2011). A few, still unpublished, ethnobotanical field studies are ongoing in Estonia, Lithuania and Ukraine. Also, a review on medicinal plants in the *Russian Pharmacopeia* was published recently (Shikov *et al.*, 2014), being so far the only recent ethnopharmacological publication in English concerning the territory of the present Russian Federation. However, this work did not have as a goal the assessment of the current plant use at a household level. Some other studies have addressed the medicinal plant-use systems of migrants in this part of Europe in comparison to other continents, for example Polish migrants in Misiones, Argentina (Kujawska and Hilgert, 2014) and Russian phytomedicine in the USA (Domarew *et al.*, 2002). Recent studies on medicinal plants used by migrant communities in northern Europe have found that most plants used in a popular medical context are actually dried materials imported from their cultural homeland (i.e. Africa, Asia, South America, Middle East etc.) and incorporation of the local flora is very uncommon (e.g. Pieroni *et al.*, 2007; van Andel and Westers, 2010).

Given the large number of publications in Spain, Italy and south-east Europe, we present here a more detailed review of the current state of medico-ethnobotanical research in these countries. Turkey is not included here in detail as most studies belong to Anatolia, its Asian part.

29.3.2.1 Medical ethnobotany in Spain

Spain has a striking climatic, geological, geographical, biological, cultural and linguistic diversity complemented by rich ethnobiological traditions. Until the 1950s, industrialization was concentrated in a few regions, and it was still an agrarian and rural country. Many people could not afford professional medical care and self-care prevailed until the national health system spread in the 1980s. Since the end of the 19th century this extensive traditional lore has attracted many researchers, but systematic ethnobotanical studies with reliable botanical identification did not appear until the 1980s. Since then, the number of studies has grown steadily and there is an increasing social, political and scientific interest in traditional knowledge and specifically medical ethnobotany. Spanish legislation has affirmed the need to promote and conserve traditional knowledge as it appears in the principles of the CBD, the Nagoya Protocol on Access and Benefit Sharing, the law on Natural Heritage and Biodiversity and in the Royal Decree that regulates the Spanish Inventory of Traditional Knowledge of Biodiversity. This Inventory consists of a database and monographs that summarize the traditional knowledge concerning each species or ecosystem (Pardo-de-Santayana *et al.*, 2014).

According to Fernández-López and Amezcúa-Ogayar (2007) the number of species employed as medicinal plants in Spain is around 1200, more than 15% of the Iberian flora, but the number of taxa used is certainly higher. More than 400 plants were used in areas of the Catalan Pyrenees such as Pallars. Medicinal plants were used for humans and animals, with the human pharmacopoeia usually being richer than the ethnoveterinary *materia medica*. For instance, 154 and 86 taxa were used in human and animal medicine in Campoo, Cantabria or 229 and 60 to the west of the Granada province, respectively. Medicinal plants were mainly used for common digestive, respiratory and skin disorders such as catarrh, sore throat, diarrhoea and other stomach and intestinal disorders, furuncles or wounds. Blood complaints, bruises and muscle-skeletal pains were also commonly self-treated (see Quave *et al.*, 2012b and references therein).

Households commonly kept a few species for treating the most common disorders, serving as a sort of traditional first aid kit. Their contribution was essential to a family's well-being and health. This group of species is specific to each geographic area and reflects its idiosyncrasy, being very different even among neighbouring territories (Menendez-Baceta *et al.*, 2014). For instance, in the Sierra Norte de Madrid this traditional medical repository contained: *Malva sylvestris* L. and *Origanum vulgare* L. for respiratory disorders, *Chamaemelum nobile* (L.) All. and *Mentha pulegium* L. for digestive conditions and with a wide rank of other uses, and *Sambucus nigra* L. mainly used for respiratory, digestive and skin disorders (Aceituno-Mata, 2010).

Apart from commonly shared knowledge, there were also remedies which were the specialized knowledge of local healers (Rivera and Obón, 1996). Some of these local experts were extraordinarily wise and had an extensive traditional knowledge. For instance, in the popular medicine in the Aragonese Pyrenees, Palacín (1994) showed that three women used more than 100 medicinal plants. One of them could prepare more than 1450 remedies with 230 medicinal plant species, 31 animals and 29 minerals. This is a clear example of the extensive ethnomedical knowledge of women, as has also been reported in many other studies (e.g. Molaes and Ladio, 2009).

Recent studies have highlighted the importance of the unsafe use of medicinal plants since poisonings (Vallejo *et al.*, 2009) and interactions with pharmaceuticals (Carrasco *et al.*, 2009) have recently been described. While many people perceive that medicinal plants are always

safe and free of side-effects, many patients hide their use when they visit their doctor in order to avoid reprimand, since many allopathic practitioners tend to exhibit a sense of disdain towards traditional medicine. It is therefore essential that health professionals adopt a culturally sensitive attitude towards herbal medicine.

29.3.2.2 Medical ethnobotany in Italy

The Italian peninsula and islands (including Sardinia and Sicily) comprise a landmass of around 300,000 km². The vascular flora includes 6711 species (Conti *et al.*, 2005), which are distributed across geographic regions of mountains, hills and plains. Much like the Iberian peninsula, from the 19th to the first half of the 20th century the rich lore and popular medical traditions of Italy attracted the attention of many scholars (e.g. see Giuseppe Ferraro (1884, 1885), Giuseppe Pitrè (1896) or Oreste Mattiolo (1918)). However, it has only been in the past 40 years or so that more systematic ethnobotanical surveys throughout Italy have emerged (see Quave *et al.*, 2012b and references therein).

Ethnobotanical studies undertaken in the past in Italy have also revealed a rich traditional ethnopharmacopoeia that utilizes both local flora and fauna. For example, in one study focused only on the topical use of plants for the treatment of skin and soft tissue infection, conducted in Basilicata, 116 distinct remedies coming from 38 medicinal plant species were documented. Another study conducted in Campania shows similar richness. All of the traditional medicinal applications of plants were recorded and they found the use of 95 medicinal species, representing roughly 24% of the entire local flora. In Liguria, a total of 82 medicinal species were recorded along with reports of high levels of wild edible species consumption that were likely serving as functional or medicinal foods. A study of the popular phytotherapy along the Amalfi coast revealed that 102 medicinal plants are used for medicinal purposes, with a total of 276 distinct uses. One of the most interesting findings of this study was that 62% of the recorded uses were still in common practice, showing that many Italians still commonly use medicinal plants (see Quave *et al.*, 2012b and references therein).

29.3.2.3 Medical ethnobotany in south-eastern Europe

Over the last three decades, south-eastern Europe has been subject to major political turmoil and also economic shifts that have heavily influenced local lifestyles, foodways, links to nature and, as a consequence, transmission of traditional knowledge regarding health and local medical practices. The rural regions of south-eastern Europe represent some of the most vibrant scenarios for conducting medical ethnobotanical studies (see studies in Croatia, Bosnia and Herzegovina, Albania, Serbia, Kosovo, Turkey and Greece in Quave *et al.*, 2012b and references therein; Pieroni *et al.*, 2013, 2014). The reasons are numerous:

1. This largely mountainous area is a hotspot for both biodiversity and cultural/ethnic/religious diversities.
2. The area has historically provided the botanical materials that were sold in the western European herbal markets (especially during the last few centuries).
3. A remarkable number of locally gathered medicinal plants are still widely used in many households for local healthcare.
4. Local wild medicinal and food plants are central to many economic initiatives and programmes devoted to rural development and food security (Quave and Pieroni, 2014).

Moreover, medico-ethnobotanical studies in the western Balkans (e.g. Pieroni *et al.*, 2013) provide a unique arena for cross-cultural analysis of local uses of medicinal plants, which can contribute to the identification and development of a better understanding of factors that affect changes in plant uses and perceptions.

The ethnopharmacopeia of south-eastern Europe shares some similarities with that of south-western Europe, especially with regard to some of the most common medicinal species, including *Allium* spp., *Hypericum* spp., *Mentha* spp., *Olea europaea* L. and *Urtica dioica* L. Besides these few common species, however, there are many examples of medicinal plants being used in very distinct ways in different Balkan areas, even in areas sharing a similar flora, but a different cultural or linguistic heritage, highlighting the importance of documenting the traditional ecological knowledge unique to diverse areas in Europe.

29.4 European ethnomedicinal flora

Given the complex geography and cultural diversity of Europe, a great number of species have been used. Lamiaceae, Asteraceae and Rosaceae are always among the most important families referred to (Quave *et al.*, 2012b and references therein) as also happens in many other ethnopharmacopoeias around the world (Moerman *et al.*, 1999; Molares and Ladio, 2009).

Most species traditionally used are abundant species that are obtained locally, gathered from the wild or cultivated in home gardens. These species have the essential characteristics for being used in elementary healthcare: they are widespread, easily gathered and have a vast array of medicinal properties and pharmacological effects (Carvalho and Morales, 2010). As highlighted by Stepp and Moerman (2001), many are weeds abundant in disturbed habitats.

Here we provide a non-exhaustive list of species classified according to the distribution of use and the origin of the plant species. These examples show that there are species widely used through the continent while others are only used regionally in one or a few countries.

1. *Common and abundant wild species with a wide distribution area.* This group includes examples such as *Chelidonium majus* L., *Crataegus monogyna* Jacq., *Equisetum arvense* L. and other species of the genus, *Hypericum perforatum* L., *Malva sylvestris* L., *Marrubium vulgare* L., *Mentha pulegium* L., *Plantago major* L., *P. lanceolata* L. and other species of the genus, *Origanum vulgare* L., *Sambucus nigra* L., *Urtica dioica* L. and *Thymus vulgaris* L. This group includes the most common species, widely used throughout Europe.
2. *Species used in one or small number of countries.* This group includes common, widely used and highly valued species at a regional scale such as *Chamaemelum nobile* (L.) All., *Jasonia glutinosa* DC., *Centaurea ornata* Willd., *Santolina chamaecyparissus* L., *Sideritis hirsuta* L., *Sideritis hyssopifolia* L., *Thymus mastichina* L. and *Sorbus aucuparia* L.
3. *Regional and restricted endemisms* such as *Lilium pyrenaicum* Gouan, *Lithodora fruticosa* (L.) Griseb. and *Phlomis lychnitis* L. More restricted endemisms include *Artemisia granatensis* Boiss., *Erodium petraeum* Willd., *Santolina oblongifolia* Boiss. and *Thymus moroderi* Pau ex Martinez.
4. *Cultivated widely used species.* This group includes *Allium cepa* L., *A. sativum* L., *Aloe* spp., *Citrus limon* (L.) Osbeck, *Hylotelephium telephium* (L.) H. Ohba, *Juglans regia* L., *Matricaria recutita* L., *Melissa officinalis* L., *Mentha × piperita* L., *Olea europaea* L., *Pelargonium* spp., *Ruta chalepensis* L., *Salvia officinalis* L., *Tilia platyphyllos* Scop., *Vitis vinifera* L. and *Zea mays* L.

29.5 Adaptation, syncretism and resilience of traditional pharmacopoeias

Local knowledge is not static; rather it is highly dynamic and adaptive. It is open to adopt new species and techniques and to reject others (Gómez-Baggethun and Reyes-Garcia, 2013; Leonti and Casu, 2013). Transhumant shepherds, schoolteachers or migrants who return to their communities often facilitate the introduction of new plants and therapies. For example, remnants of ancient Albanian medicinal plant uses and names can still be found today amongst the Arbëreshë diaspora in Italy, who are descendants of Albanians that fled to southern Italy following the Ottoman occupation about 500 years ago (e.g. Pieroni *et al.*, 2002).

Most European ethnobotanical studies report a downward trend in the use of traditional medicinal plants since they have been replaced with pharmaceuticals following the dramatic social and economic changes of the past few decades (Parada *et al.*, 2009; Carvalho and Morales, 2010). However, this erosion process is not homogeneous since some species (e.g. *Chamaemelum nobile* (L.) All., *Matricaria recutita* L., *Cichorium intybus* L. and *Malva sylvestris* L.) are still widely used in different European regions (Pieroni *et al.*, 2002; Quave *et al.*, 2012b; Menendez-Baceta *et al.*, 2014).

In Estonia, changes in use illustrate the tendency for using weeds, i.e. species, which grow in disturbed environments (Sõukand and Kalle, 2011). Newly introduced species and practices, sometimes as commercial herbal products, are also entering into local pharmacopoeias, demonstrating the highly dynamic nature of traditional medical practices. Concerns about the health risks of consuming industrial foods and pharmaceuticals are promoting a revitalization of traditional medical practices (Carvalho and Morales, 2010). The interest in pursuing a more 'natural' or 'healthier' lifestyle as an alternative to the mainstream western system has emerged and allochthonous medical systems such as acupuncture are being syncretized with local traditional health self-care practices. For example, commercial dietary supplements and nutraceuticals containing non-native species like *Aloe vera* (L.) Burm. F., *Echinacea* spp. and *Panax ginseng* C.A. Mey have become popular elements of these traditions (Bonet *et al.*, 1992; Rivera and Obón, 2002).

29.6 Pharmacological studies of European medicinal plants

Bioprospecting, or searching for new drugs among plants and other remedies used by indigenous people, has been part of the European scholars' interest in economic plants at least since Linnaeus' time, who as a physician tried the plant remedies he learnt about from peasants during his travels. Marsh rosemary (*Ledum palustre* L.) was praised by him as a remedy against scurvy, whooping cough, laryngitis and leprosy (Svanberg *et al.*, 2011). He and his contemporaries had great confidence in finding new medicaments among popular medicine. Another well-known example concerns the English physician William Withering (1741–1799), who analysed a herbal remedy used by a local female healer in Shropshire for patients suffering from 'dropsy' (edema). He concluded that the key ingredient was foxglove (*Digitalis purpurea* L.), prepared an extract of the plant and examined its effect on patients. The treatment successfully reduced the fluid build-up in the tissues by its effects in strengthening contractions of the cardiac tissue (Wilkins *et al.*, 1985).

This interest in using medico-ethnobotanical field studies as a basis for phytochemical and pharmacological research still continues in Europe (e.g. Adersen *et al.*, 2006; Jäger *et al.*, 2013; Vogl *et al.*, 2013). For example, the elm leaf blackberry (*Rubus ulmifolius* Schott.) known in the popular treatment of skin and soft tissue infections in southern Italy (Quave *et al.*, 2008) contains ellagic acid glycoside-rich fractions with potent antibacterial properties, especially against *Staphylococcus aureus* (Quave *et al.*, 2012a) and *Streptococcus pneumoniae* (Talekar *et al.*, 2014) biofilm-associated infections. In addition to the search for new antimicrobial drugs, other areas of high interest include drug targets related to cancer, chronic disease, mental health and skin health. Local ethnopharmacopoeias play a critical role in providing researchers with guidance as to which genera (or even specific taxa) merit additional analysis with regard to these high-priority targets in drug discovery.

29.7 Concluding remarks

Medical ethnobotanical studies in Europe have illuminated the dynamic nature of traditional knowledge concerning medicinal plants. While in some cases a resilience of local medical practices has been observed, most studies report a significant loss of knowledge that parallels transculturation processes and loss of cultural diversity.

Pluralistic and culturally appropriate approaches, which include emic views of newcomers' health-seeking strategies, are increasingly considered a crucial element of our public health policies. In fact these are often considered the only approaches that can build a genuine understanding of the holistic essence of health as a composite of physical, psychological and social aspects of well-being. Understanding migrants' use of medicinal plants can therefore offer a unique arena for fostering this aim and for implementing the safe use of medicinal plants within the multicultural framework of diversity in Europe.

Medical ethnobotanical field studies can provide useful, but hitherto often overlooked information to the allopathic medical community as they sought to reconcile existing and emerging therapies with conventional biomedicine. This is of great importance not only for phyto-pharmacovigilance and managing the risk of herb–drug interactions in mainstream patients that use herbal medicines, but also for informing the medical community about ethnomedical systems and practices so that they can better serve the society at large that includes a growing migrant population.

These studies are also important sources of guidance in the search for new medicines to address globally relevant diseases, such as antibiotic resistant infections, metabolic syndrome, cancer and diabetes. Thus, medical ethnobotany in Europe promises to continue to develop as a highly relevant scientific field in the future with diverse topics at the centre of research, such as:

- cultural competency in the delivery of healthcare to migrants;
- biocultural conservation initiatives;
- phyto-pharmacovigilance;
- drug discovery.

Research into medicinal plants that are presently underused may lead to the development of the pharmaceuticals, food supplements and complementary medicines of tomorrow (Quave *et al.*, 2012b).

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