

MUSLIMS' CONTRIBUTIONS TO THE FIELD OF BOTANY

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Abstract: Botany is the branch of knowledge that deals with plants. Plants have nutritional and medicinal importance. Medieval period is the golden age of Muslims in all branches of knowledge, culture, and civilization. They planted the famous gardens of Persia, Spain, and Morocco with well-planned arrangements of trees, shrubs and flowers which throw light on their interest in agriculture, gardening, and love for flowers. The writings of the Muslims on the subject of botany initially depended upon the Greek, Persian and Nabatean sources. Beginning with the translations of these sources, they produced original manuscripts and raised this discipline to the zenith of glory at that time. Many works of Muslim botanists and agronomists later became a source of knowledge for the Western botanists. This research paper throws light on the contributions of such botanists of the medieval period.

Key Words: *Al-Nabāt*, *al-Adwiyah al-Mufradah*, botanist, Ibn al-Bayṭār.

The medieval period marks the time of glory of the Muslim traditions. They became ardent lovers of knowledge and acquired it from every nook and corner of the world. They summed up the scattered knowledge and made significant additions and huge advancement in it. Science and technology had been an area of their keen interest. They bestowed the mankind with wonderful inventions and remarkable discoveries and produced classical treatises about medicine, surgery, physics, chemistry, astronomy, geometry, mathematics, and many other scientific disciplines. The field of botany is one of these disciplines that can proudly name a number of Muslims who opened new vistas in this knowledge.

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Muslims have done the botanical work in different capacities. Taufic Fahd has divided the Muslims' botanical work into four categories, namely, the lexicographic sources, the agronomical sources, the botanical and pharmacological sources, and lastly, the geographical sources.

The discipline-wise division of Taufic Fahd is helpful in systematically arranging all the work and it also makes it easy to memorize the entries of the contributors that fall under each discipline. Nevertheless, it lacks the chronological sequence and makes it difficult to get an analysis based on time-to-time advancements made in the field of botany by the Muslim botanists. Furthermore, he gives a succinct account of the sources. In this paper, the entries of the scientists have been set in chronological sequence and the botanists' account has been elaborated as follows:

1. Al-Aṣma'ī (d.216/831)

Abū Sa'īd 'Abd al-Mālik b. Qurayb al-Aṣma'ī, born and died in Baṣrah (Iraq), was a noted scholar in science, poetry and geography. He is known as Al- Aṣma'ī which has been attributed to the name of his grandfather, Aṣma'.¹

He authored a number of books. One of his books is "*Kitāb al-Nabāt wa'l-Shajar (Book of Plants and Trees)*" in which he has given the names of 276 plants of which many are collective designations, such as *rabl* (plants which get green again at the end of Autumn without rain, following cold nights), *ribba* (trees constantly green like the carob tree). He has divided the vegetables in *abrar*, *dhukur*, and *hamd* (salsigienus and bitter plants), *'idah*. He has named the plants which grow in different regions of Arabia (the Hijaz, the Najad, the Sarat, the deserts).²

2. Al-Dīnawarī (d.282/895)

Abū Ḥanīfah Aḥmad b. Dā'ūd al-Dīnawarī was an astronomer, a botanist, and historian. One of the most famous early Muslim works on botany *Kitāb al-Nabāt (Book of Plants)* was authored by him. It includes oral and written Arabic botanical traditions as well as much of the Persian material.³

Abū Ḥanīfah al-Dīnawarī can rightly be called "*the Founder of the Arabic Botany*". The work of this great botanist was made public by Silberberg's thesis on his work defended in Breslau in 1908.⁴ Although the book *Kitāb al-Nabāt* has been lost, but many extracts of it are frequently

known through citations by later authors, chiefly Ibn Sīda, Ibn al-‘Awwām, and Ibn al-Bayṭār. According to some authors, the book included 300 to 400 descriptions of plants.⁵

According to ‘Abd al-Qādir Baghdādī, the *Kitāb al-Nabāt* of al-Dīnawarī comprised six big volumes, of which only the third and the fifth have reached us. Muḥammad Hamīdullāh reconstructed the sixth volume from citations he picked up in the big dictionaries and in numerous monographs. According to him, the treatise comprised essentially of two parts: the first dedicated to botany and occupying four and a quarter volumes, and the second part consisting of an alphabetical dictionary briefly describing plants in one and three-quarter volumes.⁶

3. Aḥmad b. Abī al-Ash‘ath (d.365/975)

Abū Ja‘far, Aḥmad b. Muḥammad. b. Abī al-Ash‘ath, was a Persian by birth, but stayed in Muṣal. He was endowed with sound judgment and a love of doing good deeds. Always earnest and serious, he studied theology diligently. He was an authority on the philosophical sciences and wrote many works in this field which testify to his extensive knowledge. He penned “*Kitāb al-Adwiyah al-Mufradah (Book on Simple Drugs)*” in three parts. He wrote it at the request of some of his pupils as Ahmad b. Muḥammad al-Baladī and Muḥammad b. Thawwāb.⁷ Dā‘ūd al-Anṭākī has also made reference to this book.⁸

4. Ibn Miskawayh (d.421/1030)

Abū ‘Alī Aḥmad b. Muḥammad b. Ya‘qūb b. Miskawayh was a Zoroastrian by birth who later embraced Islam. Hailed from Rayy, he settled in Iṣfahān and died there. He shines as one of the notables in the history of Arab natural sciences for his works “*Al-Fawz al-Aṣghar (Lesser Victory)*” and “*Tabdhīb al-Akhlāq (Refinement of Morals)*”. He laid down the principles on which the plant kingdom is classified. He is also the first one who told the scientific principles which govern the laws of the growth and development of plants. He authored a book entitled “*Kitāb al-Adwiyah al-Mufradah (Book of Simple Drugs)*.”⁹

5. Ibn Sīnā (d.428/1037)

Abī ‘Alī Husayn b. ‘Abd Allāh b. Ibn Sīnā known in the west as “Avicenna” was a physician and philosopher, and one of the renowned

intellectual figures of the Middle Ages. His two most influential books are “*Al-Qānūn fi’l-Ṭibb*” (The Canon of Medicine) and “*Kitāb al-Shifā*” (The Book of Healing).¹⁰ In both books he has discussed plants also.

In *Al-Qānūn fi’l-Ṭibb*, for instance, he has mentioned some medicinal plants that are effective in the management of stroke. These include *zanjebeel* (ginger), *gharanfol* (clove), *zanbagh* (lilly), *vard-e-abmar* (damask rose), *jowsheer* (prangos), *jows-e-booya* (nutmeg), *otroj* (citron), *selgh* (beet), *felfel-e-siah* (black pepper), *dar felfel* (long pepper) etc.¹¹

In the seventh section of *Kitāb al-Shifā* he has elaborated on the physiology of plants. He has discussed the constitution of plants, their organs, their nourishment, the differences between them, the functions of the roots, branches, leaves, fruits, seeds, thorns, etc. He has also discussed wild and domestic plants.¹²

6. Ibn Wāfid (d. 467/1075)

Abū al-Muṭarrif ‘Abd al-Raḥmān b. Muḥammad b. ‘Abd al-Kabīr al-Lakhmī, known as Ibn Wāfid, was from one of the noblest and most ancient families in Andalusia.¹³

Ibn Wāfid specialized in the field of simple drugs. He composed a remarkably well ordered book *Kitāb fi ’l-Adwiyah al-Mufradah* (Book of Simple Drugs) on this subject in which he compiled the relevant information compiled by Dioscorides and Galen. It had taken him about twenty years to collect the material and put it in order, to verify the names and qualities of the medicinal plants and herbs, including details of their powers and strength.¹⁴ The book covers about 300 plants.¹⁵ The medicinal plant purslane has been mentioned by Ibn Wāfid under the name *baqla hamqa* and *missita*.¹⁶ The book was abridged and translated into Latin by Gerard of Cremona. Translations into Catalan and Hebrew are also extant.¹⁷

He also authored a pharmacopeia and manual of therapeutics in which he described compound medicines entitled *Kitāb al-Wisād fi ’l-Ṭibb* (*Book of the Pillow of Medicine*). Juan Vernet opines that this could be a misreading of the Arabic title *Kitāb al-Rashshād fi ’l-Ṭibb* (*Guide to medicine*).¹⁸

7. Ibn Bājjah (d. 533/1138)

Abū Bakr Muḥammad b. Yaḥyā b. al-Ṣā'igh, known as Ibn Bājjah, was from Andalusia. Known in the West as Avempace, he was born in Zaragoza. Ibn Bājjah died in his youth in the town of Fez and was buried there.¹⁹

On the subject of botany, he wrote "*Al-Kalām fi 'l-Nabāt*" (*The Discourse on Plants*) which is a short commentary on *Liber de plantis*, attributed to Aristotle, but actually written by Nicolaus Damascenus. In this book, he has studied the characteristics common to all plants and their differences. Based on these characteristics, he has classified the plants and the genera and species thus defined are explained with the help of examples. He has also discussed the existence of gender in plants and observed that the palm tree had male and female flowers. He has also cited the example of fig tree in this regard and acknowledged a sort of sexual reproduction.²⁰

He has also written a pharmacological work in which he has discussed plants from the point of view of their medical importance entitled "*Kitāb al-Tajribatayn 'alā Adwiyah Ibn Wāfid*" (Book of Experiences on Drugs of Ibn Wafid). This treatise has been the object of partial reconstruction on the basis of quotations found in the work of later pharmacologist and botanist Ibn al-Baytar (d.1248).²¹

8. Al-Idrīsī (d. 560/1165)

Abū 'Abd Allāh Muḥammad b. Muḥammad b. 'Abd Allāh b. Idrīsī al-Ḥasanī al-Ṭālibī, commonly known as *al-Sharīf al-Idrīsī*, was a famous geographer. Born and died in Ceuta, he got early education in Cordoba and travelled great distances until he reached Sicilia.²²

He was an eminent scholar who knew the benefits of simple drugs and their benefits. One of his books is "*Kitāb al-Adwiyah al-Mufradah (Book of Simple Drugs)*".²³

He penned another book entitled "*Kitāb al-Jāmi' li Ṣiffāt Ashtāt al-Nabāt (Comprehensive Book on the Qualities of Various Plants)*" having description of various useful drugs relating to trees, fruits, roots, flowers and minerals. The names of drugs have been arranged in alphabetical order, and their Arabic, Persian, Greek, Syriac, Latin and Berban names have been described.²⁴ The author excelled in the knowledge of the fauna and flora of the land he had visited, and was acquainted with technical botanical terms.²⁵

9. Al-Ghāfiqī (d. after 560/1165)

Abū Ja‘far Aḥmad b. Muḥammad b. Aḥmad b Sayyid al-Ghāfiqī, an illustrious scholar and a distinguished botanist, had a great knowledge of properties, uses and names of simple drugs. He was counted among the notables of Spain. He wrote the book “*Al-Adwiyah al-Mufradah (Simple Drugs)*” which had no match in quality and no parallel in meaning. His book on simple drugs summed up writings of all learned scholars of the Greek particularly Dioscorides and Galen. Thus, he summarized all that had been stated by the savants on this subject, until it became an encyclopaedia to which one could turn whenever one needed verification.²⁶

George Sarton opined that the description of plants by al-Ghāfiqī was the most precise ever made in Islam. His works contain information on yellow amber and sal ammoniac. He has given the names of each plant in Arabic, Latin, and Berber. Two abridgments of his book were made: the one by Aḥmad b. ‘Alī al-Jumhūrī and the other by Abū al-Faraj (Barhebraeus).²⁷

Ibn Bayṭār used to take al-Ghāfiqī’s book with him whenever he set out for a voyage. He has frequently quoted al-Ghāfiqī in his book, so much so that Meyerhof has stated that Ibn Bayṭār’s pharmacology is nothing more than al-Ghāfiqī’s book with some enlargements and commentaries.²⁸

10. Muwaffaq al-Dīn al-Baghdādī (d.629/1231)

Muwaffaq al-Dīn Abū Muḥammad ‘Abd al-Laṭīf b. Abī Sa‘d, known as *Ibn al-Labbād*, who hailed from Muṣal, but was born in Baghdad. He became renowned for his knowledge of various sciences and his scholarship.²⁹

His books on phytology are abridgements of other books like “*Ikhtišār Kitāb al-Adwiyah al-Mufradah of Ibn Wāfid*”, “*Ikhtišār Kitāb al-Adwiyah al-Mufradah of Ibn Saḥnūn*”, “*Ikhtišār Kitāb al-Nabāt of Abū Ḥanīfah al-Dīnawarī*.”.³⁰

One of his books is “*Kitāb al-Ifādah wa’l-I’tibār fī ’l-Umūr wa ’l-Mushāhadah wa ’l-Aḥwāl al-Mu‘āyanah fī Arḍ Miṣr (Book of Information and Consideration, on Things Seen and Events Witnessed in the Land of Egypt)*.” In the book, he mentioned many plants which he saw and showed versatility in making comparisons of plants and drawing conclusions of his research.³¹ The text of the book is divided into nine chapters dealing respectively with generalities, plants, animals, ancient monuments, buildings and ships, cookery, the Nile, and the events of the year 597 and 598.³²

11. Ibn al-Rūmiyah (d.637/1239)

Abū'l-‘Abbās Aḥmad b. Muḥammad b. Mufarraj b. Abī 'l-Khatīb, often called *al-Nabātī* and also known by the name *Ibn al-Rūmiyah*, a native of Seville, was noted for his knowledge of two disciplines: *ḥadīth* and plants. He moved to the east and lived for two years in Egypt, Syria and Iraq. There he learned *ḥadīth* and also observed many plants, not found in his native land. He rose to high level in both disciplines and wrote books on them.³³

He had a profound knowledge of botany and drugs, their power, uses, qualities and places of occurrence. His books on botany include “*Tafsīr Asmā' al-Adwiyah al-Mufradah (A Commentary on the Names of Simple Drugs Mentioned in Dioscorides' Book)*”, “*Maqalah fī Tarkīb al-Adwiyah (A Treatise on the Composition of Drugs)*.”³⁴

He also wrote an account of his journey entitled *Kitāb al-Riḥla* which dealt primarily with his observations of plants, many of which were new, e.g., those growing along the shores of the Red Sea. Ibn Bayṭār was his disciple and frequently quoted him.³⁵

12. Al-Ṣūrī (d. 639/1241)

Rashīd al-Dīn Abū 'l-Manṣūr b. Abū 'l-Faḍl b. 'Alī al-Ṣūrī, a great authority on simple drugs, the variety of their names, their properties and uses, was born in 573/1177 in Ṣūr, a city in Syria, and grew up there. Later, he moved from there and studied medicine from Shaykh Muwaffaq al-Dīn b. 'Abd 'l 'Azīz and Shaykh Muwaffaq al-Dīn 'Abd al-Laṭīf al-Baghdādī. He died in 639/1241 in Damascus.³⁶

He authored the book “*Kitāb al-Adwiyāh al-Mufradah (Book of Simple Drugs)*” which he started writing in the days of al-Malik al-Mu‘azzam. In the book, he gave a full account of all simple drugs, including some which he himself had discovered and tried out and which had not been mentioned by his predecessors. He kept with him a painter, who had at his disposal all kinds and shades of colour. He used to visit places which had plants, each of which was distinguished by a specific flora. After inspecting the plants, he showed them to the painter who after contemplating their colour and examining their leaves, branches and roots reproduced their likeness accordingly.³⁷

Moreover, Rashīd al-Dīn employed a very useful method of representing plants. He showed them to the painter in three stages: sprouting and tender; full-grown and seeding; and withering and drying up. The artist then painted them at these stages, and so the user of the book, seeing them in all the conditions in which he was liable to encounter them in nature, was in a position to obtain more perfect knowledge and clearer notions.³⁸

Sarton held the view that the earliest illustrations of plants in Arabic literature were made by al-Ṣūrī. He was a distinguished botanist, and was familiar with the writings of Dioscorides, Galen, and al-Ghāfiqī, but Ibn Bayṭār does not mention him.³⁹

13. Ibn al-Bayṭār (d.646/1248)

Ḍiyā' al-Dīn Abū Muḥammad 'Abd Allāh b. Aḥmad al-Māliqī al-Nabātī, known by the name Ibn al-Bayṭār, was the greatest expert of his time in identifying the plants and shrubs. He was born in or near Malaga towards the end of the twelfth century, and died in Damascus in 1248. He travelled Asia Minor to make observations of plants and to meet botanists. He was considered to be an authority on simple drugs and shrubs.⁴⁰

He learned the book of Dioscorides to the level that there was no parallel to him. He had wisdom, acuteness, and comprehension of the matters of plants. He was so intelligent that he could mention the name of the book of Galen or Dioscorides from which he used to tell about the plant or shrub and could even tell its place in the list of simple medicines.⁴¹

He wrote many books on simple drugs and other subjects. One of them is "*Kitāb al-Jāmi' fi 'l-Adwiyah al-Mufradah (A Compendium of Simple Drugs)*". This book shows the influence of Greek and Muslim scholars and his personal experiences made in various lands. The author has given the names of medicinal plants and herbs in various languages in alphabetical order. Clearing the confusions in the names, he has also narrated their properties.⁴² This is the most complete treatise on applied botany produced in the Middle Ages. It contains information from more than 150 sources and listed more than two thousand simples in alphabetical order.⁴³

The work remained untranslated until the nineteenth century. Andrea Alpago (second half of the fifteenth century) made use of it for enriching his glossary of Ibn Sīnā's *al-Qānūn*. The first western orientalist to

pay attention to Ibn al-Baytār was Guillaume Postel (1510-1581). He was followed by other orientalist. The first complete translation in any western language came in 1842.⁴⁴

He had also written the book "*Kitāb al-Mughnī fī 'l Adwiyah al-Mufradah (A Complete Book on Simple Drugs)*".⁴⁵ Hājī Khalīfah titles his book as *Jāmi' al-Adwiyah wa 'l Aghdhiyah al-Mufradah*.⁴⁶ It deals with the same simples and vegetables which are arranged therapeutically rather than alphabetically. Its main focus is on materia medica instead of natural history.⁴⁷

14. Al-Anṭākī (d.1008/1600)

Dā'ūd b. 'Umar al-Nāṣīr al-Anṭākī, a distinguished physician and a literary notable of his time, was blind from birth. Born in Antioch, he memorized the Quran, studied logic, mathematics, physics, and the Greek. A year before his death he went to Makkah where he died.⁴⁸

Nearly thirty treatises on medical and philosophical topics written by him are extant, most in manuscript. He is known as an authoritative physician due to his comprehensive medical book entitled "*Tadhkirah Ulī al-Bāb wa 'l-Jāmi' lil 'Ajab al-'Ujāb (Remembrance of the Prudents and Collector of the Wonder of Wonders)*" which is also known as "*Tadhkirah Dā'ūd*".⁴⁹ He has divided the book into an introduction, four chapters and a conclusion. He has cited in the book several hundred names of plants, animals, drugs and metals. He has given characteristics of a large number of plants, their English names, and methods of preparation of drugs and ointments.⁵⁰

Conclusion:

The above mentioned are the names and contributions of only a few Muslim botanists although the list of contributors is obviously long. From all this, it may be inferred that the interest of Muslim scientists was present in pure botany. The vastness of botanical subjects which is known today was lacking as much advancement has now occurred in this field. The geographers gathered information about the plants which they met in the areas under study. Their work provides the geographical distribution of plants which is a field of biological knowledge. The medical practitioners collected the plants used in pharmacy. Their work contains the medicinal worth of these plants which is also a field of botanical sciences.

Muslims not only studied the medicinal properties of the plants but also paid attention to the plants' habitat, their stages of growth, the colour of their body parts i.e. leaves, flowers and stems. They also studied the land conditions suitable for plant growth and accounted them in their monographs. The greatest service they rendered was to preserve and translate the Greek knowledge. It is through their work that the world is aware of the Greek heritage. Muslims took into consideration the plant knowledge pertinent to most branches of botany and the ultimate goal of their botanic knowledge was the benefit of mankind which had been a chief characteristic of their work.

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