1 The History of Persian Medicine At a Glance, Emphasizing the Life and Works of Avicenna

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Abstract
This chapter gives a detailed overview of the history of Traditional Persian Medicine (TPM) and, in this context, specifically describes the biography of Ibn Sinā (also known as Avicenna). This famous philosopher and physician was born near Bukhara in Central Asia (Uzbekistan) in AD 980 and died in Iran in 1037. In his youth he acquired extensive knowledge in physics, mathematics, logic, and metaphysics, and began studying medicine at the age of 13. His outstanding medical knowledge earned him the attention of the Sultan of Bukhara, whom he successfully treated for a serious infection. During his busy life, he managed to write nearly 131 books, including the famous *Qānun fi aṭ-Ṭibb* (*Canon of Medicine*), which was first translated into Latin in the 12th century and became the standard textbook not only in Asia but also in the medical schools of Europe for several centuries. Avicenna originally wrote the book in Arabic, but it was later translated into several other languages, including Persian, Chinese, Hebrew, German, French, and English. In addition, the *Canon* contains descriptions of about 800 mineral, herbal, and animal-based medicinal materials, which until today are an important basis for TPM.

History of Medicine in Iran

Historical and geographical position of Iran

Iran is a relatively high land that covers a major part of the Iranian Plateau. The country is located between 25° and 45° N (latitude) and 40° and 63° E (longitude). The time difference between the easternmost and westernmost parts of Iran is 1 h and 18 min. The area of Iran is about 3.7% of the area of the Asian continent and 1.1% of the area of the world's drylands (Badiʿi, 1999). Iran is bounded by the republics of Armenia and Azerbaijan, the Caspian Sea, and the Republic of Turkmenistan from the north; Afghanistan and Pakistan from the east; the Oman Sea and the Persian Gulf from the south; and the republics of Iraq and Turkey from the west. In terms of plant groups, the land of Iran can be divided into six vegetation zones: (i) the region of northern moist broadleaf forests, which are located between

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the ridges of Talish and Alborz in the parts overlooking the Caspian Sea; (ii) the region of western broadleaf forests, which includes all the forests of the Zagros region and encompasses Kurdistan, Kermanshah, Lorestan, and Bakhtiari; (iii) the mountainous steppe region, which includes the mountains of North Khorasan and Azerbaijan; (iv) the dry region of the plateau rivers (foothills), which covers a large part of the country; (v) the dry region of the desert rivers, which includes all the deserts and sand fields as well as internal sand dunes of great extent and covers the eastern and southern desert areas; and finally (vi) the forest region of the southern coast, which is located on the edge of the Iranian Plateau (Rahnamai, 2019).

The plateau of Iran is one of the habitats of ancient humans and the place of one of the ancient civilizations of the world, where many historical monuments from past eras remain in its various areas. The special geographical position of the Iranian Plateau, which connects Central Asia and the Far East to the Near East and Europe, turned this region into one of the most important centers of waves of migrations and settlements and various wars and developments since the prehistoric era. This plateau has been a place of passage, invasion, and life of different tribes. Asian, African, and European physical characteristics in Iranian people, and their speaking in different languages and dialects are signs of the mixing of the people of this land. Apparently, the oldest site related to the Old Paleolithic period that has been found in Iran so far is located in Khorasan and in the bed of the Kashaf Roud (a river), where the stone tools found there are estimated to be about 800,000 years old (Smith, 1968). The history of "Iran", which means "land of Aryans", begins with the migration of a group of Aryan peoples (Indian and Iranian) into the Iranian Plateau. The Aryans themselves were Indo-European peoples who lived in Central Asia after separating from their fellow races in the 2nd millennium BC. According to some researches, Aryan immigrants entered the western regions of this plateau around 1000–800 BC when the Iranian Plateau was in the Iron Age (Young, 1967; Mallory, 1989). Later in Iran/Persia, various dynasties including Medes (670 to 550 BC), Achaemenid Empire (546 to 330 BC), Seleucid Empire (312 to 129 BC), Arsacid Empire (238 BC to AD 224), and Sassanid Empire (AD 220 to 651) ruled. Shortly after the the assassination of Yazdegerd III, the last Sassanid king who was killed while fleeing (AD 651), Persia almost officially became part of the Islamic Caliphate and entered its Islamic history. In the post-Islam era, the various dynasties included the Tahirids (AD 821 to 873), Saffarids (AD 861 to 1002), Samanids (AD 819 to 1004), Buyids (AD 934 to 1055), Ghaznavids (AD 963 to 1187), Seljuk Empire (AD 1037 to 1194), Khwarezmian (AD 1071 to 1231), Ilkhanate (AD 1256 to 1335), Timurids Empire (AD 1370 to 1506), Safavids (AD 1501 to 1736), Afsharids (AD 1736 to 1796), Zands (AD 1751 to 1794), and Qajars (AD 1794 to 1925). The Pahlavi dynasty ruled from AD 1925 to 1979 and with the fall of the last dynasty, the Iranian monarchy was dismantled and turned into the Islamic Republic (Zarrinkoob, 2012).

Medicine in ancient Persia

There is not much information left about the medicine of ancient Persia, but it seems that there were regular medical institutions in the vast territory of Achaemenid. One of the famous sages and physicians of Persia during the Achaemenid period was Jamasp, who is mentioned in *History of Balʿami* (*Tārikh-i Balʿami* in Persian) as the author of books on geometry and medicine (Balaʿmi, 2016). In addition, as another instance, according to Xenophon, Cyrus the Great (Kurush Kabir in Persian) realized the importance of people's health and its effect on improving the individual and social situation (Xenophon, 2001). He tried to improve the situation of medicine and treatment, provided medical facilities and free medicine, and paid the cost of treatment from the general budget of the country (Fig. 1.1).

In addition to local doctors, foreign doctors were also in the service of Achaemenid kings. During the Achaemenid era, special

Fig. 1.1. The Tomb of Cyrus (Persian: آرامگاه کوروش بزرگ) is the final resting place of Cyrus the Great, the founder of the ancient Achaemenid Empire. The mausoleum is located in Pasargadae, an archaeological site in the Fars Province of Iran. (Image extracted from p. 621 of *A journey from London to Persepolis; including wanderings in Daghestan, Georgia, Armenia*, by John Ussher, *c*.1865 CE. Original held and digitized by the British Library (accession number: HMNTS 10076.g.6.), https://commons.wikimedia.org/wiki/File:USSHER(1865)_p621_TOMB_OF_CYRUS,_MURGHAB.jpg.)

attention was paid to health matters, of which water and food hygiene is an example. Achaemenid kings tried to use safe and boiled water in a clean container during their travels and campaigns. The Persian king Darius I attached great importance to medical knowledge (Fig. 1.2) and encouraged scientific doctors. According to some available documents, Darius appointed one of his generals known as "Udjahorresnet" to repair the medical school located in Sais city (Lloyd, 1982).

In an inscription left by him and kept in the Vatican today, the mentioned general said: "I chose the sons of famous people as students and provided the necessary books and equipment for them to study medicine. The Emperor did this because he knew the superiority of this art to restore health to a sick man" (Posener, 1936). The mentioned document is actually considered an example in which the existence of medical schools during the Achaemenid era can be understood.

A point that needs attention is that although Greece is considered the cradle of medical knowledge and Hippocrates is considered the father of medicine, the Eastern world, especially ancient Persia, has had a significant impact on the foundation of Greek medicine. Hippocrates was born in 460 BC on the island of Kos and died in 375 BC. According to Hippocrates, every disease has a cause, and the basis of his work is accurate observations and recording of the patient's condition. Hippocratic medicine is based on the theory of four humors, the principle of which entered Persia with the religious thoughts of the Aryans, and the Persian physicians developed and elevated it. The principle of this theory is based on the hypothesis of a small world (Kahjahān in Persian) and its similarity with a big world (Mahjahān in Persian). In this way of thinking, the human being represents a mirror of the whole view of the world. The theory of four natures is also based on the similarity of different human temperaments with the

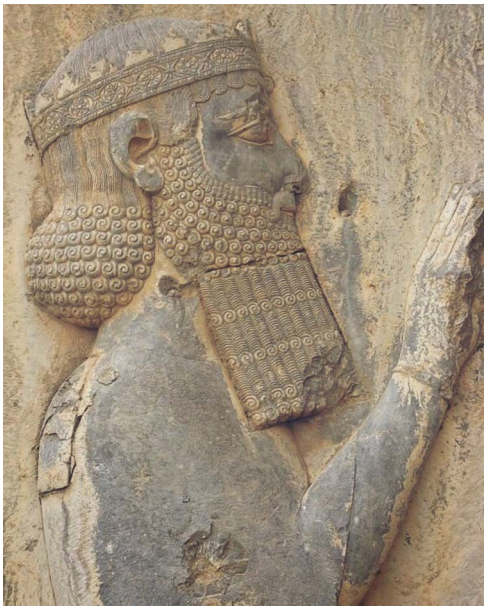

Fig. 1.2. The relief stone of Darius the Great in the Behistun Inscription, a large rock-relief carved at Mount Behistun, near the city of Kermanshah in Iran. (By Surenae, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=125510181.)

four elements of nature. The similarity between these two worlds is explained in the 13th part of *Bondahesh*. Apparently, the concept of four humors, *Akhlat Arbaʿah* in Arabic and Persian, which is the basis of Hippocratic medicine, came from ancient Persia to Greece.

The mentioned transfer took place after Alexander's attack on Persia and during the Seleucid Empire period. During the Arsacid Empire era, Persian medicine was a mixture of Greek and Zoroastrian methods of medicine. Among the famous physicians of the mentioned era, Azonax, who mastered both medicine and manual mechanics, should be especially noted, and also King Phraates I (Farhad in Persian), who lived in the middle of the 4th century AD, should be mentioned. One of the other researchers of medical knowledge during the Arsacid period is Mithridates (Mehrdad in Persian) VI, the founder of the school of Mithridatism, which means getting used to poisons. He was suspicious of his fellow men and even of his mother, and for fear of being poisoned, he took small amounts of arsenic daily, steadily increasing the dose. In this way he was able to better resist the deadly quantities of this poison. He also conducted many studies on various other poisons, and his reports can therefore be considered today as the first foundations of immunology.

During the Sassanid Empire era, medical teachings were a mixture of Greek, Indian, and Zoroastrian schools of medicine. During this period, the "GundeShapur" University and Hospital was founded by King Shapur I in the northwest of Khuzestan between Shushtar and Shush (at the site of today's village of Shahabad) that reached its peak under Khosrow I, also known as Anushirvan ("with the immortal soul"), who ruled from AD 531 to 579. In the mentioned university, Greek, Syriac, Indian, and Persian professors were engaged in teaching and translated various books into Pahlavi. At first, Greek medicine was taught in Syriac in this university, but apparently from the time of Anushirvan, its official language was changed to Pahlavi, and efforts were made to translate books related to various sciences from different languages into Pahlavi. In addition to Syriac and Greek scholars, a number of Indian doctors also lived in GundeShapur School, who translated some books from Indian into Persian language. In addition to teaching the medicine of different nations, Persian and Zoroastrian medicine was also taught and researched at this university. Although in GundeShapur medical knowledge was given special attention, philosophy, theology, mathematics, botany, and pharmacology were not neglected either. Thus, many books of philosophy and other intellectual and experimental sciences were translated and reached the Islamic world in this way through the masters of this school. The city of GundeShapur was conquered by Muslims in the 12th century AD and had activities until two centuries later, but then that university was no longer of interest and its top professors went to Baghdad, where they boosted Baghdad University and translated scientific works into Arabic. The translation of the mentioned books is due to the valuable and continuous

efforts of some famous translators such as John Grammaticus, Aaron Alexandrian, Sergius of Rechina, Issa ibn Sahar Boxt, Sabet ibn Qorrah, Qusta ibn Luqa of Heliopolis, Sahl ibn Shapur, Shapur ibn Sahl, Ibn Serapion, al-Kendy, and members of some families such as the Boxtishu (the servant of Christ), Massarjuyah, Hunayn, Karkhy, Massuyah, and Sinān families who came generally from the graduates of this university. Regarding the medical formations of ancient Persia, it should be said that Persians considered Fereydon (Triteh) as the first doctor. In ancient Persia, the head of healthcare was called "Dorostbod̲", which is probably the original form of the said word "Dord̲sotbod̲" who was also the king's special physician and the head of GundeShapur Hospital and was considered the head of physical medicine in the country. In this context it is important to mention that all doctors, both physical and spiritual doctors, were under the great presidency of Mōbadān Mōbad (head of the clergy). During the Sassanid Empire era, in addition to GundeShapur, there were public and charity hospitals in other cities of Persia, where patients and people who were blind, crippled, disabled, and strangers were hospitalized and treated.

There were three classes of doctors in hospitals as follows: (i) divine healers who were called "psychiatrists" and were considered the highest class of doctors; (ii) herbal medicine specialists; and (iii) legal doctors who were the official doctors of the country and trusted by the health system. Of course, the fourth category, called kard pezeshk (A doctor who works with a knife=surgeon), worked under the supervision of the last category. In ancient Persia, cesarean section (*Rostamineh*) was performed, which Ferdowsi also refers to in *Shahnameh* (Ferdowsi, 1987). Also, a mixture of marijuana and wine was used to induce anesthesia. The ancient Persians already had extensive research on poisons and their antidotes, but there is only little information left about the medicine that was used in serious and very difficult cases. In ancient Persia, many medicinal plants such as agarwood (*Aquilaria malaccensis* Lam.), asafoetida (*Ferula assa-foetida* L.), barberry (*Berberis integerrima* Bunge), black mustard (*Brassica nigra* L.), cinnamon (*Cinnamomum verum* J. Presl), citron (*Citrus medica* L.), cumin (*Cuminum cyminum* L.), damask rose (*Rosa* × *damascena* Mill.), frankincense (*Boswellia sacra* Flück.), gum tragacanth (*Astragalus tragacantha* Ucria), haoma (*Ephedra* spp.), hemp (*Cannabis sativa* L.), labdanum (*Cistus creticus* subsp. *creticus*), myrtle (*Myrtus communis* L.), narcissus (*Narcissus tazetta* L.), olive (*Olea europaea* L.), pepper (*Piper nigrum* L.), pomegranate (*Punica granatum* L.), saffron (*Crocus sativus* L.), Syrian rue (*Peganum harmala* L.), true indigo (*Indigofera tinctoria* Gouan), violet (*Viola odorata* L.), and white water-lily (*Nymphaea alba* L.) were used; and also aromatherapy with aromatic drugs such as Arabian balsam (*Commiphora gileadensis* (L.) C. Chr.), camphor (*Cinnamomum camphora* (L.) J. Presl), and sandalwood (*Santalum album* L.) was practiced. Furthermore, some minerals such as alum (*Alumen*), lapis (*Lapis lazuli*), nushadir salt (*Sal ammoniacum*), and sulfur are among the drugs used in ancient Persian medicine (Emami *et al*., 2017).

Since there are some adaptations and similarities between medicine in ancient Persia after Islam and ancient Greek medicine, it is necessary to take a brief look at the history of medicine in ancient Greece before dealing with the former.

Medicine in ancient Greece

The founder of Greek medicine is considered to be Aesculapius, who was probably a semi-historical, semi-legendary character with a divine aspect. Hippocrates (460–375 BC), a Greek physician who is generally considered to be the founder of medical knowledge, had a deep influence on Roman medicine as well as common medicine in the Middle Ages (Fig. 1.3) (Garrison, 1966; Nuland, 1988). However, Hippocrates owes his fame to his eloquent works known as *The Hippocratic Corpus*, which contain some 70 textbooks, lectures, research notes, and philosophical essays on various subjects in medicine, in no particular order. Notable among the treatises of the *Corpus* are *The Hippocratic Oath*, *The Book of Prognostics*, *On*

Fig. 1.3. Asclepius (center) arrives in Kos and is greeted by Hippocrates (left) and a citizen (right), mosaic, 2nd–3rd century AD. (Mosaic Arrival of Asclepius, Archaeological Museum of Kos; blackbird (GR) by Tedmek – CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=15847465.)

Regimen in Acute Diseases, *Aphorisms*, *On Airs*, *Waters and Places*, *Instruments of Reduction*, *On The Sacred Disease*, and others (Singer and Underwood, 1962; Rutkow, 1993; Iniesta, 2011), but the prescriptions, prescription methods, and drug regimens invented by him also play a major role in his famous work. For example, he recommended asparagus (*Asparagus officinalis* L.) and garlic (*Allium sativum* L.) as a diuretic, poppy (*Papaver somniferum* L.) to induce sleep, and willow (*Salix alba* L.) to relieve pain and fever. The interesting point is that the big plane tree that still casts a shadow on the grave of this great scientist in the state of Larissa in the north of Greece is the one under which he already taught medicine during his lifetime.

The first written treatise in the field of medicinal botany parallel to the rise of Greek civilization was presented by Theophrastus (371–287 BC) (Fig. 1.4). This treatise was entitled *De historia plantarum* and originally consisted of ten books, nine of which are extant.

The work is arranged into a system whereby plants are classified according to their modes of generation, their localities, their sizes, and according to their practical uses such as foods, juices, herbs, etc. (Long, 1842). The first book deals with the individual parts of plants; the second book with the reproduction of plant species and the times and manner of sowing; the third, fourth, and fifth books are devoted to trees, their types, their locations, and their practical applications; the sixth book deals with shrubs and spiny plants; the seventh book describes various herbs; the eighth book deals with plants that produce edible seeds; and the ninth book is focused on plants that produce useful juices, gums, resins, etc. (Long, 1842). Although this work shows the valuable effort of the author in presenting an important subject with the necessary scientific coherence, it also presents the limited boundaries of the author's work, which itself is caused by the limited information and knowledge available in the field of medicinal

Fig. 1.4. The frontispiece to an illustrated 1644 edition of *De historia plantarum* by the ancient Greek scholar Theophrastus. (By Henricus Laurentius (editor), http://www.abocamuseum.it/uk/bibliothecaantiqua/Book_View.asp?Id_Book=161&Display=P&From=S&Id_page=98935, Public Domain, https://commons.wikimedia.org/w/index.php?curid=1294802.)

plants at that time. However, in this book, in addition to the interesting information about different medicinal plants, for the first time, ferns that were used as anthelmintic are mentioned. Also, in this book, for the first time, the differences between round pepper (*Piper nigrum* L.) and long pepper (*Piper longum* L.) are stated. Ironically, reading this book is not very easy, because the names of the plants mentioned in this book are completely different from their common and modern names, and this makes it difficult to recognize them.

One of the most important books in the field of medicinal plants is *De materia medica* written by Pedanius Dioscorides. He lived in the 1st century AD (AD 40–90) and was a surgeon in Nero's army. During his military trips, he investigated the plants and animals of some regions such as Italy, Greece, Asia Minor, Spain, and France, and collected a significant number of minerals, plants, and animal samples, and at every possible opportunity, he researched the medicinal properties of the collected samples. The mentioned work was edited in five volumes, which contain all the information related to medical knowledge at that time and the description of 600 plant samples (Fig. 1.5).

In this work, an attempt has been made to classify medicinal plants, which, of course, is not based on the letters of the alphabet, but based on the common features of the plants and their similarities. The descriptions are very accurate and presented in a very simple and unambiguous language, and the preparation methods are also stated accurately and correctly. Dioscorides' frequent travels as an army doctor provided him with an opportunity to study and record all the uses and benefits of foreign plants. In fact, almost until the end of the 16th century AD, his writings were considered a reference and standard work in the field of pharmacology, and this shows the extent of his knowledge about the subject under discussion. *De materia medica* was translated into Arabic for the first time in the second half of the 3rd century of Hijri (9th century AD)[1] by Istfan bin Basil and Hunayn ibn Ishaq. The aforementioned translation was published in 1952 in the city of Tétouan, Morocco. Another translation of it was made by Mehran bin Mansour in the 12th century AD. Fortunately, the recent translation with the correction and research of Seyed Mahmoud Tabatabai was published in 2011 by the Tehran University of Medical Sciences publishing house in five volumes and at the same time the Persian translation by his pen was published by the same publisher in five volumes. Centuries later, Dioscorides' works were used by Muslim scholars who influenced the great universities of their day, especially Montpellier, the most famous botanical center in Europe. In the medieval period, *De materia medica* was circulated in Greek, as well as Latin and Arabic translation (Osbaldeston and Wood, 2000).

While being reproduced in manuscript form through the centuries, it was often supplemented with commentary and minor additions from Arabic and Indian sources. Ibn al-Bayṭār's commentary on Dioscorides' *De materia medica*, entitled *Tafsīr Kitāb Diāsqūrīdūs*, has been used by scholars to identify many of the flora mentioned by Dioscorides (Ibn al-Bayṭār, 1989). The importance of Dioscorides' works made many other writers try to expand the topics mentioned by him or to criticize his writings. The topics of the written books are often lexical, but undoubtedly the most complete book in this field is *Commentarii in sex libros Pedacii Dioscoridis Anazarbei de medica materia* written by the Italian scientist Pietro Andrea Mattioli (AD 1501–1577) in the 16th century AD. His book replaced Dioscorides' book as an accepted work. Mattioli criticized and analyzed the statements of Dioscorides and by accurately naming each plant, he tried to solve the inadequacies and ambiguities in his book and to reclassify the plants in it. In his work, he recorded new plants such as sunflower (*Helianthus annuus*) and added a number of foreign plants such as horse chestnut (*Aesculus hippocastanum*) to this collection. Some other Greek and Roman scholars in this field include Scribonius Largus (AD 1–50), Gaius Plinius Secundus or Pliny the Elder (AD 23–79), and Oribasius (AD 320–403). Today, Largus is known for the use of words such as "anodyne" (analgesic) and "epispastic" (blister-opening drug), which

Fig. 1.5. Illustrated page from the Vienna *Dioscorides codex* (*Codex medicus Graecus* of the Austrian National Library; unknown author). (Public Domain, https://commons.wikimedia.org/w/index.php?curid=745191.)

are common in the medical vocabulary. It is said that his activity was only in the field of medicinal botany. Although Oribasius played an effective role in the field of knowledge of medicinal plants, Pliny contributed the most in this field by writing his multi-volume work entitled *Naturalis historia* (*Natural History*) (Fig. 1.6). The work is divided into 37 books, organized into ten volumes. These cover topics including astronomy, mathematics, geography, ethnography, anthropology, human physiology, zoology, botany, agriculture, horticulture, pharmacology, mining, mineralogy, sculpture,

Fig. 1.6. The *Natural History* of Pliny in a mid-12th-century manuscript from the Abbaye de Saint Vincent, Le Mans, France. (By PHGCOM, photographed at Musee de Cluny, Public Domain, https://commons.wikimedia.org/w/index.php?curid=6834497.)

art, and precious stones. In this work, he has carefully described the knowledge and scientific thinking of his time. The result of his work, which was a collection of theories and views of about 400 researchers of that time, today is considered as one of the most important reference books of pharmacology in the ancient world.

Galen or Claudius Galenus (AD 129–216) is a well-known person in the medical community (Fig. 1.7) and certainly his fame as a physician is more than that of Dioscorides. The physician, who came from Pergamum, classified drugs based on a kind of thermal scale and in this way provided a suitable factor for identifying the right drug for each disease. Galen's theory of the physiology of the circulatory system remained unchallenged until 1242, when Ibn al-Nafis wrote his book *Commentary on Anatomy in Avicenna's Canon* (*Sharh Tashrih al-Qanun li' Ibn Sinā*), in which he reported his discovery of pulmonary circulation (West, 1985). Galen may have produced more work than any author in antiquity, and may have written as many as 500 treatises (McClellan and Dorn, 2006). In AD 191, a fire in the Temple of Peace destroyed many of his works, in particular treatises on philosophy (Houston, 2003). In the Abbasid period (after AD 750) Arab Muslims began to be interested in Greek scientific and medical texts for the first time, and had some of Galen's texts translated into Arabic, often by Syrian Christian scholars. As a result, some texts of Galen exist only in Arabic translation while others exist only in Medieval Latin translations of the Arabic. Various attempts have been made to classify Galen's vast output. The most complete compendium of Galen's writings is the one compiled and translated by Karl Gottlob Kühn of Leipzig between 1821 and 1833 (Kotrc and Walters, 1979). This collection consists of 122 of Galen's treatises, translated from the original Greek into Latin (the text is presented in both languages).

The history of Islamic medicine

In the history of medicine, Islamic medicine or Arabic medicine refers to medicine developed

Fig. 1.7. Portrait of Galen (an 18th-century engraving by Georg P. Busch). (Public Domain, https://commons.wikimedia.org/w/index.php?curid=40855568.)

in the medieval Islamic civilization and written in Arabic, the lingua franca of the Islamic civilization. Despite these names, a significant number of scientists during this period were not Arab. Some consider the label "Arab-Islamic" as historically inaccurate, arguing that this label does not appreciate the rich diversity of Eastern scholars who have contributed to Islamic science in this era. Latin translations of Arabic medical works had a significant influence on the development of the modern medicine, as did the

Arabic texts chronicling the medical works of earlier cultures.

In the world of Islam, Muslim physicians or other medicinal practitioners found a very congenital atmosphere to conduct medical research and teach medicine, which they inherited from Greece and ancient Persia. During the Abbāsid era between the 8th and 10th centuries AD, great physicians of the medical school of GundeShapur, who were mostly Persians, translated the ancient medical books from Greek, Syriac, Pahlavi Persian, Sanskrit, and other languages into Arabic. They included some famous translators such as John Grammaticus, Aaron Alexandrian, Sergius of Rechina, Issa ibn Sahar Boxt, Sabet ibn Qorrah, Qusta ibn Luqa of Heliopolis, Sahl ibn Shapur, Shapur ibn Sahl, Ibn Serapion, al-Kendy (Nadjmabādi, 1995; Ṣafā, 1997; Daffāᶜ, 1998; Ibn Abi Oṣṣaybaᶜh, 1998; Sezgin, 2001; Tadjbakhsh, 2003; Tayarani-Najaran *et al*., 2014), and members of some families such as the Boxtishu (the servant of Christ) family, Massarjuyah family, Hunayn family, Karkhy family, Massuyah family, and Sinān family (Al-Aᶜlouchi, 1967; Nadjmabādi, 1995; Ṣafā, 1997; Daffāᶜ, 1998; Ibn Abi Oṣṣaybaᶜh, 1998; Sezgin, 2001; Tadjbakhsh, 2003; Tayarani-Najaran *et al*., 2014).

After translation of medical books of the ancient world known as the "Greek medicine", but owing its development also to the ancient Persian medicine, the Muslim physicians scrutinized these works. They found the defects in these books, removed the faults, and perfected them through experience, revision, and practice.

In the meantime, the term "Islamic medicine" has become established for this medicine. Although most of the books are written in Arabic and were therefore long referred to in the West as "Arabic medicine", the term "Islamic medicine" has now become accepted for it, referring to the four founders of this scientific discipline, namely Ali ibn Rabban Ṭabari, Rhazes, Ali ibn Aᶜbbās Majussi Ahwāzi Arjāni (Hali Abbās), and Avicenna. Medicine in other Islamic countries also owes its existence and perfection to these well-known physicians. Therefore, Islamic medicine today is also synonymous with Traditional Iranian Medicine (TIM) and Traditional Persian Medicine (TPM). Islamic Spain also made valuable contributions to medicine by producing scientists such as Abu al-Qāssem al-Zahrawi.

The history of Islamic medicine in Iran

Abu al-Hassan Ali ibn Rabban Ṭabari (AD 807–861) was the first great Islamic physician practicing in Persia. His main work is *Firdaws al-Ḥikmah* (*The Paradise of Wisdom*) that contains seven parts, 30 essays, and 360 chapters (Fig. 1.8a). In general this book is a complete collection of medicine and pharmacy (Nadjmabādi, 1995; Daffāᶜ, 1998; Ibn Abi Oṣṣaybaᶜh, 1998; Sezgin, 2001; Tadjbakhsh 2003). It was published in 1928 in Berlin (Aṭ-Ṭabari, 1928).

Abu Bakr Mohammad ibn Zakariyyāʾ al-Rāzī, also known as Rhazes (AH 251–313/AD 865–925), a renowned Persian physician, philosopher, and chemist (Fig. 1.9), wrote about 250 books and treatises (Nadjmabādi, 1992, 1995; Ṣafā, 1997; Daffāᶜ, 1998; Ibn Abi Oṣṣaybaᶜh, 1998; Sezgin, 2001; Tadjbakhsh, 2001, 2003).

Al-Ḥāwi (*The Continens*) is well known as Rāzi's most important and most complete book on which he worked for 15 years (Fig. 1.8b). The book was translated into Latin in 1279 by Faraj ibn Salem (Farrgut) and was reprinted five times in Europe between 1488 and 1542. The Arabic text of *al-Ḥāwi* was published in Heydarabad, India in the 7th decade of the 20th century (Rāzi, 1955–1971). Among other famous medicinal books of Rāzi one can mention (Nadjmabādi, 1992, 1995; Ṣafā, 1997; Daffāᶜ, 1998; Ibn Abi Oṣṣaybaᶜh, 1998; Sezgin, 2001; Tadjbakhsh, 2001, 2003):

- *Man lā Yaḥḍuruhu aṭ-Ṭabib* (*For One in Need of a Physician*), a medical advisory for the general public. Rāzi was probably the first Persian doctor to deliberately write a home medical manual (remedial) directed at the general public. The book covers 36 chapters.
- *Al-Manṣouri* (*Book for al-Mansur*) that contains ten chapters. In *al-Manṣouri*, Rāzi presented a description of the

Fig. 1.8. Six important books of Islamic traditional medicine of Iran before the Mongol attack: (a) *Firdaws al-Ḥikmah*; (b) Al-Ḥāwi; (c) *Hedāyat al-Motaʿallemin fi aṭ-Ṭibb*; (d) *Al-Abniyah aʿn Ḥaqāyeq al-Adwiyah*; (e) *Al-Maliki*; (f) *Zakhirah Khārazmshāhi*. (By Milad Iranshahi.)

identification of tempers, anatomy, hygiene, orthopedics, wounds and sores, and bites, as well as a complete course of therapeutics. This book was translated into several European languages and was published many times.

- *Al-Jodari wa al-Ḥaṣbah* (*The Smallpox and The Measles*), which was the first book on differential diagnosis of the smallpox and the measles. It was reprinted more than 40 times in Europe. *Al-Jodari wa al-Ḥaṣbah* has been translated into Persian by M. Nadjmabādi and published by Tehran University Publications in 1992 (Rāzi, 1992).
- *Al-Morshed* (*The Guide*), which comprises 29 chapters and and adapts one of the writings of Hippocrates.

Some other of his medical books are aṭ-Ṭibb al-Mlouki (The Royal Medicine), Bur al-Sāʿah (Medical Emergencies), al-Taqseem wa al-Tashjir (Divisions and the Branches), al-Qarābādin al-Kabir (The Great Pharmacopoeia), and al-Shukuk al'a Jālinus (Doubts about some opinions of Galen). Rhazes was the most important specialist in clinical and practical medicine in the Islamic world.

One of Rhazes' contemporary physicians was Abu Manṣour Ḥassan ibn Nooḥ Qamari Bukhāri (died in AD 997). He had a

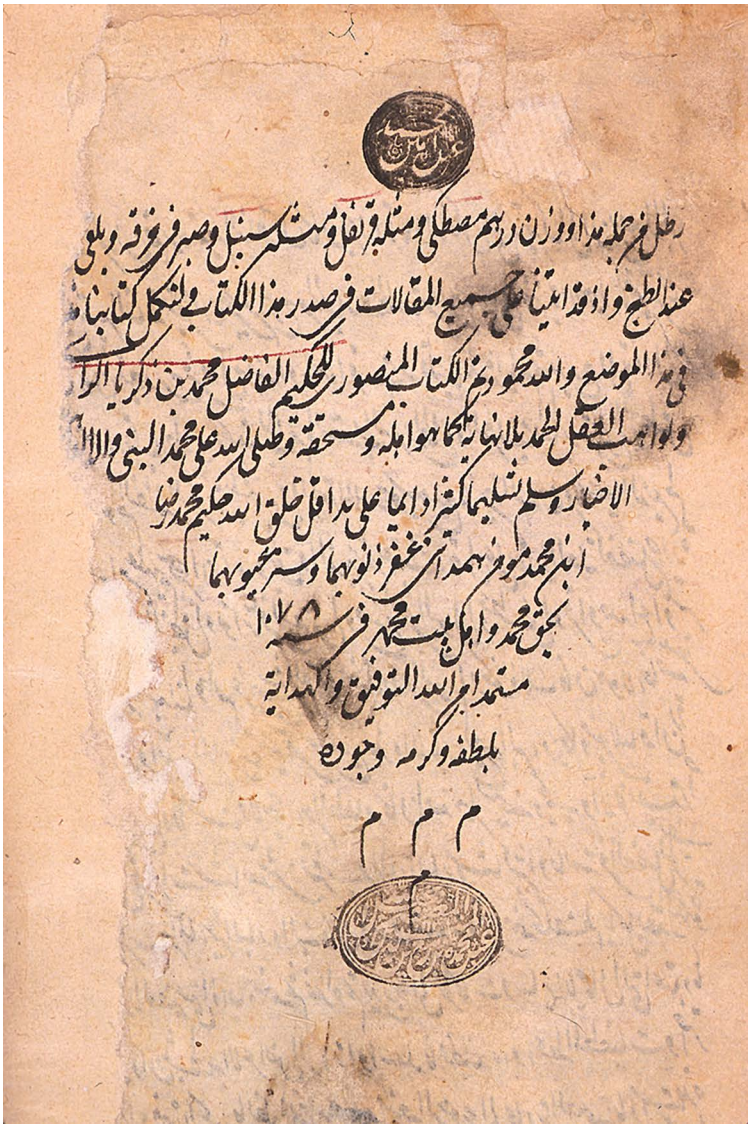

Fig. 1.9. Cover of the famous *Razi's Book of Medicine (Al-Mansouri)*. (As reproduced in the frontispiece to McCarthy's *Freedom and Fulfillment* (Boston: Twayne, 1980) by Abu Bakr al-Razi – transferred from http://en.wikipedia.org/wiki/Image:Colophon-Razi's_Book_of_medicine_for_Mansur.jpg, Public Domain, https://commons.wikimedia.org/w/index.php?curid=673628.)

prominent position to the Samanid kings. His books include: *Ghenā wa Menā* (*Wealth and Wishes*), *Eʿlat al-Eʿlal* (*The Cause of Diseases*), *Moālejat Manṣouri* (*Manṣouri's Treatments*), *Maqālahh fi al-Boḥran* (*An Article on Crisis*), *Resālah fi Aʿlāj Amrāḍ al-Ṣadr* (*A Treatise on Curing Chest Diseases*), *Resālah fi Ḥommiyāt al-Dāyereh* (*A Treatise on Intermittent Fevers*), *Maqālah fi al-Maraz al-Estesqsā* (*A Treatise on Dropsy*), and *al-Tanwir* (*Enlightening*). He wrote the latter book in Arabic and Persian (Nadjmabādi, 1995; Daffāʿ, 1998; Ibn Abi Oṣṣaybaʿh, 1998; Sezgin, 2001).

One of the renowned physicians who was the student of Abu al-Qāssem Moqāneʿi (a Rhazes student) is Abu Bakr Rabʿi ibn

Ahmad Akhaweyni Bukhari (died in AD 983). Akhaweyni dedicated his whole lifetime to medicine (Nadjmabād, 1995; Tadjbakhsh, 2001, 2003). He recorded his medicinal attempts in *Hedāyat al-Motaʿallemin fi aṭ-Ṭibb* (*An Educational Guide for Medicinal Students*). The book was written in an eloquent Persian language and contains three parts. The first part comprises 51 chapters on elements, tempers, humors, simple and compound organs and also descriptions on functions, souls, foods and drinks, physical movement, rest, sleep, and others. The second part, written in 130 chapters, applies pathology cap-a-pie. In the third part, containing 19 chapters (Fig. 1.8c), Akhaweyni introduces various types of fevers and pulses. This book was published by Ferdowsi University of Mashhad, Iran in 1965 (Akhaweyni Bukhāri, 1965).

Contemporary with Akhaweyni was Moafaq al-Din Abu Manṣour Ali Herawi, who was the author of *al-Abniyah aʿn Ḥaqāyeq al-Adwiyah* (*Basics of the Realities of Drugs*). It is the most ancient book written in Persian language (Nadjmabādi, 1995; Tadjbakhsh 2001, 2003) and contains the Persian names of simple drugs listing the individual properties in alphabetic order. In addition, a total of 584 mineral, plant, and animal drugs are described in more detail (Fig. 1.8d). A manuscript of this book, written by Assadi Ṭussi, is available in Vienna National Library. The book was later published by Tehran University (Al-Herawi, 1992).

The most noted Muslim physician after Rhazes was Ali ibn Aʿbbās Majussi Ahwāzi Arjāni, known as Haly Abbās (AD 930–994). He is the author of the valuable book *Kāmil al-Ṣināʿah aṭ-Ṭibbiyyah* (*Complete Book of the Medical Art*) or *al-Maliki* (Nadjmabādi, 1995; Daffāʿ, 1998; Ibn Abi Oṣṣaybaʿh, 1998; Sezgin, 2001; Tadjbakhsh, 2001, 2003).

The book *al-Maliki* is divided into two parts. Each part contains ten discourses that cover the complete course of medicine. The first ten deal with the theory of medicine and its divisions, as well as types of tempers, elements, humors, anatomy, physiology, general principles of hygiene, diseases and their divisions, types of pulses, kinds of fevers, symptom of diseases cap-a-pie, and subjects on the period and consequences of diseases. The second ten contain topics on health and hygiene care, introductions to all kinds of therapeutic methods, treatment of different types of fevers, dermatologic ailments, all kinds of bites and poisonings, headaches and psychological diseases, respiratory diseases, heart diseases, gastrointestinal diseases, genitourinary diseases, a complete course on surgery and orthopedics, and finally a course on pharmacology and pharmaceutics (Fig. 1.8e). The Latin translation has been published three times in Europe and the Arabic text was printed in Bulāq, Egypt (Ahwāzi Arjāni, 1877).

Shaykh al-Ra'is (The Chief Principal) Abu Ali Ḥussain ibn Abdullah ibn Sinā, known as Avicenna (AD 980–1037), was the most prestigious scholar of Persia and the Islamic world.

Some of Avicenna's contemporary physicians were (Nadjmabādi, 1995; Daffāʿ, 1998; Ibn Abi Oṣṣaybaʿh, 1998; Sezgin, 2001; Tadjbakhsh, 2001, 2003):

1. Abu al-Khayr Ḥassan ibn Sowār, known as Ibn Khammār (AD 943–1049), who wrote books such as *al-Ḥawāṣel fi al-Ṭibb* (*The Consequences in Medicine*) and *Imteḥān al-Aṭebā* (*Trial of Physicians*).
2. Abu Ali Ahmad ibn Yaqub ibn Moskuyeh (AD 937–1030), who wrote the books *al-James* (*The Comprehensive*) and *al-Adwiyah al-Mofradah* (*Simple Drugs*).
3. Abu Rayḥān Mohammad ibn Ahmad al-Biruni (AD 973–1048), the author of *aṣ-Ṣaydanah fi al-Ṭibb* (*Book of Pharmacy*) where he presents 799 simple mineral, herbal, and animal drugs. There exists an ancient Persian translation of this book, which has been published. Of the two texts of *aṣ-Ṣaydana*, one corrected by the late Aʿbbās Zaryāb Khooei has been printed in Iran (Biruni, 1991) and the other by the late Hakim Muhammad Saʿeid and Ranā Ehsānallahi was printed in Pakistan (Biruni, 1973).
4. Abu al-Qāssem Abd al-Raḥmān ibn Ali ibn Ahmad ibn Abi Ṣādeq (AD 995–1078) is another physician contemporary with Avicenna, being his student and the master of Jorjāni. Ibn Abi Ṣādeq wrote *Sharḥ Foṣul al-Aboqrāt* (*An Exposition to the Hippocrates' Articles*), *Sharḥ Masāel Ḥonain* (*An Explanation to Ḥunain's Problems*), *Sharḥ Taqdameh*

al Maʿrefah al-Boqrāt (*An Explanation to Hippocrates' Prognosis*), and *al-Adwiyah al-Qalbiyah* (*Cardiac Medicines*).

The most important celebrated physician after Avicenna was Seyyed Ismāʿil Jorjāni (AD 1041–1136). Jorjāni wrote valuable books on medicine during his lifetime (Nadjmabādi, 1995; Daffāʿ, 1998; Sezgin, 2001; Tadjbakhsh, 2001, 2003) but his most significant book, which is considered to be the most detailed medical book in Persia, is *Zakhirah Khārazmshāhi* (*The Treasure of Khārazmshāh*). This book contains nine main books and two appendices on simple and compound drugs (Fig. 1.8f): the first book of *Zakhirah* is about medical science, identifying types of different humors and temperaments, and also general aspects of anatomy; the second book discusses health and diseases and also types of pulses, sweating, urine, and feces; the third book includes a complete course on maintaining health; the fourth book is allocated to ways of diagnosing diseases and disease duration; the fifth book is on identifying different types of fevers and methods to cure them; the sixth book is assigned to methods of curing diseases cap-a-pie; the seventh book describes types of inflammation, wounds, and fractures, and the ways to treat them; the eighth book describes various cosmetic applications; the ninth book is assigned to various types of poisons, antidotes, bites, Poisonings, and their individual treatments; and the final section explains simple and compound drugs in detail.

In fact, the mentioned book is an encyclopedia, fraught with pure Persian medicopharmaceutical terms. The complete text of *Zakhirah* was photoprinted in 1977 by the Iranian Culture Foundation (Jorjāni, 1977). Due to its importance, the book was also translated into Hebrew and Turkish.

Jorjāni wrote a summary of the *Zakhirah* named *al-Aghraḍ aṭ-Ṭibbiah wa al-Mabāhethi al-Aʿlāiah* (*Medical Goals and Aʿlāiyeh's Discussions*). This book provides an introduction to medicine, deals with the treatment of various diseases, and finally describes simple and compound medicines. A photoprint of *al-Aghrāḍ aṭ-Ṭibbiah* was published in 1966 by the Iranian Cultural Foundation and fortunately edited by H. Tadjbakhsh and published by Tehran University Press (Jorjāni, 2005–2006).

The third book of Jorjāni in medicine is named *Khofi Aʿlāii* (*A very compact book that fits in Ala ad-Din Atsiz's boot*), which is an abbreviated medical text consisting of two parts. The first part includes the theoretical aspects of medicine and the second provides scientific medical knowledge comprising seven articles. The book was lithographed in Kanpur, India in 1891. It was also published with valuable footnotes and descriptions (Jorjāni, 1998).

The fourth book of Jorjāni, which is called *Yādegār* (*The Memorial*), is an extract text and codified in five parts. *Yādegār* has been edited by M. Mohaghegh and published by the Institute of Islamic Studies in Tehran (Jorjāni, 2003).

One of Jorjāni's books is *Zobdat aṭ-Ṭibb* (*Selected Topics in Medicine*). This book was written in Arabic, and its context was ordered in numerous tables.

Other famous physicians of the Islamic civilization before the Mongol invasion will not be discussed further here, but at least their names and works will be briefly mentioned (Nadjmabādi, 1995; Daffāʿ, 1998; Ibn Abi Oṣṣaybaʿh, 1998; Sezgin, 2001; Tadjbakhsh, 2001, 2003):

1. Abu al-Ḥassan Ahmad ibn Mohammad Ṭabari (AD 932–995), the author of *al-Muʿālejāt al-Boqrātiyah* (*Hippocratic Treatments*).
2. Ḥakim Maysari (died in AD 981), the composer of *Dāneshnāmeh Dar Pezeshki* (*The Handbook of Medicine*), which is a versified medical textbook in Persian, published in Tehran (Ḥakim Maysari, 2015).
3. Abu Ali Ahmad ibn Abd al-Raḥmān ibn Manduyeh Iṣfaḥāni (died in AD 1020), the author of books such as *Nahāyat al-Ekhtesār* (*The Utmost of Conciseness*) and *al-Kāfi* (*The Sufficient*).
4. Abusahl Maṣiḥi (AD 971–1012), author of the book *al-Meah fi aṣ-Ṣenaʿāh aṭ-Ṭibbiyah* (*The Hundred Chapters in Medicine*).
5. Abu al-Faraj Ali ibn Ḥussein ibn Hendowi Qomi Rāzi (died in AD 1029), author of *Meftāḥ aṭ-Ṭibb* (*A Key to the Medicine*).

6. Sharaf al-Din Mohammad ibn Yussef Ilāqi (killed in AD 1041), writer of the book *al-Foṣul al-Ilāqyah* (*Ilāqyian Articles*).
7. Abu al-Ḥassan Ali ibn Ahmad ibn Hobal Tabrizi (AD 1121–1213), composer of the book *al-Mokhtār fi aṭ-Ṭibb* (*The Selected in Medicine*) that has been published in Ḥeyderabad, India, in four volumes.
8. Badr al-Din Mohammad ibn Bahram Qalānessi Samarqandi (late 12th to early 13th century AD), author of the book *al-Aqrābādin* (*The Pharmacopoeia*) in 49 chapters, which is a very complete work on various compound drugs.

The Mongol war began in AD 1219 with the attack of Changiz to Utrar, then spread to the Mavāra an-Nahr (Transoxiana) and Khorasan, Iraq, and Ajam Iraq (part of Persia comprising Tehran, Isfahan, and Arak). It caused the destruction to many cities, the murder of many inhabitants, and the collapse of many Islamic civilizations including ancient Persia. This cruel attack also resulted in a destructive shock to the scientific development of medicine.

One of the famous physicians after the Mongol attack was Abu Hāmed Mohammad ibn Ali Samarqandi (died in AD 1221). He was the author of the books *al-Asbāb wa al-Aʿlāmāt* (*Etiology and Symptomology*) and *al-Faraq Bayn al-Amrāḍ al-Moshkelah* (*Differences Between Difficult Diseases*) (Daffāʿ, 1998; Tadjbakhsh, 2001). Some of the great physicians from the post-Mongol era are mentioned below:

1. Qotb al-Din Mahmud ibn Masuʿd Kazeruni Shirāzi (AD 1236–1311), one of the greatest sage physicians who was the author of the book *al-Toḥfat al-Saʿdiah* (*An Offering to Saʿd*), which is the commentary on the *Canon*.
2. Shams al-Din Mohammad ibn Mahmud Āmoli (died in AD 1352) was a great scientist of his time. He wrote the books *Nafāis al-Fonoun* (*The Precious Arts*) and *Sharh Kolyāt Qānon ibn Sinā* (*Commentary on Generalities of the Canon*).
3. Mahmud ibn Oʿmar Chaghmini Khārazmi (died in AD 1344) is the author of *Qānonchah* (*The Small Canon*) (Fig. 1.10a) (Chaghmini Khārazmi, 1422).

Some of the great physicians who emerged in Persia during the Timurid era are discussed below:

1. Ali ibn Ḥussein Ansāri, known as Zeyn al-Attār (died AD 1403), has left his book *Ekhtiyārāt Badiʿi* (*Badiʿi Selections*) (Fig. 1.10b) that contains two articles (Ansāri, 1992).
2. One of the famous physicians in that time is Yusuf ibn Mohammad Herawi, also known as Yusufi, who lived in the court of Ẓaheyr al-Din Bāber, and his son, Homāyoun. He impressed several treatises in medicine. An eight-treatise collection of Yusufi, namely *Ṭibb Yusufi* (*Yusufi's Medicine*), has been published in Lahore, India.
3. Another famous physician of this age is Mohammad ibn Yusuf Herawi who wrote the worthwhile book entitled *Baḥr al-Javāher* (*Sea of Gems*), which is a dictionary of medical words and was published in the Qajarid era.
4. Another great physician of this period of time is Bahā al-Dowlah Seyyed Mohammad ibn Qāssem Nourbakhsh (AD 1455–1509). He is the author of *Kholasata al-Tajāreb* (*Summary of Experiences*) in Persian, which includes 28 chapters and subjects such as general health, children and elderly health, cosmetics, types of different fevers, simpleton, leprosy, frosting, contusion, poisoning, a course of disease treatment cap-a-pie, compound drugs, and finally weights usually used in pharmacology.

Some of the great physicians who emerged during the Safavid era are the following:

1. Ḥakim Moẓaffar ibn Mohammad Ḥussein Shafāee Iṣfahāni (died in AD 1555) is one of the famous physicians in the reign of Safavid. His famous book entitled *Ṭibb Shafāee* (*Shafāee's Medicine*) was translated by Angelus de St. Joseph (French) to Latin and was reprinted in the Netherlands with the new title *Pharmacopeia Persica*.
2. Sharaf ad-Din Ḥassan ibn Ḥakim Molāye Iṣfahāni (AD 1558–1627), famed as Hakim Shafāii, the author of *Qarābādin Shafāee* (*Shafāee's Pharmacopoeia*).
3. Mir Mohammad Akbar, known as Shāh Arzāni, who lived in the time of Urang Zib in India. He left the books *Ṭibb Akbari* (*Akbari's*

Fig. 1.10. Four important books of Islamic traditional medicine of Iran after the Mongol attack: (a) *Qānonchah*; (b) *Ekhtiyārāt Badi'i*; (c) *Toḥfata al-Momenin*; (d) *Makhzan al-Adwiyah*. (By Milad Iranshahi.)

Medicine), *Mizān aṭ-Ṭibb* (*The Scale of Medicine*), and *Qarābādin Qāderi* (*Qāderi's Pharmacopeia*), which were all written in Persian language.

4. Seyyed Mohammad Momen ibn Mohammad Zamān Ḥusseini Tunekāboni was a famous physician who lived during the Safavid reign. He was the chief physician of Shah Suleymān Safavi and the author of *Toḥfata al-Momenin known as Toḥfeḥ Ḥakim Momen* (*Ḥakim Mo'men's Gift*). This book is written in Persian and contains five diagnoses and two orders (Fig. 1.10c). The first diagnosis concerns the explanation of different medical views and the designation of the degrees of the medicines; the second diagnosis refers to the explanation of names and expressions; the third and most detailed part of the book contains monographs of drugs in alphabetical order; the fourth diagnosis discusses the treatment of poisoning; and the fifth diagnosis deals with weights. The first order offers methods for preparation of simple drugs and the second is about preparation of compound drugs (Tunekāboni, 2007). *Toḥfeh Ḥakim Momen*, has been published in Iran and India several times.

Some of the great physicians who emerged in Persia in the Afsharid age are:

1. Ḥakim Mirzā Mohammad Hāshem ibn Mohammad Hādi Aʿlawi Shirāzi known as Aʿlawi Khān (died in AD 1695) lived in the Afsharid era. He wrote the books *al-Qarābādin Kabir* (*The Grand Pharmacopeia*) and *Majmaʿ al-Jawāmeʿ* (*Union of Comprehensives*) written in Persian language and published by Ḥakim Aʿqili Aʿlawi Khorāsāni Shirāzi (Wāseṭi, 1988).

2. Ḥakim Seyed Mohammad Ḥussein ibn Mohammad Hādi Aʿqili Aʿlawi Khorāsāni Shirāzi was one of the renowned physicians in the reign of the Afsharids. He was the author of *Makhzan al-Adwiyah* (*Drug Treasure*), which is a comprehensive book describing several simple drugs (Fig. 1.10d). *Makhzan al-Adwiyah* discusses predecessors' experiences about types of natural drugs. The book is ordered alphabetically. It was published numerous times in Iran and India (Wāseṭi, 1988; Aʿqili Aʿlawi Khorāsāni Shirāzi, 2014). He also wrote another book focused on general medicine entitled *Kholāsat al-Ḥikmah* (*Essence of Wisdom*).

We can consider Ḥakim Aʿqili as the last Islamic physician, although a few physicians like Mirzā Ahmad Tonekāboni, Mirzā Bābā Tabib Shirazi, and others emerged after him, but at this time Persia established cultural connection with Europeans and educated people and officials were influenced and intimidated by Western civilization and new European medicine. The ancient Islamic medicine was then neglected in Persia and also in other Islamic countries. Finally, European medicine gradually pushed aside the TPM. Fortunately, the body of Islamic medicine managed to continue on the Indian subcontinent. Some of the compiled books that verify the permanency of Islamic medicine on the Indian subcontinent are: *Moḥiṭ Aʿẓam* (*The Grand Ocean*) and *Excir Aʿẓam* (*The Grand Elixir*) written by Ḥakim Mohammad Aʿẓam Khān (Ḥakim Mohammad Aʿẓam Khān, 2019); *Tadhkarata al-Hind* (*A Collection of Indian Drugs*) written by Ḥakim Reḍa Ali Khān Dakani (Wāseṭi, 1988); and also *Kanz al-Adwiyah* (*The Treasure of Drugs*) written by Ḥakim Mohammad Najm al-Ghani Khān (Wāseṭi, 1988). Finally, the founding of Hamdard Great Institute in the Indian subcontinent is an example of the permanence of Islamic medicine in India.

Avicenna

Shaykh al-Ra'is (The Chief Principal) Abu Ali Ḥussein bin Aʿbdullah bin Ḥasan bin Ali bin Sinā (Avicenna) (AD 980–1037) has a very high position in medicine and philosophy. This claim derives primarily from his following books: *ash-Shifā* (*The Book of Healing*), *al-Ishārāt wa al-Tanbihāt* (*Remarks and Admonitions*), *an-Naajāt* (*Book of Salvation*), *Uʿyun al-Ḥikmah* (*Principles of Wisdom*), and *Dāneshnāmeh-e-Aʿlāii* (*Aʿlāii's Encyclopaedia*).

Biography

Avicenna was born in AD 980. His father Aʿbdullah was from Balkh and during the

reign of Noah bin Manṣour (Noah II), one of the Samanid kings, he moved from Balkh, became a civil servant in a village named Khormaithan, and married a girl named Setarah from a nearby village named Afshnah. Some time later, his father moved to Bukhara where he left his son to tutors to learn the Quran and literature. Ibn Sinā learned jurisprudence and polemics from a teacher named Ismāil Zāhid and logic and geometry from Abu Ābdullah Nāteli. The young Ibn Sinā soon surpassed his masters in these techniques. After Nāteli left Bukhara, Ibn Sinā began to research and study in the divine and natural sciences; shortly after, the desire to learn medicine appeared in him, and he carefully read what previous doctors had written and soon achieved great success in this field. He achieved so much that the great scientists of medicine turned to him and studied under him. Ibn Sinā, while engaged in medicine and treatment of patients, did not neglect other sciences and spent one-and-a-half years re-studying logic and philosophy. After that, he turned to theology and started studying the book *Metaphysics* by Aristotle, but despite reading this book 40 times, he could not understand the author's intention until he accidentally came across the book of *The Aims of Aristotle's Metaphysics* written by Abu Naṣr Fārābi, and the difficulties of the mentioned text became easy. At that time, he had just turned 17 years old. When Ibn Sinā was 18 years old, Noah II fell seriously ill and the doctors were unable to treat him. Ibn Sinā treated Noah II and was allowed to study in his precious library in return for this service. After some time, Ibn Sinā's father passed away, and times changed his life. He went from Bukhara to Gorgānj, Khārazm. He lived in this country for some time, becoming close to the ruler, and he managed to write several books in this city. After that he went to Ray and entered the service of Majd ad-Dawlah, one of the rulers of the Buyid dynasty who was suffering from a mental illness, and he cured him; and from there he went to Qazvin and then to Hamedān. He stayed in this city for a long time, and it was in this city that he entered the service of Shams ad-Dawlah Daylami. At the same time, he wrote the *Al-Qānun fi aṭ-Ṭibb* (*The Canon of Medicine*) and started the compilation of the great book *Ash-Shifā* (*Book of Healing*) at the request of Abu Oʿbaid Bozjāni. When Shams ad-Dawlah passed away and his son succeeded him, Ibn Sinā did not accept his ministry and soon after he was accused of having correspondence with the ruler of Iṣfahān and because of this he was imprisoned. He spent 4 months in prison and wrote three books there. After being released from prison, Ibn Sinā was in Hamedān for some time, then he secretly left Hamedān and went to Iṣfahān. Aʿlā ad-Dawlah, the ruler of Iṣfahān, received him warmly and respected him very much. He became his companion. In this city, the master completed the *Ash-Shifā*, and in 1038, during a trip to Hamedān with Aʿlā ad-Dawlah, he fell ill and died.

Principal works

Many works of Ibn Sinā have been left behind or could be attributed to him; a comprehensive list of his oeuvre can be found below. This list includes 131 original scripts written by Ibn Sinā and 111 works attributed to him. Unfortunately, some of his books have been lost, but the names of some of the most important works left by him are as follows (Mahdavi, 1954).

Philosophy

- *Ash-Shifā* (*Book of Healing*): This book is the most detailed philosophical work of Ibn Sinā that has survived so far (Fig. 1.11a). *Ash-Shifā* is the most important and comprehensive work of Ibn Sinā and represents an encyclopedia in Arabic language in which humanities, summaries of opinions of eminent philosophers of ancient Greece, and commentators of the School of Alexandria, Platonists, and Neoplatonists were expressed and subjected to scientific analysis and criticism. This book consists of four sections: logic (nine subjects, 38 articles, and 248 chapters), natural sciences (eight subjects, 35 articles, and 206 chapters), mathematics (four subjects: geometry consisting of 15 articles; astronomy consisting of

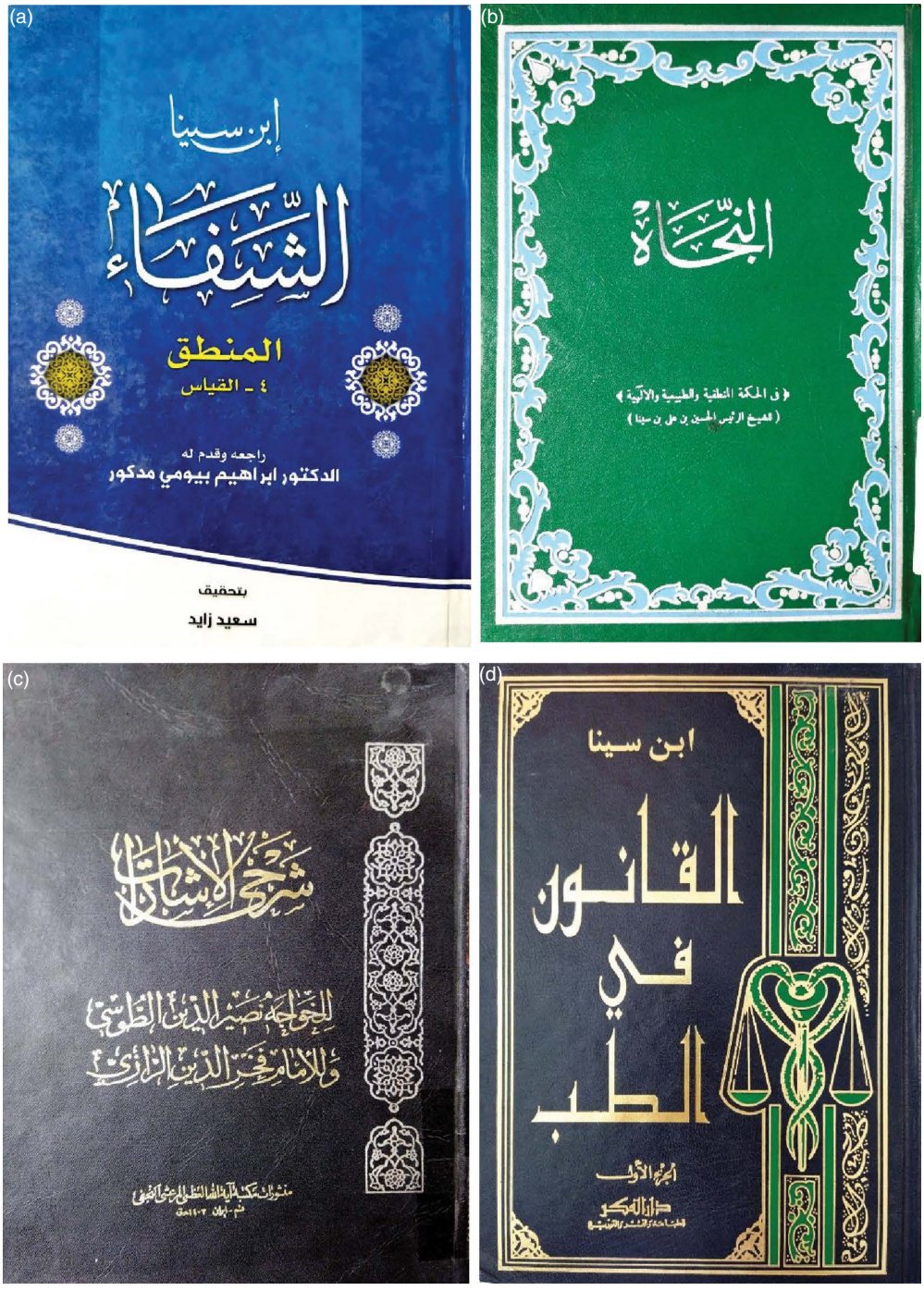

Fig. 1.11. Four important books of Avicenna: (a) *Ash-Shifā*; (b) *An-Naajāt*; (c) *Al-Ishārāt wa al-Tanbihāt*; (d) *Al-Qānun fi aṭ-Ṭibb*. (By Milad Iranshahi.)

14 articles and 79 chapters; arithmetic consisting of four articles; and music consisting of six articles and 16 chapters), and theology (one subject, ten articles, and 59 chapters) (Ibn Sinā, 1984). According to Jawzjāni's report, in Hamedān Avicenna prepared the list of the main titles of *ash-Shifā* materials in two days and without referring to any book, and then devoted himself to the work of writing it, until all the natural sciences (except the books of animals and plants) and theology and part of the logic were written; then he went from Hamedān to Iṣfahān with several people, including his disciple Jawzjāni, where he devoted himself to completing the *ash-Shifā* book and wrote the sections on logic and mathematics; on the way to Sabon, he finally wrote the rest of *ash-Shifā*, namely the books on plants and animals as well as *an-Naajāt*.

- *An-Naajāt* (*Book of Salvation*): This book is a summary of *ash-Shifā*, which was written according to the common tradition of summary writing in that era (Fig. 1.11b). This book also includes four types of logic (149 chapters), natural sciences (six articles and 47 chapters), mathematics (four subjects: geometry consisting of ten chapters; arithmetic; almagest (in astronomy) consisting of nine chapters; and music) and theology (two articles and 58 chapters) (Ibn Sinā, 1985).
- *Al-Ishārāt wa al-Tanbihāt* (*Remarks and Admonitions*): This book, written at the end of Ibn Sinā's life, is his most mature and fruitful book in the field of philosophy and includes his last views (Fig. 1.11c). This book also has four sections: logic, natural sciences, theology, and mysticism, which are placed instead of mathematics (Ibn Sinā, 1982).
- *Al-Mabada* and *Al-Maʿād* (*Origin and Resurrection*): In this book, in three articles, Ibn Sinā talks about *Wājib al-Wujud* (God) and His attributes, the order and nature of the grace of existence from the first to the last (and lowest) being, and finally the immortality of the soul, its happiness, and misery in the afterlife, and the topics he considers to be the fruit of two metaphysical and natural sciences.
- *At-Taʿliqāt* (*Commentaries*): As the name suggests, this book contains Ibn Sinā's commentaries on the philosophical works of earlier philosophers and on his own works, and sometimes they are also answers to the questions that were put to him. Logical, natural, theological (= metaphysical), and mathematical topics are discussed in this book beside other various topics.
- *Al-Mobāḥethāt* (*Discussions*): This book is also the result of written dialogues between Ibn Sinā and some of his students (especially Bahmanyār and Abu Manṣour bin Zailah), which, like *at-Taʿliqāt*, covers various topics.
- *Uʿyun al-Ḥikmah* (*Principles of Wisdom*): This book presents the main topics of logic, natural sciences, and theology in a compact and concise manner.
- *Dāneshnāmeh-e-Aʿlāii* (*Aʿlāii's Encyclopaedia*): Ibn Sinā wrote this encyclopedia at the request of and for Aʿlā ad-Dawlah Kākuyah. This book is apparently the first philosophical book written in Persian language after the establishment of Islamic philosophy. The encyclopedia includes four sections: logic, natural sciences, mathematics, and theology.
- *Al-Enṣāf* (*The Fairness*): According to Ibn Sinā, this book contains nearly 28,000 problems. The manuscript was destroyed during Masoʿud Ghaznavi's attack on Iṣfahān. Ibn Sinā wanted to rewrite it, but apparently he did not succeed in doing so. Parts of this book were found by Aʿbd al-Raḥmān al-Badawi and included in the book of *Arasṭu end al-Aʿrab* (*Aristotle from the Perspective of the Arabs*).
- *Risalah fi Aqsam al-Uʿloom al-Aʿqliyyah* (*Treatise on the Types of Philosophical Sciences*): In this treatise, Ibn Sinā divides philosophy into theoretical and practical, then divides each of them into types, defines them concisely, and points to their topics, issues, and branches.

- *Risalah al-AḍḤāwiyyah fi Amr Al-Maʿād* (*Treatise al-AḍḤāwiyyah about the Truth of the Resurrection*): Avicenna wrote this treatise for a person named Abu Bakr bin Muḥammad, nicknamed al-Sheikh al-Amin, and in it, about the truth of the resurrection, various opinions about it, invalidation of false opinions, the truth of man (i.e. the soul) and its survival, he discussed the necessity of resurrection and the hereafter. In this treatise, Ibn Sinā considered physical resurrection impossible and interpreted individual Quranic verses that indicate physical resurrection.
- *Risalah al-Ḥudood* (*A Treatise on Limits*): In this treatise, he defined the concepts and philosophical terms.
- The Story of *Ḥayy ibn Yaqẓān*: This work is a mystical treatise by Ibn Sinā, and a Persian translation and commentary has been found on it, attributed to his student Jawzjāni.
- *Manteq al-Mashrqeen* (*Logic of the Orientalists*): This book is the logic section of *Ḥikmahqtol al-Mashrqeen* (*Philosophy of the Orientalists*) and in the introduction Ibn Sinā says that he wishes to include in it the most important contents of true knowledge, which only those who are very intellectual and opinionated and who benefit from correct guesses can find it. Ibn Sinā says that he wrote this book only for those who are like him, and for the people of philosophy, he considered *Kitāb ash-Shifā* to be sufficient, and even beyond their needs. In this way, it is clear that Ibn Sinā wanted to present a special school of thought in this book, other than what he had presented in *ash-Shifā*; but unfortunately, except for the logic part, nothing of it has reached us, and this amount is not much different from the logic of *ash-Shifā*.

Medicine

Avicenna also wrote 61 books and treatises on medical science, but it is generally agreed that his book *Al-Qānun fi aṭ-Ṭibb* (*The Canon of Medicine*) is Avicenna's masterpiece (Fig. 1.11d). It represents a source book of medicine in the Eastern and Western worlds. The *Canon* contains five main books each divided into some arts, tuitions, sentences, and chapters:

- The first book of the *Canon* discusses the concept of medicine, particularly the medicine extent and its subjects, and also topics around humors, tempers, elements, organs, spirits, functions, and powers. Themes on diseases and their etiology, hygiene, and finally general guides to treatment are also mentioned.
- The second book is assigned to simple drugs and includes about 800 mineral, herbal, and animal-based medicinal materials. The drugs are ordered alphabetically (Abjad), and in each monograph, the manner, characteristics, the best type (quality) of drugs, nature, application, properties, and indication are mentioned.
- The third book of the *Canon* diseases are treated in 22 arts. Each art comprises several articles. In fact, this part acts as a complete review of pathology.
- The fourth book offers ways to cure common diseases such as fevers and edema, and it also includes orthopedics, toxicology, and cosmetic and hygienic products.
- The fifth and final book that is allocated to compounded drugs is called *Qarābādin* (*The Pharmacopoeia*) and represents properties and recipes to make all kinds of pills, mixtures, powders, syrups, suppositories, tablets, and others (Ibn Sinā, 1981–1997).

There have been numerous expositions of the whole *Canon* or its parts and it has been summarized many times. The book has been translated into European, Hebrew, and Persian languages and it has been reprinted frequently.

- *Al-Adwiyah al-Qalbiyah* (*Cardiac Drugs*) includes an introduction and 16 chapters.
- *Al-Orjozah fi at-Tibb (A Poetical Treatise in Medicine)* has 1338 lines of poetry.

- *Al-Orjozah fi Tadbir aṣ-Ṣeḥah fi al-Foṣoul al-Arbaʿah* (A Poetical Treatise in Health Measures in Four Seasons) describes various health measures during the four seasons in 1338 lines of poetry.
- *An-Nabḍ* (*The Pulse*) consists of nine chapters written in Persian about various topics related to blood vessels.

Students of Avicenna

Ibn Sinā trained knowledgeable and capable students such as Abu Uʿbaid Jawzjāni, Abul Ḥasan Bahmanyār, Abu Manṣour bin Zailah Iṣfahāni, and Abu Aʿbdullah Muhammad bin Ahmad al-Maʿṣoumi, the most prominent of whom are listed below (Moṭṭahari, 2020):

1. Abul Ḥasan Bahmanyār bin Marzbān is a very famous student of Ibn Sinā who, among other works, wrote the book of *at-Taḥṣil* (*The Obtain*). He was descended from Zoroastrians of Azerbaijan, but later he became a Muslim. One of Ibn Sinā's books called *al-Mabāḥeth* (*The Topics*) contains the master's answers to his questions.

2. Abu Uʿbaidullah Aʿbdulwāḥid bin Muhammad Jawzjāni was in his service continuously from AD 1013 until the death of Ibn Sinā, and after his death he collected and compiled his works. During Avicenna's ministry in the service of Shams ad-Dawlah, he asked Bu Ali to explain Aristotle's books. Jawzjāni has added the mathematics part of *an-Naajāt* and the mathematics and music parts of *Dāneshnāmeh-e-Aʿlāii* in his own style. His death has been considered 10 years after the death of Ibn Sinā in AD 1047.

3. Abu Aʿbdullah Muhammad bin Ahmad al-Maʿṣoumi is another famous student of Ibn Sinā, who wrote *Risālah al-Eʿshq* (*A Treatise on Love*) in his name. When the scientific dispute between Avicenna and Abu Riḥān Biruni was interrupted due to some of Abu Riḥān's words, al-Maʿṣoumi took over the continuation of the debate with Abu Riḥān. Al-Maʿṣoumi's material along with Ibn Sinā's answers and Biruni's questions and answers have been published in the book of *al-Asalah wa al-Ajwabah* (*Questions and Answers*) in Iran and Lebanon.

4. Sheikh Ali Nasāi Khorasāni is another student of Ibn Sinā whom Nāṣer Khosrow mentions in his travelogue.

5. Abu Manṣour Ḥussein bin Ṭahir bin Zailah Iṣfahāni was one of the Persian scholars of the 10th and 11th centuries and one of Ibn Sinā's students. According to the knowledge of his time, he was particularly skilled in mathematics. He died in AD 1049.

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Note

[1] In the following text, the year numbers mostly based on the Islamic calendar (anno Hegirae, AH) have been converted to the Gregorian calendar (anno domini, AD) for consistency.

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