Iran's specific geographical position and variable climates make it unique in the world with its diverse climatic conditions. Among its 12 different geographic environments, Iran is divided into 5 major climates including Mediterranean, Desert and Half-desert, Warm-Humid, Warm-Dry, and Mountainous (see Figure 1).2

Due to this variety of climate, more than 7500 plant species grow in Iran, and about 1800 of those species are considered medicinal. Among these species, some are not found in any other part of the world.3 The rich floral biodiversity in Iran has its origin mostly from diverse climate conditions and partly from its great trade routes to India and China. During the Sassanid dynasty in the sixth century CE, Burzūya (Perzoes in Latin), one of the famous physicians sent to India, brought many Indian medicinal plants into Persia. The trade of medicinal plants between Persia and India throughout history had an important influence on the Iranian medicinal plant heritage.4

The Iranian people are largely descendants of the Medo-Persians, an Indo-European culture, thus making Iranians more closely related to Afghanis, whose original language is Persian, than their Arab/Semitic neighbors. The traditional knowledge on medicine and pharmacy in Persia is an amalgamation of the prehistoric beliefs and practices of early inhabitants of the Mesopotamian plains, plus that of the later Babylonians, Assyrians, Elamites, and other ancient civilizations.5,6

Figure 1. Iran Climate Map and Distribution of Faculties of Pharmacy

Note: There are 3 faculties of pharmacy in Tehran
One of the main sources of medical and herbal knowledge of the ancient inhabitants of Iran is the Avesta (the holy book of the Zoroastrians, aka Zarathustrans). In this book, Tbrta (or Srita) was the first mythical physician to whom Ahuramazda (The Wise God of Light in the dualistic theology of Zoroastrianism) gave thousands of healing plants (urvarō baešazau in the Avestan language). The term urvarō baešazau (gyaab pezeshk in the Persian language), or herbal physician, is one of the 5 categories of physicians named in this book and the bēšāzišnīh kartrīh in the Pahlavi (Median Farsi) language means growing and caring for medicinal plants. It may be constructive to mention that the word drug was probably derived from the ancient Iranian word dārāv, meaning the stem of a plant, as the origin of medicinal herbs. This word later changed into dārūk in the Pahlavi language, and later became droga in Latin, drogue in French, drug in English, and dārū in the present Persian languages. Many herbs are introduced in this book for various ailments. Some herbal extracts, infusions, decoctions, abortifacients, and disinfectants are also well described in the Vandādīd and Yashts, 2 sections of the 5 sections of the Avesta.1-3

One of the most sacred herbs was hōm or hōmā, which has been identified by Flattery and Schwartz as Peganum harmala, Zygophyllaceae (esfand in Farsi).4 But according to other reputed documents, this plant is identified as Ephedra vulgaris, Ephedraceae.5 Many other herbs and herbal treatments are also mentioned in different sections of the Avesta.6 Determining the exact scientific name for these plants is a delicate and perhaps even impossible scientific task. However, some of these plants are given probable scientific names through logical reasoning. A selection of these plants is shown in Table 1 (on page 40), which lists their ancient names, common Persian names, equivalent English names, attributed botanical names, and ancient indications.8,12,15

The Jundishapur academic center in ancient Persia, due to its cosmopolitan nature, could be defined as one of the earliest universities in the world. Sabur (or Shapur) Sahl, a well-known pharmacist of this institution, composed his Agrabadin-e-Kabīr (great pharmocopeia) in 869 CE, which became the first pharmacopoeia to receive widespread acceptance. His book was used in hospitals and pharmacies of the time.4,6 According to Edward Brown: “The most cogent evidence for ancient Iranian interest in pharmacy is the Iranian origin of many drug names in medieval medicine.”17

With the establishment of an Islamic state in Iran and neighboring lands in the seventh century CE, the cultural knowledge of different nations, such as Egyptian, Babylonian, Persian, Greek, Roman, Indian, and even Chinese, came under the rule of Islam. A new era of medical, pharmaceutical, and other sciences came into being that was later disseminated into Europe, which greatly influenced the European Renaissance. Iranian scholars played an exceptional role in the advancement of sciences and arts in this period. The Arabic language became the dominant language of art and science. Unfortunately, an in-depth discussion of this era within the short space in this article would not be possible, especially when considering the thousands of relevant writings that existed in this period.18-21 For example, according to Levey, “during this era over 600,000 manuscripts were dispersed in depositories throughout the world.” These manuscripts are mostly in Arabic and some in Persian languages.5 The first book on pharmacology in the Persian language was written about 975 CE by Abu-Mansur Muafffaq Heravi and was titled Kitab ul-Abniya an Haqa’iq-il Adviya (Book of the Foundation of the True Properties of Remedies). This book ushered a new trend in pharmacology in Persia.5 When reviewing the primary humanist and rationalist sages in the history of Persian medicine and pharmacy, some well-known scholars and writings must be mentioned.

Ali ibn Sahil Rabban al-Tabari (circa 818-870 CE). This Iranian scholar was born in Marv, Tabaristan, from a respectable Jewish family. His father Sahil was a well-known physician and a reputable philosopher called Rabbin (Great teacher). As a result of his association with his learned father, Tabari was educated in the fields of medicine, calligraphy, astrology, and mathematics. He was also proficient in Syriac and Greek languages. Later, he was obliged to leave Marv and fled to Ray, the birthplace of the famous physician Zakariya Razi (near present Tehran). Then he moved to Baghdad and converted to Islam. However, he introduced his previous religion as Christianity in one of his writings, Deen-o-Doulat (although it is not clear why he would have done so, having been raised Jewish). Some historians have described him as a tutor of Razi, which is not accepted by others (e.g., Myerhof, due to the differences on their birth and death dates). However, Razi, as a disciple, remembered him several times in his well-known book Al-Hawi fi Tibb. It is quite possible that Razi had taught many aspects of medicine and pharmacy from Tabari’s writings. In Tabari’s famous book about medicine and pharmacy, Ferdous-al-Hikamat (The Paradise of Wisdom), 2 out of 7 sections are dedicated to drugs and poisons.4,22 Some writers consider this book the first medical encyclopedia. Tabari’s reliance on information from Greek medicine and the traditional uses of Indian herbal drugs can be seen in this book.

Mohammad ibn Zakariya Razi (Rhazes in Latin) (865-925 CE). This chemist, pharmacist, musician, physicist, philosopher, and great clinical physician was a leading figure in the field of medieval medicine.23 He wrote his famous encyclopedia (Al-Hawi fi Tibb) in about 26 books, which was translated from Arabic into Latin under the name of The Continens of Rhazes by Faraj ibn Salim (Farragut) in 1279 CE. The first Latin edition of this book was printed in Brescia, Italy, in 1486. This edition was published in Venice 4 times from 1505-1542. The book was among the 9 books employed by the Paris Faculty of Medicine in 1395.18,22 Razi’s book, al-Hawi fi Tibb, based on his clinical approach, did not make as strong an impression on Western medical history as did Ibn Sina’s works, which were more theoretical in approach and had been translated earlier, incorporating the Greco-Roman Galenic theories of the second century CE.

Two volumes of Razi’s encyclopedia were dedicated to pharmacy and pharmacology and served as one of the main sources of pharmacology even a long time after the scientific Renaissance in Europe.24 Razi’s work on pharmacy is greatly appreciated. He introduced mercurial ointments and apothecary apparatuses such as pestles, flasks, beakers, and glass vessels into the Western world.25 His independent mind is revealed in his famous book Shukuk ‘ala Jalinus (Doubts about Galen), a critique of the writings and practice of the second century (CE) Greco-Roman physician Galen. His independent thinking is seen even is his clinical records.23,26,27

Abu Ali al-Husain ibn Abdallah ibn Sina (Avicenna in Latin) (980-1037 CE). This philosopher, mathematician,
writer, poet, politician, physician, and pharmacologist was known in Europe as “The Prince of Physicians.” In 1491 CE his masterpiece Al-Qanun fi-Tibb (The Canon of Medicine) was translated into Latin by Gherardus Cremonensis in Naples, and it was translated into other languages and taught in many European universities for years. He dedicated 2 of the 5 volumes of this book to pharmacy and pharmacology. Ibn Sina also mentioned about 900 drugs, mostly herbal, in these 2 volumes. He also was one of the first persons to introduce the concept of polypharmacy (using compound drugs) on humoral theory, and he discussed the changing effects of drugs from one person to another, which is considered an important factor in pharmacokinetics today.

In this era many herbal formularies and compendia were written by different scientists as separate fascicules or as a part of a collection. These classified and coded writings have had a strong influence on the advancement of medical, pharmaceutical, and pharmacological sciences. Ibn Sina occupies a prominent place among the European scholars and philosophers who indirectly translated his works into Latin, thereby significantly impacting Western medical literature and university curriculum and helping to awaken Europe to the Renaissance.

Other Important Texts

Two popular pharmacopeias in Farsi have been used as main sources of traditional remedies by later physicians, traditional healers, and even traditional herbalists: (1) *Tuhfat al-Mu'minin* (The Gift of two Mumins) written by Muhammad Zaman e-Tunekabuni in about 1669, and (2) *Makhzan al-adviyah* (The Storage of Medicaments) written by Muhammad husayn ibn al-Alavi al-Khurasani al-Shirazi in 1771 CE.

The Advent of Western Medicine in Iran

Modern Western conventional medicine was introduced into Iran with the establishment of Dar-ul-Fonun (Polytechnic School) in Tehran in 1850. With the advent of Western medicine, the traditional knowledge of herbs and healers was gradually ignored and eventually excluded from the mainstream of the Iranian medico-pharmaceutical community. Nevertheless, traditional medicine has continued its survival through medical services rendered by unauthorized healers, sometimes even within urban areas that have well-equipped hospitals.

People choose Iranian traditional medicine and herbal therapies mostly because of their socio-cultural beliefs and, of course, partly because of the barriers presented by the complicated, time-consuming, and expensive system of modern health care. Currently, the following categories of traditional healers can be found in Iran.

1. Herbal Sellers (Attaries)

These are usually laymen who sell medicinal herbs, dispense herbal drugs, and even provide medical services. A number of them have traditional knowledge and experience in herbal medicine. Many Iranian people continue to consult these herbal sellers/practitioners.

2. Unauthorized and Unofficial Healers

Usually these healers have some information of Iranian traditional medicine. They are usually recognized by the community rather than by the health authorities. At present the government has no plan to include folk healers in the scope of officially authorized medical services. These healers are frequently engaged in medical, pharmaceutical, and even non-medical activities. No statistical data are available for this category of healers.

3. Physicians and Pharmacists

The main sources of information for physicians are older Iranian herbal books written by Iranian scholars, newly-published manuscripts translated from other languages into Farsi, and other European or American books on herbal medicine in original languages.

A group of pharmacists provide as nonprescription drugs (NPD) various herb-based pharmaceuticals and
فُولِيطيِّتِس حشيشت تشيد أضراطول وأخضر ونافِلَا وجرَّولَمْعَن
مَنَال الأنوار ناجهم كالدود اللطيف ودوس كتابة وسبعة وسبعة يفاجع
كَيْبَاراً أوُذْبَبٍ، وعُوْسطِه ملعوماً ولَ بعيداً ولتقُرََرَأ ولِبَ الأمر.
herbal preparations by themselves. They also dispense them according to the order or suggestion (prescription) of conventional physicians or traditional and complementary and alternative medicine (CAM) practitioners.

4. Bonesetters (Shekasteh-band in Persian)

Bonesetters are traditional orthopedists who have not undergone formal institutional training. They acquired their skill from other experienced persons, often close family members. They usually have a considerable reputation and some people believe strongly in them. They use herbal or animal materials for management of sprains and broken bones.

5. Traditional Birth Attendants (Ghabeleh or Mama in Persian)

A number of babies in rural areas are still delivered by local midwives or birth attendants who are not trained in official conventional medicine. They usually acquire their skills by working with other experienced persons. These traditional birth attendants also use herbal preparations before or after delivery.

Recent Changes in Herbal Medicine

During the last 2 decades there have been appreciable changes in the attitudes of the general public as well as medical and pharmaceutical authorities towards medicinal plants and herbal products. Serious attempts have been made to promote traditional medicine (TM) and to avoid possible misuse of other TM and CAM systems. Reform has been carried out within the framework of a national drug policy (NDP) toward the promotion of TM/CAM implementations of...
technical guidelines for ensuring quality, safety, and efficacy of herbal medicines and other approved TM/CAM products. These reform measures establish an effective system for regulation, quality assurance, and the rational use of herbal drugs according to World Health Organization (WHO) recommendations. The expert committee on medicinal herbs has formulated a separate regulation for herbal products under the supervision of the Ministry of Health and Medical Education. This panel of experts is also charged with evaluating the safety and efficacy of herbal products.

The Iranian Academy of Medical Sciences has taken steps to revive and promote traditional and herbal medicines and to integrate Iranian traditional medicine into the scientific conventional medical system. The primary health care system in Iran is internationally acknowledged as one of the best in the world as reported by UNICEF. There are plans to gradually substitute traditional birth attendants with trained midwives so that each village would have one trained birth attendant.

Iranians are still interested in using herbal remedies. A recent cross-sectional study of 4123 people (more than 15 years old) in Tehran showed the following:

- 75.6% of the studied population were familiar with herbal therapy,
- 50.8% of the population familiar with herbal therapy had used it at least once, and
- 38.4% of the total population had used it at least once.

On the other hand, many conventional physicians use herbal drugs, alone or in combination with synthetic drugs, to treat their patients. Another study that surveyed knowledge, attitude, and practice of CAM among general practitioners in Tehran showed that 85% of them believed complementary medicine had become more popular. In their opinion, the most commonly used modality in Iran is herbal medicine. An investigation on the knowledge of Iranian pharmacists about herbal medicine revealed that those pharmacists who had some courses about herbal medicine had a fair knowledge on this subject.

In addition to its traditional popularity, phytotherapy is accepted as a recognized CAM by the state authority. According to new regulations of this modality, only physicians (usually general practitioners) who pass specific courses on phytotherapy are allowed to treat patients.

Fortunately, the knowledge of traditional Iranian medicine is largely based on written documents. However, complex challenges and problems surrounding the use of this knowledge need urgent scientific review, documentation, and validation.

### Institutional and Research Activities

#### Educational Activities

The most important educational activities in herbal medicine are related to faculties (colleges) of pharmacy. There are 11 Faculties of Pharmacy in different provinces of Iran. All

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### Table 1. Selected Medicinal Plants Mentioned in the Avesta

<table>
<thead>
<tr>
<th>Ancient Name</th>
<th>Pahlavi</th>
<th>Persian</th>
<th>English</th>
<th>Attributed Latin Name</th>
<th>Ancient Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vahugaonā</td>
<td>Hugun</td>
<td>Kondor</td>
<td>Frankincense, Olibanum</td>
<td>Boswellia carterii</td>
<td>Disinfectant, Aromatic</td>
</tr>
<tr>
<td>Banghā</td>
<td>Mang, Šāhdān̄</td>
<td>Shāhdāneh</td>
<td>Hemp</td>
<td>Cannabis sativa</td>
<td>Anesthetic, Abortifacient</td>
</tr>
<tr>
<td>Vanpašak</td>
<td>Vanasfak</td>
<td>Gol-e Banafsheh</td>
<td>Violet flower</td>
<td>Melissa officinalis</td>
<td>Sedative</td>
</tr>
<tr>
<td>Vātrang</td>
<td>Vātrangbōy</td>
<td>Bádranbuyeh</td>
<td>Lemon balm</td>
<td>Opium poppy</td>
<td>Papaver somniferum</td>
</tr>
<tr>
<td>Gāokerenā</td>
<td>Kukren</td>
<td>Kuknār, Khashkhāsh</td>
<td>Opium poppy</td>
<td>Santalum album</td>
<td>Aromatic, Anti-septic</td>
</tr>
<tr>
<td>Urvasnā</td>
<td>Čandal</td>
<td>Sandal</td>
<td>White sandalwood</td>
<td>Punica granatum</td>
<td>Disinfectant</td>
</tr>
<tr>
<td>Hāōaneāptā</td>
<td>Anār</td>
<td>Anār</td>
<td>Pomegranate</td>
<td>Thymus vulgaris</td>
<td>Stomachic</td>
</tr>
<tr>
<td>Āvišan</td>
<td>Āvišan</td>
<td>Ávishan</td>
<td>Thyme</td>
<td>Mandragora officinalis</td>
<td>Sedative</td>
</tr>
<tr>
<td>Mitrogyā</td>
<td>Mahryā, Mahryā</td>
<td>Mahryāh</td>
<td>Mandrake</td>
<td>Glycyrrhiza glabra</td>
<td>Stomachic</td>
</tr>
<tr>
<td>Hirbazān</td>
<td>-</td>
<td>Shirinbayān</td>
<td>Licorice</td>
<td>Ephedra vulgaris</td>
<td>Religious mythical plant, Stimulant</td>
</tr>
<tr>
<td>Háomā, Hōm</td>
<td>Hōm</td>
<td>Rishboz, Ormak</td>
<td>Ephedra</td>
<td>Peganum harmala</td>
<td>Antiseptic, Protection of devil eye as fumigation</td>
</tr>
<tr>
<td>Spand</td>
<td>Spand</td>
<td>Esfand</td>
<td>Harmel</td>
<td>Myrtus communis</td>
<td>Antiseptic</td>
</tr>
<tr>
<td>Murta</td>
<td>Murt</td>
<td>Murd, Murt</td>
<td>Myrtle</td>
<td>Iris spp</td>
<td>Aromatic oil</td>
</tr>
<tr>
<td>Mabāk</td>
<td>Čambak</td>
<td>Zanbag</td>
<td>Orris</td>
<td>Lilium spp</td>
<td>Analgesic oil</td>
</tr>
<tr>
<td>Spitjambak</td>
<td>Sōsan</td>
<td>Susan</td>
<td>Lilly</td>
<td>Ocimum basilicum</td>
<td>Aromatic, Diaphoretic</td>
</tr>
<tr>
<td>Spanyam</td>
<td>Šāhsparham</td>
<td>Shāhesparham, Reyhān</td>
<td>Basil</td>
<td>Calendula officinalis</td>
<td>Dermatic</td>
</tr>
</tbody>
</table>
of these colleges have a Department of Pharmacognosy (the study of drugs of natural origin, usually with an emphasis on plant-derived drugs), and they present various courses on medicinal herbs. The geographic distribution of these faculties/colleges is shown in Figure 1 on page 35.

Pharmacognosy is among the 7 major postgraduate (PhD) programs, which have been taught only in 4 colleges of pharmacy (Tehran, Shahid Beheshti, Isfahan, and Tabriz) in Iran since 1989. Some specific courses of CAM are in practice in some colleges. However, these courses are limited to a few permitted CAM subjects such as homeopathy, acupuncture, Iranian traditional medicine, herbal medicine, and a few others.

Research Activities

1. Faculties (Colleges) of Pharmacy

The main body of research on herbal medicine is concentrated in the faculties of pharmacy. Research on medicinal plants, which is carried out in different departments of these faculties, play an important role in education and promotion of herbal knowledge. Over the past two decades, in accordance with the new wave of medicinal plant usage and initiation principles of doctorates in pharmacognosy and other branches, research activities have shown significant progress. Ethnobotanical information forms the starting point for many of these research activities. The results of these investigations have been published in reputable international periodicals as well as domestic journals.

The indexed articles in Medline, ISI Web of Knowledge, and IranMedex about herbal medicine by Iranian researchers are presented in Figure 2 on page 39.

2. Research Centers

There are 6 research centers on herbal medicine in Iran. The broad range of investigation carried out in these centers includes phytochemical, pharmacological, and clinical studies on medicinal plants. Parts of these investigations are based on the plants described in the classic books and treatises written by famous Iranian scholars as well as those supported by ethnological customs. Furthermore, there are some medical institutes such as the Iranian Cancer Institute, the Research Institute on Gastroenterology, and others that are concerned in part with research on medicinal plants.

3. Herbal Medicine Research Network

The Herbal Medicine Research Network has been established since 2003 in the office of the Deputy of Research and Technology at the Ministry of Health and Medical Education. The major goals of this network are summarized as follows:


b. Organization and management of network communications with other research centers.

c. Development of education and research on medicinal plants.

d. Development of local and international market activities.

Industrial Activities

1. Pharmaceutical

There are 30 pharmaceutical companies producing herbal products either as unprocessed medicinal herbs in bulk or as finished products. The government’s good manufac-
turing practice (GMP) requirements for finished herbal drug products are the same as those required for conventional drugs. Safety assessment requirements are used to document potentially harmful effects. Currently, 223 herbal drugs are registered and 130 approved herbal drugs have been produced and marketed. These drugs are usually available as Nonprescription Drugs (NPD) and have popular use among the Iranian people. Many of them are also prescribed by physicians. Aromatic waters containing medicinal herbs are also produced for both local markets as well as for export to other countries.

2. Agricultural
To protect wild and native species of medicinal plants as a national heritage, some of these species, as well as those medicinal plants brought from abroad, are cultivated by private or state agricultural corporations. The products of these agricultural corporations are usually used by local factories or are exported to other countries.

Summary
Iran’s diverse climate produces more than 7500 plant species—about 1800 of which are considered medicinal. Iran also has an impressive heritage of medico-pharmaceutical knowledge. One of the main sources of this medical knowledge comes from the ancient inhabitants of Persia who wrote Avesta (the holy book of Zoroastrians). This book mentions numerous medicinal plants with their indications and five categories of physicians including herbal physician.

With the establishment of the Islamic state in Iran and neighboring lands in the seventh century, a new era of arts and medicine came into being that was later disseminated into Europe, which influenced the European Renaissance. Iranian scholars such as Rhazes (Razi) and Avicenna (Ibn-Sina) played a major role in this advancement. The introduction of Western medicine in 1850 CE eventually supplanted much of Iran’s traditional medicine. However, even today various categories of traditional medicine are still practiced by unauthorized healers who are supported by the general population. With the advancement of herbal medicine throughout many parts of the world, Iranian medical authorities have adopted a new strategy. Iran’s Ministry of Health is strongly committed to promoting the use of herbal drugs and traditional medicines as well as several types of CAM systems of medicine in the public health sector. HG

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