

Uses of and Considerations on Algae in Medieval Islamic Geography

Mustafa Yavuz

Abstract

Recent studies in the History of Botany put forth that the books translated to and authored in Arabic have circulated from the East of the Caspian Sea, to the centre of Iberian Peninsula, strengthening the 'traditional uses' of plants and alike. An ancient genre of writing called the 'book on the Materia medica' was especially the most favourite in Medieval Islamic Geography. In these books, algae have been mentioned among the kinds of medicinal plants. In this study, I investigate several Materia medica books among which I shall first focus on Avicenna's *Canon of Medicine*, then have a look at Aliboron's *Book of Pharmacy* since these two were contemporary sources from the 11th century. I shall also investigate two illustrated sources, an Arabic copy of Dioscorides' *Materia Medica* and al-Ghafiqi's *Book on Simple Drugs*, both from the 13th century. In doing so, on the one hand, I will be able to compare the drawings of algae, and on the other I will shed light on the transfer of knowledge on algae. These two methods will result in the *textual apparatus* and the *illustrative apparatus* in my study.

Keywords

algae – mosses – medicinal manuscripts – history of medicine – history of botany – history of pharmacy

1 Introduction

Until the discovery of 'inferior' organisms, in the classical meaning there were two kingdoms of taxonomy: *the plants* and *the animals*. In this division, plants were always primitive compared to animals. According to the Pseudo-Aristotelian *De Plantis*, the difference between animals and plants was the manifestation of vitality (being alive). Therefore, plants were regarded to

be occult or not evident when it comes to the vitality compared to animals.¹ De plantis was regarded as the bible of plant-science and therefore translated to Arabic in the ninth century (Yavuz and Herraiz Oliva, 2020). Understandably, for many centuries during the Medieval, plants had been considered as the key organisms referring to the difference in the vitality between living and non-living things. Therefore, the Great Chain of Being was sequenced as minerals, plants, and animals etc. Similar to many other creatures that are neither animals, nor minerals, *algae* were considered as a part of the plant phenomena. What was the position of algae in the diversity of minerals, plants, animals, humans, angels etc. as viewed by medieval scholars? In other words, what kind of role were algae playing for a medieval natural philosopher, for a physician, or for a polymath?

The aim of this study is an investigation on Arabic medicinal sources authored by Medieval Scholars, in order to describe and understand how they received information on algae from the ancient lore and how much they transmitted to us. Regarding this aim, the structure of this study will be as follows. Section 2 introduces the types of books that deal with the *Plant Phenomena in Medieval Islamic Geography*. Considerably, algae are mentioned among the Simple Drugs since they were very similar to plants rather than animals or minerals. In fact, as we understand from *Materia medica* books from the antiquity and the Medieval, any living being, or any part of living beings may be regarded as a source of medicine. In Section 3, I offer a brief comparison of non-illustrated manuscripts namely *Works of Ibn Sina and al-Biruni*. First focusing on Ibn Sina's (Avicenna) *Canon of Medicine*, it being the prestigious book of medieval medicine in the East and in the West. Then I will look at al-Biruni's (Aliboron) *Book of Pharmacy*. These two books were contemporary sources from the 11th century. In Section 4, I will examine the two illustrated sources, an Arabic copy of Dioscorides' *Materia medica* and al-Ghafiqi's *Book on Simple Drugs*, both from the 13th century. In doing so, on the one hand, I will be able to compare the drawings of *Algae in the Illustrated Manuscripts*, and on the other hand, I will shed light on the transfer of knowledge on the algal phenomena. Finally, I will try to identify any algal genera or species if this is possible. Sections 3 and 4 are aligned in a chronological order to avoid anachronism. These sections provide the informative basis for discussion in Section 5 where I evaluate what is original or transmitted regarding our findings on the

1 In the famous piece of Ps.Aristotelian corpus De Plantis, Nicholas of Damascus says: "Vita in animalibus et plantis inventa est, in animalibus manifesta apparens, in plantis vero occulta, non evidens" (Meyer, 1841, 5).

uses of algae in eleventh and thirteenth century pharmaco-medicine in the Islamic civilization.

I assume that all these sections which provide a great deal information from Medieval Islamic Pharmaco-Medicine often with references to the antiquity, will provide epistemological and ontological basis on which we may question our knowledge of and in relation to the algae, in the contemporary world.

2 Plant Phenomena in Medieval Islamic Geography

Recent studies in the history of botany put forth that the ancient Greek studies on plants have been revived in Arabic, through a transfer or a transform of knowledge. Consequently, from agricultural studies to the philosophical ones, there were discussions on the plant phenomena here and there, which yielded the formation of (علم النبات / *Ilm al-Nabat*) *the Plant Science*.² The books translated to and authored in Arabic have circulated from the East of the Caspian Sea to the centre of Iberian Peninsula, strengthening the 'traditional uses of' and 'knowledge of' plants and alike.

As discussed by Yavuz & Herraiz Oliva (2020), we can group medieval plant studies under four (or more) categories, all of which have their roots in the antiquity. Among these, the first genre *Kitab al-Filaha / Book of Agriculture* focused on the plantation, growth and harvesting of plant products, and in doing so; preserved, provided, and distributed the knowledge for the nutritional needs of humankind. The second genre named *Kitab al-Nabat / Book of Plants* did the same for the general investigation of plant phenomena and their dissimilarity from the animals by discussing different plant parts and habitats of plants, thus satisfying the philosophical needs of intellectuals. The third genre consisted in books on occult sciences, which were never studied in traditional Islamic Medieval education system. The fourth genre, *Kitab al-Adwiyat al-Mufradah / Book of Materia medica* provided knowledge on medicinal plants which corresponded to a guidebook for pharmacists and herbalists. This ancient genre of books was especially the most favourite one in the Medieval

2 It should be noted for the general audience that, here the correct word is knowledge instead of science. However, for practical purposes, refraining the anachronism, I prefer to use "science" through this chapter.

Islamic Geography.³ In these books, we see that algae have been mentioned among the kinds of medicinal plants.

When we examine Arabic lexicons and dictionaries for an equivalent of algae, we find the term طحلب *tuhlub* (طحالب *tahaleb* in plural). This word was used by authors of Medieval Islamic Geography in order to denote *water-moss*, *seaweed*, and even some kinds of aquatic plants. It is possible in some cases to identify a genus or species of algal phenomena with an investigation of Arabic sources of Islamic Medieval based on two different apparatuses. The first is the *textual apparatus* which is mostly an investigation and a comparison of Arabic texts. As mentioned below, in this study the text from four different books will be examined. Probably, these texts will have parallel approaches especially when they refer to the ancient Greek or Roman authors. The *illustrative apparatus* is the analysis and comparison of botanical illustrations if any. Since it has been harder to draw a botanical element exactly as it is, rather than to describe it by words, the precise copy of such a manuscript cost a lot moreover, most books from medieval ages lack illustrations.

3 Works of Ibn Sina and al-Biruni

3.1 *Ibn Sina*

He is known shortly as *Avicenna* by Christians and Jews, and *Ibn Sina* by Muslims. To mention his full name, Abu Ali al-Husayn ibn Abd Allah ibn al-Hasan ibn Ali ibn Sina (980–1037), we should also add that he had a reputation as ‘Prince of Physicians’, since he was one of the most famous physicians and philosophers in Medieval Islamdom. The most important work that Ibn Sina authored in the field of medicine is undoubtedly his encyclopaedic book called *al-Qanun fi al-Tibb* (*Canon of Medicine*).

Written in Arabic, the lingua franca of the Islamic geography, this work was the standard medical textbook used and commented on, for many centuries in Islamdom. It was translated into Latin, the common language of the Christian geography in the early periods. Thus, it was accepted as a major source among physicians until the eighteenth century (McGinnis 2010, p. 251). The *Canon of Medicine* consists of five books with the following content: *Kulliyat* (*Principles*) is the general discussion of the scientific and philosophical foundations of

3 I prefer to use Islamic Geography; however, it is possible to use Islamdom as well. This is to mention that in a certain territory, the rulers or the governing characters were Muslim, there were many religious groups like Muslims, Christians, Jews, Sabaens, Nabatans, Zoroastrians etc. involved in the intellectual and medicinal studies.

medicine and anatomy. *Mufradat* (*Simple drugs*) focuses on approximately 800 herbal, animal and mineral substances used as independent medicine, namely *materia medica*. *Mualajat* (*Pathology*) which mentions the specific or localized ailments for various diseases. *Hummiyat* (*Fevers*) deals with more general diseases, such as fever, that affect the whole body. Finally, *Murakkabat* (*Compound drugs*) is about pharmacology, drugs, and consists of medical prescriptions. In his *Canon of Medicine*, Ibn Sina created a system of medicine based on the three pillars: *Natural Philosophy* from Aristotelian, knowledge of practical and theoretical medicine from Galenic, and finally pharmaco-botanical knowledge from Dioscoridean traditions. In his synthesis of medicine, nevertheless, Ibn Sina consulted opera of many other physicians and cited by name including (but far from being limited to) *Hippocrates*, *Abu Bakr al-Razi* (Rhazes in Medieval Latin), and *Ali ibn Abbas al-Majusi* (Haly Abbas in Medieval Latin).

al-Qanun fi al-Tibb already had a great number of circulating handwritten copies in Islamic geography, until it was printed for the first time in Rome, in the sixteenth century. From the time of Pope Gregory XIII, press permission for the printing of any book was given by the highest political authority in the country (Witcombe 2004, pp. 73–74). As can be seen from the phrase *cum licentia superiorum* on the front cover, the necessary permission and support for the printing of this important work was provided by the Papal Authority (Figure 7.1). Even in 1772, there were still more than eight hundred copies of *al-Qanun* in the warehouses of the Medici Printing House (Toomer 1996, pp. 20–25). This number may be an indication of how many copies of the work that had been produced, if it was not a commercial mistake. In the sixteenth century, the preparation for Arabic-print-edition of *al-Qanun*, required both a text review and some technical skills accompanied by certain equipment. Among the names who were involved in this process, the *al-Qanun Printing Project*, we should first mention *Giovanni Battista Raimondi* (1536–1614) as the manager of the printing house and especially the head of the project. *Robert Granjon* was the person who prepared the Arabic fonts.

The typography preparation of a work to be printed in the Arabic alphabet is more difficult compared to that in Latin, since most letters of the Arabic script require separate types for their initial, middle, trailing and independent positions. This *al-Qanun Printing Project* was initiated in 1584 by *Cardinal Ferdinand de Medici*, under the auspices of *Pope Gregory XIII*. After nine years of preparation and five successive popes, the publication of the work was completed during the reign of *Pope Clemens VII* (Siraisi 1987, pp. 148–150). The project was led by Raimondi; however, *Giovan Battista Lucchese* and *Paolo Orsini of Constantinople* were in the team as well. In addition, Patriarch

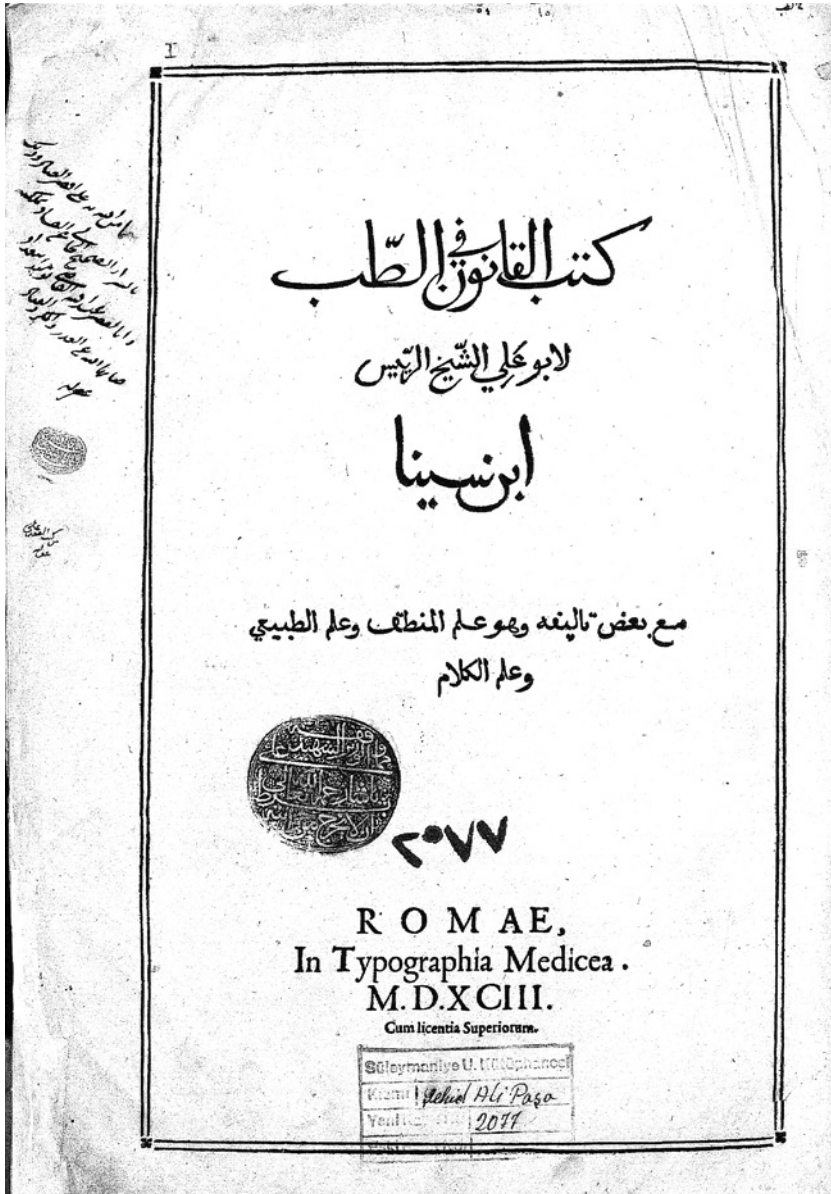


FIGURE 7.1 Front cover of 1593 Rome Edition (Süleymaniye Library, Şehid Ali Paşa 2077)

*Ignatius Ni'matallah Asfar Mardini*⁴ provided the core manuscripts and was present in the proofreading and translation (Casari 2016, Vol. 86, pp. 221–224).

Tuhlub, the seaweed or alga is mentioned in *الكتاب الثاني the second book, حرف الطاء* *second part, on the materia medica*, in *بيان الأدوية المفردة* under the drugs starting with the letter *Ta*. In this study, the Arabic texts I have included below are derived from the Rome edition (1593, p. 183). I have also compared the text from the relevant chapter of al-Dinnawi (1999, p. 501). Then explanations and corrections in the footnotes had been added wherever it was necessary. The differences from 1593 edition are given in footnotes with an indication of letter D. The English translation is mine otherwise noted, I have included some words in brackets (), to support the meaning.

English Translation:

Tuhlub

Quiddity: The riverine (variety is of) water and earth (element type). The marine (variety) is very astringent. And the rock-moss which is *Hazaz al-Sakhr* (tetter of rocks), we have mentioned (it above).

Nature: (It is) cold.

Properties: It is styptic for blood (or bleeding) in any place it is painted. Marine (variety) is most severe (in this respect).

Arabic Text:

طحلب ٣٠٠ II

الماهية:⁵ النهري مائي أرضي، والبحري أشد قبضة. وأما طحلب الصخر وهو حرار الصخر⁶ وقد ذكرناه.

الطبع: بارد.

الخواص: حابس للدم في كل موضع طلاء، والبحري أشد.

4 Mar Ignatius Nemet Aloho I (Mardin, ca. 1515 – Bracciano, 1587), was the Syro-Orthodox Patriarch of Antioch (modern Antakya, Turkey) between 1557–1576. Settled in Rome in 1577, he personally delivered the manuscripts of *al-Qanun fi al-Tibb* to Cardinal Ferdinand (Ferdinando I de Medici, Grand Duke of Tuscany). *Ni'matallah* played a key role in the connection between Rome and the Levant in the sixteenth century onwards. He was a physician, astronomer, and theologian; thus, he engaged in the calendar reform promoted by Pope Gregory XIII, the establishment of a printing press in Arabic and Chaldean, and he worked to unite the Syrian Orthodox and Roman Churches. More information on his life and works are available at Toomer (2016, pp. 20–25); Borbone & Farina (2014) and Casari (2017) studies; moreover, the involvement of *Typographia Medicea* in the Renaissance – Levant connection, there is an outstanding work authored by Farina & Fani. (2016).

5 D: *الماهية: معروف، و* Quiddity: (It is) known and.

6 In 1593 Rome edition, this drug is given (in plural form) as *حزار الصخور*. Probably due to a typo error, the name is misgiven. It must be corrected as *حزاز الصخر* (singular) or *حزاز الصخور* (plural). A literal translation of these words means tetter of rock(s), which denotes saxicolous lichens and/or mosses.

Tumours and Blisters: It is applied (in cases of) hot tumours, erysipelas tumours, and eczemas. The lenticular weed, (if used) with fine flour, is similar (in this effect).

Organs of Articulation: (It is also applied) on vehement gout and severe arthralgia. If / when decocted with old olive oil, it softens the nerves.

Excretory Organs: (When) Bandaged with it, the haematocele (or hydrocele) of the intestines is atrophied.

الأورام والبثور: يجعل على الأورام الحارة والحمرة والنملة، وكذلك العدسي من الطحلب مع السويق.

آلات المفاصل: على⁷ النقرس الحار وأوجاع المفاصل الحارة، وإذا أغلي بالزيت العتيق لين العصب.

أعضاء النفض: يضمده به قيلة الأمعاء فيضمدها.

3.2 *Al-Biruni*

He is known as *Aliboron* by Christians and Jews, and *al-Biruni* by Muslims. His full name was Abu al-Rayhan Muhammad ibn Ahmad al-Biruni. He was born in Khwarazm (in Uzbekistan) in 973 and he died in Ghazna (in Afghanistan) ca. 1050 (Kennedy, 1970, pp. 147–158). In fact, al-Biruni was famous for his works on astronomy, mineralogy, and ethnography. However, his final opera was about materia medica. He died soon after completing his *Kitab al-Saydanah fi al-Tibb*, which is “The Book of Pharmacy in Medicine.”

Kitab al-Saydanah is organized in a form which consists of an introduction and five *fasl* (فصل). In the first *fasl*, al-Biruni discusses possible etymological origins of the word *Saydanah* and he explains the reasons to use this word in the title of the book. In the second *fasl* he compares foods, drugs, and poisons, while in the third he discusses the substitution between different kinds of materia medica. The fourth *fasl* is devoted to mention Arabic as a proper language for philosophy and medicine. In the last *fasl*, al-Biruni mentions his sources, namely Dioscorides, Galen, Paul of Aegina, and Oribasius, whose books were available in Arabic. Al-Biruni mentions 890 items of Materia medica in Arabic, Greek, Latin, Syriac, Persian, and Sanskrit. *Kitab al-Saydanah fi al-Tibb* has been studied less than Avicenna's *al-Qanun fi al-Tibb*. Two codices are known to us, the first Bursa⁸ codex consists of 134 folios and the second Baghdad codex⁹ that of 209. An edition and an English translation were produced by

⁷ D: *و على* and on/over.

⁸ Bursa Inebey Manuscript Library, Kurşunlu Collection No: 149.

⁹ Baghdad Iraqi Archaeology Department No: 191.

Hakim Mohammed Said (1973), with the assistance of Rana Ehsan Elahie, Kamal M. Habib and L.A. D'Silva (vol. 1) together with a commentary by Sami Khalaf Hamarneh (vol. 2). This work is well-known as Hamdard edition. The differences of Bursa manuscript from Hamdard edition are given in footnotes with an indication of letter B.

English Translation:

Tuhlub

Dioscorides: "The greenery (vegetation) similar to lentil and lying over the water, is duckweed.¹⁰ *Tuhlub al-Bahri* (seaweed) is the thing which is found on stones and reef that are close to the sea." (It is) thin, similar to hair in thinness, it does not have a stalk. Moisture and dew occur on it. It is said that *Tuhlub al-Barri* is named as *Jamah ghawk*.¹¹

Sanawbari¹³ said about it in "*Nehr Quyaq*":

"Whence the frogs cry: Quyaq! Quyaq! So that we reply, They settle in the residue of summer tuhclub, vestment tunic."

Arabic Text:

662 [85^r] طحلب
ديسقوريدس: اما الخضره الشبيهة بالعدس القائم فوق الماء فهو عدس الماء. واما الطحلب البحري فهو شيء يكون على الحجارة والجرف¹² الذي يقرب من البحر، دقيق شبيه بالشعر في الدقة لا ساق لها، يقع عليه من الندى والطل. ويقال الطحلب البري يسمى جامه غوك.
وقال الصنوبري في نهر قويق.
إذا ما الضفادع ناديته قويق قويق¹⁴ الى أن يجيبا،
فيأوين منه بقايا كسين من طحلب الصيف ثوبا قشيبا.

10 In Arabic Materia medica books, *عدس الماء* (*Adas al-Ma, Water-lentille*) is probably a member of Lemna L. genus, namely common duckweed. Genus Lemna has species that are known as free-floating aquatic plants, but not algae.

11 The phrase: *جامه غوك* means "raiment of the frog".

12 B: الجوف hollow, cave, cavity.

13 His name is Abu Bakr Muhammad ibn Ahmad ibn Husayn al-Dabbi al-Sanawbari. He was born in Antioch about 895 he died in 945. He is often considered as the first Muslim poet of nature, landscapes, trees, gardens, etc. Probably al-Biruni was interested in his opera (Said, 1973).

14 B: writes قويق قويق however, it must be قويق قويق meaning the sound and call of frogs.

Galenos: Bryon thalassion, Tuhlub al-Barri.¹⁵ In another topic, mentions (as) water-lentil and says that it is *tuhlub*. The one that Dioscorides proceeded was the lichen of the rocks.¹⁶ As for *tuhlub* according to the Arabs, it is this (thing) that floats on water.

Dhu al-Rummah¹⁸ said:

“A fountain, environs (of which) covered with *tuhlub*, overflowing, Where the frogs and the fish clamour.”

Ibn Durayd¹⁹ said: When *tuhlub* gets old, it dries then it becomes peat. *Darast al-Sahrat* (is the rock that) becomes green by the accumulation of *Tuhlub*.

جالينوس: برواون ثلاثيون الطحلب البري.¹⁷
وفي موضع آخر ذكر عدس الماء وقال هو
الطحلب. كان الذي يسير اليه ديسقوريدس
هو حزاز الصخور. فأما الطحلب عند العرب
هو هذا الذي يطفو فوق الماء.

وقال ذوالرمة:

عينا مطحلبة الأرجاء طامية،
فيها الضفادع والحيتان تصطخب.

ابن دريد: إذا قدم عهد الطحلب فييس فهو
الخش. ودرست الصخرة اخضرت من
طحلب ركبها.

15 It should be *Tuhlub al-Bahri*, see the footnote 17.

16 In the Arabic texts, حزاز الصخور (*hazaz al-sukhur*, tetter of rocks) or حزاز الصخر (*hazaz al-sakhr*, tetter of rock) denote saxicolous lichens, in allusion to the skin disease called lichen planus today. For further discussions see Yavuz (2018) and Yavuz (2020) studies.

17 Arabic text mentions الطحلب البري (*Tuhlub al-Barri*, Terrestrial *tuhlub*) here, however, it should be الطحلب البحري (*Tuhlub al-Bahri*, Marine *tuhlub*), since Galen mentions θάλασσα, the sea.

18 Dhu al-Rummah, Abu al-Harith Ghaylan ibn Uqbah ibn Rabiah (d. 736), was a famous Bedouin poet. According to Sami Khalaf Hamameh (Said 1973), he often visited spice shops that this explains his knowledge on spices he mentioned in his poems. More information on his poetry and especially his romantic verses has been given by Abbott (1972, pp. 164–202).

19 Ibn Durayd, Abu Bakr Muhammad ibn al-Hasan al-Azdi (d. 933), was one of the most celebrated hexicographers, and grammarians (Said 1973).

Al-Jahiz:²⁰ Dried tuhlob does not ignite by fire, and neither does some wood in Kerman,²¹ and (of this wood) it was a cross on the neck of a monk; the people were fascinated with it and claimed that it was from the wood of the (original) Cross. It (Kerman) was said to be near Khabis.²²

Abu Tammam:²³

“You showed me the skin of water, which

I thought to be lots of tuhlob.”

Tuhlob around the water is green. What I saw on top of the water, have layered like a spider’s web, is *armad* (عرمض). It is said that *awafiq* (عوافق) is the greenery (vegetation) that rises on water, and it is *armad* and *tuhlob*.

Paulos (Aeginata): Tuhlob al-Bahri (seaweed) is found on trees (like) oak, walnut, and male pine from which the tar is derived.²⁶

الجاحظ: الطحلب المجفف لا يحترق بالنار وكذلك عود بكرمان وقد كان منه صليب في عنق راهب يفتن به الناس ويزعم أنه من خشبة الصليب. قيل هو بقرب خبيص.

ابوتمام:

ابدت لي عن جلدة الماء الذي

قد كنت اعده كثير الطحلب

الطحلب ما حول الماء اخضر. والعرمض²⁴ ما رأيته على رأس الماء مثل نسج العنكبوت قد طبقه. قيل العوافق²⁵ انخضرة التي تعلق الماء وهو العرمض والطحلب.

بولس: الطحلب البحري يوجد في شجر البلوط والجوز والصنوبر الذكر الذي منه القطران.

20 Al-Jahiz, Abu Uthman Amr ibn Bahr ibn Mahbub (d. 869), the famous prolific author who studied Aristotelian philosophy and wrote especially on zoological, rhetorical, and sociological topics (Said 1973).

21 Kerman or Kirman (Persian: کرمان) is the capital city of Kerman Province, Iran.

22 Khabis (Persian: خبيص) is a village in of Firuzabad County, Fars Province, Iran.

23 Abu Tammam, Ḥabib ibn Aws al-Tai (d. ca. 850), was an Arab poet and Muslim convert. For more information on his biography, Thatcher (1911, pp. 1–81) should be visited.

24 Persian, a green film, or moss that floats on the surface of stagnant water.

25 This word عوافق may be a broken version of غلفق it may be caused by a copy-error.

26 Paul of Aegina (d. c. 690) a Byzantine Greek physician. His opera is called Ἐπιτομὴς Ἱατρικῆς βιβλία ἑπτὰ, Medical Compendium in Seven Books. In his compendium VII.3.128, we read Bryon thalassion, the algae and Bryon sphlanchnon, the mosses and lichens:

“Bryon thalassion, refrigerat et adstringit inde im positum feruentes phlegmonas iuvat. Bryon sphlanchnon, quod in quercibus et populis albis et piceis inucnitur, distrahendisimul et mollien di habet potestatem mediocriter. Praecipue quod cedris adheret” (Brunfels 1531, p. 14). Regarding this text we can conclude that the Arabic authors have mentioned mosses/lichens instead algae or in other words, Bryon sphlanchnon was referred instead Bryon thalassion as a mistake.

Poem by al-Buhturi:²⁷

“Until the dawn appears from its sides,
Like water shining from behind the tuhlob.”

Abu Hanifah:²⁸ *Armad* and *ghalfaq* are the vegetation that spread over water, if present in the periphery, it is tuhlob.

Al-Mashahir:³¹ *Armad* is thicker than tuhlob.

شعر للبحري:

حتى تبدى الصبح من جنباته،
كالماء يلمع من وراء الطحلب.

ابو حنيفة: [85^v] العرمض²⁹ والغلق³⁰ هو
الاخضر الذي يتغشى الماء وإذا كان في
جوانبه فهو الطحلب.

المشاهير: العرمض ما غلظ من الطحلب.

4 Algae in the Illustrated Manuscripts

This section is divided into two titles. The first is about Dioscoridean tradition which focuses on the Arabic translation of *Materia medica* for the entries of algae, while the second is about the illustrated work of an Andalusian physician: al-Ghafiqi.

4.1 *Dioscoridean Tradition*

Pedanius Dioscorides was born in Anazarba (Adana, Turkey) in the first century. He authored a book called *Περὶ ὕλης ἰατρικῆς* (*Peri Hyles Iatrikes*) which is well known in the Latin language as *De Materia Medica*.³² Based on the previous

27 Al-Buhturi, Abu Ubadah al-Walid ibn Ubayd ibn Qahtan al-Tai (d. 897), a picturesque poet and follower of Abu Tammam (Said 1973).

28 Dinawari, Abu Hanifah Ahmad ibn Dawud ibn Wanand (d. 895), Persian polymath who authored *Kitab al-Nabat*, Book of Plants.

29 B: الغومض.

30 Persian, water-moss.

31 Al-Mashahir is a book, al-Biruni sometimes mentions “author of al Mashahir”, or “compiler of al-Mashahir”, however, at the moment, it is not clear which book is this and who is its author.

32 It was first translated to English by Goodyer (1655), printed by Gunther (1934) and there are many prints and reprints until Osbaldeston's (2000) illustrated translation. However, the recent translation of Beck (2005) also gives the Greek titles which are useful to follow the nomenclature of *materia medica*.

writings, local traditions, and personal experience. Dioscorides compiled his treatise consisting of more than 800 chapters mostly on plants, minerals, and animals (Riddle, 1980; Scarborough, 2012). *De Materia medica* is the result of his extensive journey as a military physician of the Roman army (Riddle 1985, pp. 2–4; Scarborough and Nutton, 1982: pp. 213–217), we can trace his geographical references especially in Asia Minor. It is not necessary to mention his prestigious impact on Medieval Arabic and Renaissance Latin authors who wrote on medicinal plants. Thus, his *De Materia medica* has been the leading figure and the studies on it constructing a tradition in the history of botany and that of pharmacy. The content has been continuously copied, translated, and transmitted from one language to another. Circulation of knowledge on medical substances in and around the Mediterranean basin has been accelerated after Dioscorides. Riddle (1985) has a masterpiece on Dioscorides' biography. However, Touwaide (1999, 2009) has excellent analyses on Dioscorides' *De Materia Medica*, and the Dioscoridean Tradition. Dubler (1991, Vol. 11, pp. 349–350) discusses a brief but informative account of Dioscorides in Islamic Medieval.

De Materia medica consists of five books, divided into different subjects: The first book covers aromatics, oils, ointments, trees, liquors, gums, and fruits. The second, animals, cereals, milk and milk products, herbs, spices, grains, resins, oils, ointments, trees, and fruits. The third, roots, weeds, herbs, juices, seeds. The fourth roots, weeds, and herbs. Finally, the fifth book mentions drinks, vines, wines, and inorganic materials.

In this section of the study, I have examined four manuscripts which are Arabic copies of Dioscorides' *De Materia Medica*, that should be cited as follows: Süleymaniye Library, Ayasofya 3702 and 3703 (will be shortened as A 3702 and A 3703), Bibliotheque National de France, Arabe 2849 (BnF 2849) and finally the British Library, Oriental Manuscripts, Or 3366 (Or 3366). The differences among the codices are given in the footnotes. In the right column, I have added the Arabic text which is derived from the above-mentioned manuscripts. In the middle column, I supply an Arabic-English translation. In the left column, I have added the Greek-English translation of the relevant text by Beck (2005). In doing so, I expect that the reader would find ease in comparing what the Arabic translation says and whether or not the Arabic text follows the original one. Dioscorides' *De Materia medica* has three different entries: φακός ό επί των τελμάτων, βρύον θαλάσσιον, and φῦκος θαλάσσιον.

Beck's Translation:

φρακός ό επί των
τελμάτων

The duckweed, which grows on stagnant waters, is a marsh-plant like the lentil, and since it has a cooling property, it is a suitable plaster by itself as well as with barley groats for every kind of inflammation, for erysipelas, and for gout. It also heals children's hernias.

Arabic-English Translation: Arabic Text:

Faqus

ذکر فاقس

It is Tuhlub. It is found on stagnant waters. It is greenery (vegetation) similar to lentil in its form. It is found in thickets on stagnant water. It is cold. Thus, if / when it is bandaged alone or with fine flour, it is suitable for hot tumours and for gout. If / when it is bandaged for the haematocele (or hydrocele) of the infected intestines of infants, (it is suitable) either adhered or bandaged.

هو الطحلب. الموجود على الماء القائم. وهو الحضرة الشبهة بالعدس في شكلها. الموجودة في الاجام و³³المياه القائمة. وهو بارد. ولذلك إذا يضمده به وحدة او مع السويق وافق الحمرة والأورام الحار والنقرس. إذا ضمده به قيلة الامعاء العارضة للصبيان ألتصقتها³⁴أي أضرها.

Beck's Translation:

βρύον θαλάσσιον

The sea lettuce, it grows on rocks and on shells by the sea. It is lettuce-like, slender, stemless, quite astringent, and effective for

Arabic-English Translation: Arabic Text:

Bruun balasiyus

It is Tuhlub al-Bahri (sea-weed). It is the thin that becomes (groves) on rocks and reefs that are near the sea. It is thin, similar to the thinness of the hair. It does not

ذکر بروون بالاسيوس³⁶ وهو طحلب البحري. هو شي يكون على الحجر³⁷والجرف التي يكون³⁸بالقرب من البحر. وهو دقيق شبيه في دقة بالشعر. وليس له ساق. وهو قائم³⁹

33 BnF 2849: على.

34 BnF 2849: - A 3703: الرقها ascended.

35 BnF 2849: -.

36 A 3703 starts with an epi-title ذكر الطحلب البحري - On Tuhlub al-Bahri. Then the secondary title reads as بروون بالاسيوس -truun balasiyus instead بروون بالاسيوس -bruun balasiyus. This title is a broken version of βρύον θαλάσσιον.

BnF 2849: The title is بروون البحري.

37 BnF 2849: الحجارة.

38 A 3703, BnF 2849: -.

39 BnF 2849: قباض.

inflammations and for gout that need cooling.

have stalk. It is actually very cooler. It heals hot tumours and those that need cooling because of gout.

مبرد⁴⁰ جدا. ويصلح للأورام الحارة وللمحتاج الي التبريد من النقرس.

Beck's Translation:

φύκος θαλάσσιον
Seaweed, there is one kind that is broad, another that is longish and somewhat purple, and another that is curly growing in Crete, near the shore; it is very colourful and not prone to decay. All of them have an astringent property and are good in plasters for gout and for other inflammations. But

Arabic-English Translation:

Fuqus
Fuqus al-Bahri: It is counted in types among which (there is) the one that is broad, the one that is long, and its colour is reddish / purplish, the one that is curly, growing in two places in the island called Qriti.⁴¹ It is very beautiful in colour, and it does not decay. These types all have astringent potency and (they) suit in case if (they) are banded for gout and for similar hot tumours. It

Arabic Text:

ذكر فوقس
فوقس البحري: وهو
عده أصناف منه⁴² ما هو
بالعرض⁴³، ومنه ما هو
بالطول⁴⁴ ولونه الي الحمرة،
ومنه جعد. وينبت عند
الأرضين⁴⁵ في الجزيرة التي
يقال لها⁴⁶ قريطي حسنا
الزهر⁴⁷ جدا وليس يعفن.⁴⁸
وقوة هذه الأصناف كلها
قابضة ويصلح ان⁴⁹ تضمد⁵⁰
بها للنقرس⁵¹ وسائر الأورام

40 BnF 2849: -.

41 Crete, we find that before Dioscorides, Theophrastos mentions Cretan algae in his *Historia Plantarum* 4.6.5. We learn that in Crete, φύκος grows on the rocks near the land and people use the dye obtained from this seaweed to dye wool and clothes. Theophrastos devotes a chole chapter (H.P. 6) to the kinds of aquatic plant phenomena including most algal species and perhaps some lichens of the Mediterranean, which should be investigated in a further study.

42 A 3703, BnF 2849: فنه .

43 BnF 2849: الي العرض .

44 BnF 2849: الي الطول .

45 BnF 2849: الأرض .

46 BnF 2849: - .

47 A 3702, A 3703: لزهر .

48 Both codices A 3702 and A 3703 reads something like “ بعض – some”, however, this word is not meaningful according to the context. Probably, due to a copyist error, it was broken.

49 BnF 2849: -.

50 A 3703: ليضمده . BnF 2849: ليضمده .

51 BnF 2849: النقرس .

they must be used while moist and before they have dried up. Nicander says that the purple is also an antidote for poisonous animals. Some thought that this is the one the women use, that being a tiny root, and which is called similarly seaweed.

is necessary to use these types (while) moist before they dry. *Niqidres*⁵² may claim that the one whose colour is red / purple is suitable for the most harmful of poisonous creatures, and some people think that this class / type is the one used by women, rather, it is a small root / origin that associates these types by name only.

الحارة. وينبغي ان يستعمل
هذه الأصناف وهي رطبة
قبل ان يجف.
وقد يزعم نيقيدرس ان الذي
لونه الي الحمرة يصلح اضرر
ذوات السموم، ومن الناس
من ظن ان هذا الصنف هو
الذي يستعمله النساء الذي
يستعمله النساء انما هو اصل
صغر يشرك هذه الأصناف
بالاسم فقط.⁵³

After giving the textual material, I will look at the images in the manuscripts if any. Information on the illustrative account can be summarized as follows: Dioscorides' *φακός* (IV, 87) is mentioned in folio 109^a of BnF Gr. 2179 (Figure 7.10), the Arabic translation *فاقس* is in 96^b of A 3702, 92^a of BnF Ar. 2849, 141^b of Or 3366 (Figure 7.4), and in 126^b of Bodleian d 138 (Figure 7.7). *βρύον θαλάσσιον* (IV, 98) is given in 112^b of BnF Gr. 2179 (Figure 7.11), the Arabic translation *برون بالاسيوس* is in 98^b of A 3702 (Figure 7.2), 92^b of BnF 2849, 143^b of Or 3366 (Figure 7.5), and in 129^a of Bodleian d 138 (Figure 7.8). Dioscorides' *φύκος θαλάσσιον* (IV, 99) is mentioned in folio 112^b of BnF Gr. 2179 as well as

52 Here Dioscorides mentions *Νίκανδρος ὁ Κολοφώνιος* / Nicander of Colophon who was a famous poet in the 2nd century BC. His book *Theriaca* is about venoms and venomous animals. In *Theriaca* 845, he mentions: “ἦ ἔτι καὶ φοινίσσον ἀλὸς καταβάλλο φῦκος” where he enumerates various plants as remedies against the strokes of some animals like moray, sea-snake, and stingray. *φύκος* – according to Nicander – is a seaweed known as its purple colour or dye. A recent study by Overduin (2014) lays the Greek text of *Theriaca* with commentary.

53 The sentences in red appear neither in A 3702 nor A3703, but only in BnF 2849. This shows us that there were several lines of transmission in the Dioscoridean tradition in the Islamdom. Further studies would allocate a stemma of the known codices. In this text, the bold text shows repeating words, and this repetition may be a copyist mistake that we sometimes come across in handwritten books.

the Arabic translation *فوقس* is in 99^a of A 3702 (Figure 7.3), 92^b of BnF 2849, 137^a of Or 3366 (Figure 7.6), and 129^b of Bodleian d 138 (Figure 7.9). Below are the images from some Dioscoridean manuscripts, both in Arabic and Greek. Please note that some codices are not illustrated at all, and some do not have figures of every item.

4.2 *Al-Ghafiqi*

Abu Jafar Muhammad ibn Ahmad al-Ghafiqi (d 1165) was a famous physician and pharmacist of al-Andalus. We do not have much information on his biography. Moreover, his encyclopaedic compilation does not have many copies compared to those of Ibn Sina or Ibn al-Baytar. al-Ghafiqi's *Kitab al-Adwiyat al-Mufrada* (Book of Simple Drugs) was studied by Di Vincenzo (2009) in her PhD thesis and the first part was edited. Al-Ghafiqi's opera was facsimiled and introduced by a number of specialists as well (Ragep et al 2015). According to the codicological data derived from the Osler codex, this manuscript was transcribed in 654 AH / 1256 AD. There are more than 450 illustrations in the manuscript. Al-Ghafiqi uses the abjad order to mention the *Materia medica* (Gacek 2015). In the entries, he uses abbreviations instead of famous sources known to him. Among these, د means *Materia medica* of Dioscorides, ج that of Galen and ح al-Hawi (Continens of Rhazes). If there is a second letter, this letter depicts the number of the book (actually sections of the book). For instance, د د depicts Dioscorides' 4th book, while ج و Galen's 6th. In the table below, the right column gives the Arabic text and the left an English translation.

In al-Ghafiqi's *Kitab al-Adwiyat al-Mufrada*, there is a chapter on algae which is as follows under the title *طحلب* – Alga. The main text is copied from Osler codex (O: McGill University, Osler Library 7508), whereas the differences in other codices are given in the footnotes. Here are the abbreviations of codices. M denotes the codex in Library of Majlis-i Malek, 5958 (Iran), and T of that in Bibliotheque Nationale 18177 (Tunis).

English Translation:

Tuhlub

Dioscorides IV: Faqus, Tuhlub al-Nahri (river-moss) is the greenery (vegetation) similar to lentil in its form, found in thickets on standing (stagnant) water.

Al-Hawi (Continens of Rhazes) VIII: Its temperament is a humid (and) cold temperament, and it bears both characteristics as if it is in the third degree.

Dioscorides: Likewise, if / when it is bandaged alone or with fine flour, it is compatible with erysipelas, hot tumours, and gout. (It is) Bandaged for the haematocele (or hydrocele) of the infected intestines of infants. As for Tuhlub al-Bahri (seaweed), it is something found on stones and cliffs that are near the sea. And it (seaweed) is thin, similar to hair in thinness, it doesn't have a stalk.

Arabic Text:

طحلب
 د دفاقوس⁵⁴ الطحلب النهري هو⁵⁵
 الخضرة الشبهة بالعدس في شكلها
 الموجودة في الاجام على الماء⁵⁶ القائمة.
 ح ح مزاج هذا مزاج رطب بارد ويبر⁵⁷
 من الخصلتين كأنه في الدرجة الثالثة.⁵⁸
 د وكذلك⁵⁹ إذا ضمد⁶⁰ به وحدة او مع
 السويق وافق الحمرة والأورام الحارة و
 النقرس⁶¹ و اذا ضمدت⁶² به قيلة⁶³ الامعاء
 العارضة للصبيان اضمرها واما⁶⁴ الطحلب
 البحري فهو شيء يكون⁶⁵ علي الحجارة و
 الجرف⁶⁶ التي بقرب⁶⁷ البحر وهو⁶⁸ دقيق
 شبيه في دقته الشعر وليس له ساق.

54 T: هو فاقوس و Faqus and it is.

55 T: and هو و it.

56 M, T: المياه.

57 T: وهو يبر.

58 T: ثانياً.

59 M: لذلك. هو بارد و T: لذلك

60 T: تضمد.

61 T: it relieves gut و ينفع النقرس.

62 T: ضمد.

63 M: قيتله.

64 T: اما يربون it invades, it dominates.

65 T: يتكون.

66 M: الخرف.

67 T: تكون بالقرب من.

68 T: وهو منبسط.

Galen VI: The capacity of this plant⁶⁹ is composed of an earthy quintessence and a watery quintessence both of which are cold, and therefore its taste is astringent and it is cold, and if a bandage is made of it, it will be of clear benefit from all hot ailments.⁷⁰

ح و⁷¹ هذا النبات قوته مركبة⁷² من جوهر ارضي وجوهر مائي وكلاهما بارد و لذلك ان طعمة قابض وهو برد⁷³ و اذا عمل منه ضماد نفع من جميع العلل الحارة نفعنا⁷⁴ بينا.

69 Please note that in pre-modern taxonomy, algae are classified as plants.

70 According to what al-Ghafiqi cites, the entry on algae should be read at Book VI of Galen, however, when we investigate, we realize that it is at Liber VIII of De Simplicium Medicamentorum Temperamentis ac Facultatibus (Γαληνου Περι Κρασεωσ Και Δυναμειωσ των Απλων Φαρμακων, الجالينوس المفردة لجالينوس). The Greek and Latin texts are from Kühn (1826) and the Arabic text is from two different codices, Real Biblioteca del Monasterio de El Escorial No: 793 and No: 794.

Περι φακού: Φακός ὁ ἐπὶ τῶν τελεμάτων ὑγρᾶς καὶ ψυχρᾶς ἐστὶ κράσεως, ἐκ τῆς δευτέρας που τάξεως ὑπάρχων κατ' ἄμφω. De Phaco, Lenticula palustri: Lenticula palustris humidae frigidaque temperie est, utrinque ex secundo quodammo ordine (Kühn 1826: XII p. 149).

On Tuhlub: Its temperament is cold and humid and in both it is in the second degree (El Escorial No: 793, 137^b).

On Tuhlub: Its temperament is cold and humid temperament and in all of these two traits it is in the second degree (El Escorial No: 794, 49^a)

ذكر الطحلب: مزاج هذا بارد رطب وهو فيهما كأنه في الدرجة الثانية.

ذكر الطحلب: مزاج هذا مزاج بارد رطب وهو في الخصلتين جميعا كأنه في الدرجة الثانية.

Περι φύκου: Φῦκος ὑγρὸν ἔτι καὶ χλωρὸν ἐξαίρουμένον τῆς θαλάττης, καὶ ψύχει καὶ ξηραίνει κατὰ τὴν δευτέραν τάξιν, ἔχει γὰρ τι καὶ στρυφνὸν μετρίως. De fuco, alga: Phycos humens etiamnum et virens ex mari exemptus desiccatur et refrigeratur ordine secundo habet enim quiddam modice acerbum (Kühn 1826: XII p. 152).

On Fuqus: It is a cochineal worm, if it is taken from the tree, it is considered humid and soft, it cools down and dries up in the second degree, **because** it contains something that is moderately astringent (El Escorial No: 794, 49^b).

On Fuqus: It is a cochineal worm, if it is taken from the tree, it is considered humid and soft, it cools down and dries up in the second degree, **when this is similar except that** it contains something that is moderately astringent (El Escorial No: 793, 138^a).

ذكر فوقس: وهو دود القرمز إذا اخذ هذا من الشجر وهو يعد رطب طري فهو يبرد ويحفف في الدرجة الثانية لان فيه شيا يقبض قبض معتدلا.

ذكر فوقس: وهو دود القرمز إذا اخذ هذا من الشجر وهو يعد رطب طري فهو يبرد ويحفف في الدرجة الثانية عند متشابهها هذا الا ان فيه شيا يقبض قبض معتدلا.

Regarding the citation by al-Ghafiqi referring to Galen, we can conclude that it is the Φακός entry instead Φῦκος.

71 T: in this codex, ج is given instead ح و which means Galen instead al-Hawi.

72 T: -.

73 T: صبر.

74 T: -, -.

Dioscorides: It is very astringent, and it heals hot tumours that need cooling because of gout.

Other(s): The abdomen or any organ is imprisoned if / when coated with it, –especially the marine and riverine –. If / when it is boiled in old olive oil it softens the nerves.

د وهو قابض جدا ويصلح⁷⁵ للأورام
الحارة المحتاجة الي التبريد من التقريس.
غيره يحبس البطن⁷⁶ من أي عضو⁷⁷
كان⁷⁸ إذا طلي به وبخاصة البحري⁷⁹
والنهري⁸⁰ إذا اغلي في الزيت العتيق لين
العصب.

Since we have two codices of al-Ghafiqi's *Kitab al-Adwiyat al-Mufrada* illustrated, we can find two pictures of طحلب – Tuhlub, Alga. Figure 7.12 shows the drawing of Tuhlub from the manuscript kept in Osler Library 7508 (Canada), folio 220^a, while Figure 7.13 shows that of Tuhlub from the manuscript in Library of Majlis-i Malek, 5958 (Iran), page 399. For a comparison I have added two illustrations from Dioscorides' *Materia Medica*. Figure 7.10 is φακός from BnF Gr. 2179, p. 109^a and Figure 7.14 is the illustration of Tuhlub from Harvard 1971.95.1,⁸¹ f. 43^b. In this way I intend to show the similarities and differences among illustrations from different codices: Dioscorides in Greek, Dioscorides in Arabic, and finally al-Ghafiqi in Arabic.

5 Discussion

5.1 Identification of Algae

Identification of any plant species through ancient or medieval text is harder than ever, since in almost every case we do not have the specimens. In the case of algae, it is almost impossible at the species level, however, we can conclude on some possible genera through the textual apparatus as well as

75 M: يصلح و يصلح same word repeats here probably due to a transcription error.

76 M: الدم البطن the abdomen and the blood, T: -.

77 T: موضع.

78 T: مثال.

79 M: من الطحلب البحري the marine, of the alga.

80 M: النهري منه the riverine, of which.

81 The reference for this illustration should be cited as “*Struchnos Plants (painting with text, recto and verso), from a De Materia Medica of Dioscorides* (Unknown Artist), 1971.95.1,” Harvard Art Museums' collections online, Aug 09, 2021, <https://hvr.dart/o/216276>. Special thanks to George Saliba, Prof. Emeritus of Arabic and Islamic Science, Columbia University and Founding Director of Farouk Jabre Center for Arabic & Islamic Science and Philosophy, American University of Beirut (AUB), who informed me about this image.

through the illustrative apparatus. Dioscoridean φακός should be a member of genus *Lemna*, namely *Lemna minor* L. of monocots. We find satisfactory evidence that Dioscorides (and others who refer to him) to mention 'lentil' in its resemblance. βρόνον θαλάσσιον sea-moss should be something like hair, in short filament form. Beck (2005) identifies it as *Ulva lactuca* L. and *U. latissima* L. To our knowledge in today's taxonomy, *Chaetomorpha* sp. (unbranched filaments), or *Cladophora* sp. and *Bryopsis* sp.⁸² are known as hair-like algae kinds.⁸³ When it comes to the identification of φῦκος θαλάσσιον, we can list more genera in this regard. The 'broad' one can be either *Ulva* sp. or *Porphyra* sp. while the 'long and reddish' one can be *Gelidium* sp. from Rhodophyta or some species like *Cystoseira* sp. or *Fucus* sp. from Phaeophyta.

5.2 Textual Apparatus

As we read Ibn Sina's *Canon of Medicine*, we understand that طحلب Tuhlub is classified among (and like other) *Materia medica* according to its qualities e.g., hot, cold, dry, and humid. It is also classified according to the habitat as طحلب النهري the riverine or طحلب البحري the marine kinds. These classifications which were inherited from the antique sources namely from Dioscorides and Galen, were thoroughly used in Islamic medicine and pharmacy. In the overall state, we understand that the medieval authors used a different taxonomy of the algae which – in my opinion – was a crucial part of their understanding or vision of the minerals, plants, animals, and humans as well. Moreover, we see that, the mediaeval authors – as well as the antique authors – grouped plants and alike according to their preference of habitats. This is somehow different in contemporary botany since we use the Linnaean system of classification, which is based mostly on the comparison of the reproductive organs. For instance, medieval authors grouped seaweed and Duckweed (*Lemna minor*) together because they grow in the water, in the same habitats. In today's taxonomy, Duckweed is classified in a totally different taxonomic group. This is very evident in the case of Ibn Sina, since in his account, Duckweed is counted as a kind of Tuhlub, again parallel to Dioscorides. However, Ibn Sina does not cite him (or any other sources) in this entry. We know that he often keeps silence to name his sources especially that of Dioscorides, regarding the *Materia medica*.

I think at least after the extensive use of and interaction with the modern biological sciences, the contemporary human vision and understanding

82 *Bryopsis* sp. are known as potential sources for a bioactive compound Khalalide F, which is well known for the therapeutic effects (Kan et al. 1999). Studies on such compounds may shed light on the antic and medieval uses of algae as *Materia medica*.

83 This morphological resemblance or analogy may be regarded as a sample of humanizing algae.

have changed a lot. What we find in the different taxonomic systems is the reflection of an idea of minerals, plants, animals, and probably every “thing” or “entity”. Since in this chapter I investigated books on *Materia medica*, it is natural to see that algae are also classified among the very *Materia medica*, by means of their healing properties. Medieval physicians used algae for analgesic, anti-inflammatory purposes as Avicenna reports solely from Dioscorides. Regarding the therapeutic properties of algae, Ibn Sina’s contemporary al-Biruni refers to three antique authors, namely Dioscorides, Galen, and Paul of Aegina.

I can certainly say that most antique authors were referred to by mediaeval physicians in the Islamic Geography. This shows us that their books were translated to Arabic, copied, distributed, and studied for centuries. Ibn Sina was the most famous figure of peripatetic philosophy in the eleventh century. His vision and understanding of the world built over the amalgamation of peripatetic tradition, Islamic creed, and local practices. On the other side, al-Biruni prefers to stand as a man of “science” rather than “philosophy” because he extensively used the mathematical and geometrical tools to learn and to understand the nature and the universe as he mentioned in his work entitled “*al-Athar al-Baqiya min Qurun al-Haliya – The Memoirs of Past Generations*”. These two figures, Ibn Sina and al-Biruni perhaps represent two different world views of the eleventh century, the peripatetic and the mathematical and geometrical respectively. For instance, we see that in the same century, there are enormous efforts on algebra or better to say the attempts and studies of applying arithmetic to algebra in every respect (Baga 2017), as observable in works of al-Karaji.⁸⁴ Probably, after this century, mathematical sciences established their autonomous authority against Peripatetic Tradition. Al-Biruni, the great polymath of the tenth and eleventh centuries, presumed that this universe is geometrically structured, and it could be understood by following the rules of mathematics and geometry (Yavuz 2020). In doing so, he stands in the “scientific” side rather than the “philosophical” one, compared to Ibn Sina.

Al-Biruni, in his entry on algae, cites from five poets, a botanist, and a zoologist. What we read under the title al-Tuhlub, is more poetry, rather than pharmacy. Ibn Sina, nonetheless, does not say anything new after the reporting of what Dioscorides says. However, al-Biruni transmits to our consideration some famous medical poets, thus mentioning the sources of poetry, which we can then conclude based on a deeper look at his *Book of Pharmacy* that this is a part of al-Biruni’s methodology. What al-Biruni cites from medieval authors are either descriptions or literal uses of algae in poetry. These literal uses may

84 Abu Bakr Muḥammad ibn al-Hasan al-Karaji (d. c.1029), Persian mathematician.

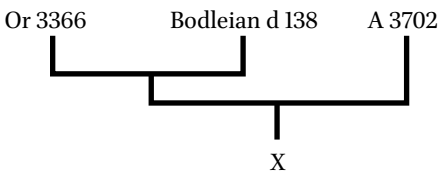
inform us about an imagery of algae, how much area they occupied in minds of the medieval authors and poets in the Islamic Geography.

When we examine the text supplied by al-Ghafiqi, we see that in the entry of Tuhlub, he refers to Dioscorides' *Materia medica* iv. 87 the duckweed, and then iv. 98 the sea-moss. Although he cites from Dioscorides in three different sentences, these are the additive combination of the texts from iv. 87 and iv. 98. The knowledge on algae is apparently unified or amalgamated, since in Arabic there is only one word to denote types of algae in spite of three Greek terms from the antiquity. Besides, what he quotes from Dioscorides exactly fits our citations which shows us al-Ghafiqi's precision or fairness in transmission of knowledge from his sources. Because al-Ghafiqi meticulously refers to his sources like Dioscorides, Galen and al-Razi (Rhazes).

We see that the authors in the Islamic Geography differ in their understanding and vision of the world, this diversity corresponds to their production and presentation of the knowledge on algae.

5.3 *Illustrative Apparatus*

Regarding the illustrative apparatus in this essay, we can compare *Dioscoridean* and *al-Ghafiqian* illustrations separately and together. First of all, it is obvious that Figures 7.2, 7.3, 7.5, 7.6, 7.8, 7.9, and 7.11 resemble branched kinds of algae. Among these, Figures 7.3, 7.6 and 7.9 are drawn as on water, while 7.2, 7.5, 7.8 and 7.11 are hairy or they have secondary branches and are drawn out of water. Figures 7.4 and 7.7 may depict a biofilm layer on water, or a thick cover of algae, while Figure 7.10 shows a pond or lake full of water and possible population of *Lemna* genus, probably *Lemna minor*. Among these illustrations from the Dioscoridean tradition, we can conclude that the two codices Or 3366 and Bodleian d 138 have a direct relationship and then A 3702 relates to these two. All of which may originate from an unknown X codex.



If we compare illustrations in al-Ghafiqi's opera, we find that Figure 7.12 again shows a pond or lake and duckweed or seaweed inside it. Figure 7.13 is similar to mosses on a stone rather than algae in a pond, however it may be a pond full of thick algal layer as well. If we make a comparison between Dioscoridean Figures (7.10 and 7.14) and al-Ghafiqian ones (7.12 and 7.13), we recognize that Figure 7.12 may be copied or derived from Figure 7.10.

The illustrative apparatus is the comparison of the very drawings of algae in different manuscripts from Greek and Arabic. The Dioscoridean tradition (in BnF 2179, Greek copy) seems to be represented in al-Ghafiqi's opera (in Osler 7508, Arabic copy) at least in the entries of φακός and Tuhlub (طحلب). Last, but not least, on the topic of algae, we find a sample transmission of knowledge from Dioscorides (1st c.) to al-Ghafiqi (13th c.), from Greek to Arabic, from the antiquity to the Middle Ages.

6 Conclusions

In order to prospect from a perspective of the future, it is necessary to decide and deduct in the present. Moreover, in order to act in the present; we have to know more about the past. Due to the temporal connection between cause and effect, we need to understand the historical origins of things and the background of processes. Therefore, historical studies in the sciences make sense in the 21st century. In this chapter, I try to shed light on the medieval uses of algae in the Islamic Civilization with an investigation through *Materia medica* books of some of the authors like al-Biruni (Aliboron), Ibn Sina (Avicenna), and al-Ghafiqi. The purpose of this chapter is to decipher the human-algae relationships in the Islamic Middle Ages. In doing so, this chapter supplies an informative base in order to question the imaginaries and narratives in the past. Moreover, this chapter tries to identify the algae in genus-level, according to the textual data derived from the manuscripts. It also uses an illustrative apparatus to compare the medieval-artist-reception of algae in the illuminated manuscripts. Consequently, this chapter investigates two contemporary figures Ibn Sina and al-Biruni in their reception and perception of algae as a kind of *Materia medica*, like many plants.

To conclude, I would like to reiterate that pre-modern scholars had a different taxonomy of the sciences and of the things. For instance, the duckweed and the seaweed were mentioned either together or very close. According to the current botanical taxonomy, they are in very different systematic units. From poems in literature, to drugs in medicine, medieval people "naturally" incorporated the algae in their daily or social lives. Perhaps this is the thing we miss in our contemporary, discrete, artificial views of natural life.

Figures from Various Manuscripts

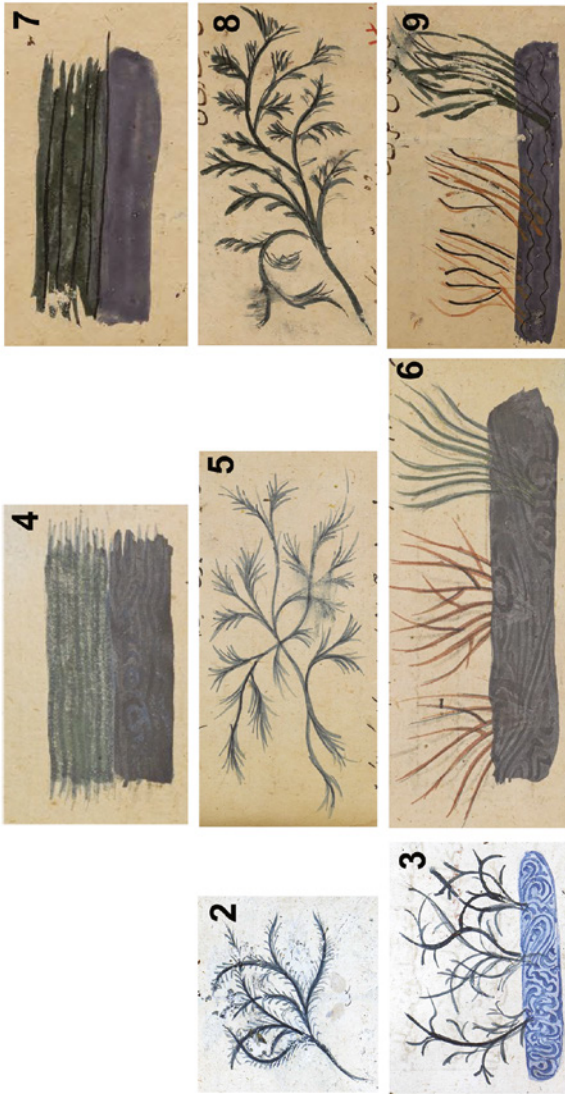


FIGURE 7.2 βρύον θαλάσσιον of Dioscorides (A 3702)
 FIGURE 7.3 φύκος θαλάσσιον of Dioscorides (A 3702)
 FIGURE 7.4 φακός of Dioscorides (Or 3366)
 FIGURE 7.5 βρύον θαλάσσιον of Dioscorides (Or 3366)
 FIGURE 7.6 φύκος θαλάσσιον of Dioscorides (Or 3366)

FIGURE 7.7 φακός of Dioscorides (Bodleian d 138)
 FIGURE 7.8 βρύον θαλάσσιον of Dioscorides (Bodleian d 138)
 FIGURE 7.9 φύκος θαλάσσιον of Dioscorides (Bodleian d 138)

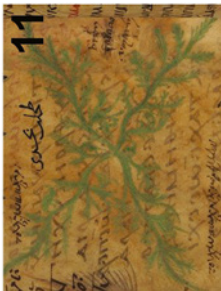
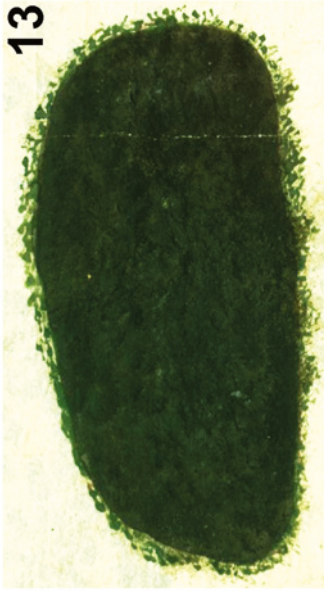


FIGURE 7.10 φαρμάκιος of Dioscorides (BnF Gr. 2179)
 FIGURE 7.11 βρόνον θαλάσσιον of Dioscorides (BnF Gr. 2179)
 FIGURE 7.12 Tuhlub of al-Ghafiqi's (Osler Library 7508)
 FIGURE 7.13 Tuhlub of al-Ghafiqi's (Majlis-i Malek 5958)
 FIGURE 7.14 Tuhlub of Dioscorides (Harvard 1971.95.1)

References

- Abbott, N. 1972. *Studies in Arabic Literary Papyri III Language and Literature*, Chicago: University of Chicago Press.
- al-Dinnawi, M.A. 1999. *Ibn Sina, al-Qanun fi al-Tibb*. Beirut: Dar al-Kutub al-Ilmiyya.
- Baga, E. 2017. "Arithmetical Algebra in the Islamic History of Mathematics and Its Peak in the 9th/15th Century: Ibn al-Ha'im's *al-Mumtā'*", *Nazariyat Journal for the History of Islamic Philosophy and Sciences* 3 (2): 69–123. doi: 10.12658/Nazariyat.3.2.M0000gen.
- Beck, L.Y. 2005. *Pedanius Dioscorides of Anazarbus De materia medica*. Zürich and New York: Olms-Weidmann.
- Borbone, P.G., M. Farina. 2014. "New Documents concerning Patriarch Ignatius Na'matallah (Mardin, ca. 1515 – Bracciano, near Rome, 1587) 1. Elias, the 'Nestorian' Bishop" *EVO XXXVII*: 179–189. doi: 10.12871/97886741501411.
- Brunfels, O. 1531. *Pauli Aeginetae Pharmaca simplicia*. Paris: Excudebat Georgius Ulricher Andlanus.
- Casari, M. 2016. "Raimondi, Giovanni Battista". *Dizionario Biografico degli Italiani*. Torino: Istituto della Enciclopedia Italiana.
- Casari, M. 2017. "'This language is more universal than any other' Values of Arabic in early modern Italy" In *The City, Court, Academy: Language choice in Early Modern Italy*, edited by Andrea Rizzi, and Eva Del Soldato, 173–198. Oxford: Routledge.
- Di Vincenzo, E. 2009. *Kitab al-adwiya al-Mufrada di Abu Ga'far Ahmad b. Muhammad b. Ahmad b. Sayyid Al Gafiqi Edizione del Capitolo Alif con Indici e Apparato Critico in Nota*. Roma: La Sapienza University.
- Dubler, C.E. 1991. "Diyuskuridis". *Encyclopaedia of Islam*. (E1²) Leiden: Brill.
- Farina, M., S. Fani. 2016. "The Typographia Medicea and the Humanistic Perspective of Renaissance Rome". In *The Grand Ducal Medici and the Levant: Material Culture, Diplomacy and Imagery in Early Modern Mediterranean*, edited by Marta Carosci & Maurizio Arfaio, 169–177. Brepols Publishers.
- Gacek, A. 2015. "The Palaeographical and Codicological Features of the Osler Manuscript in the Context of the Manuscript Transmission of al-Ghafiqi's Herbal". In *The Herbal of al-Ghafiqi (A Facsimile Edition with Critical Essays)* edited by F. Jamil Ragep and Faith Wallis, Pamela Miller, Adam Gacek, 18–34. Montreal: McGill Queen's University Press.
- Gunther, R.T. 1934. *The Greek Herbal of Dioscorides. Illustrated by a Byzantine AD 512, Englished by John Goodyer AD 1655, edited and first printed AD 1933*. New York: Hafner Publishing.
- Ibn Sina. 1593. *El Kanun fi't Tibb*. Romae: Typographie Medicea.
- Kan, Y., T. Fujita, B. Sakamoto, Y. Hokama, H. Nagai. 1999. "Kahalalide K: A new cyclic depsipeptide from the Hawaiian green alga *Bryopsis* species", *J Nat Prod* 62: 1169–1172.
- Kennedy, E.S. 1970. "Al-Birūnī". *Dictionary of Scientific Biography*. New York: Charles Scribner's Sons.

- McGinnis, J. 2010. *Avicenna*. Oxford: Oxford University Press.
- Meyer, E.H.F. 1841. *Nicolai Damasceni Libri Duo Aristoteli Vulgo Adscripti*. Lipsiae: Sumtibus Leopoldi Voss.
- Osbaldeston, T.A. 2000. *Dioscorides: De Materia Medica: A New Indexed Version in Modern English*. Johannesburg: Ibis Press.
- Overduin, F. 2014. *Nicander of Colophon's Theriaca: A Literary Commentary (Mnemosyne, Supplements)*. Leiden: Brill.
- Ragep, J.F., F. Wallis, P. Miller, A. Gacek. 2015. *The Herbal of al-Ghafiqi (A Facsimile Edition with Critical Essays)*. Montreal: McGill Queen's University Press.
- Riddle, J.M. 1985. *Dioscorides on Pharmacy and Medicine*. Austin: University of Texas Press.
- Said, H.M. 1973. *Al-Biruni's Book on Pharmacy and Materia Medica*. Karachi, Hamdard Edition.
- Siraisi, N.G. 1987. *Avicenna in Renaissance Italy: The Canon and Medical Teaching in Italian Universities after 1500*. New Jersey: Princeton University Press.
- Thatcher, G.W. 1911. "Abu Tammam". *Encyclopædia Britannica*. Cambridge: Cambridge University Press.
- Toomer, G.J. 1996. *Eastern Wisdom and Learning: The Study of Arabic in Seventeenth-century England*. Oxford: Clarendon Press.
- Touwaide, A. 1999. "La botanique entre science et culture au Ier siècle de notre ère". In *Die Geschichte der Mathematik und der Naturwissenschaften in der Antike*, 1: Biologie edited by Georg Wöhrle and Jochen Althoff, 219–52. Stuttgart: F. Steiner.
- Touwaide, A. 2009. "Translation and Transliteration of Plant Names in Hunayn b. Ishaq's and Istifan B. Basil's Arabic Version of Dioscorides, *De materia medica*". *Al-Qantara*. xxx (2): 557–580.
- Witcombe, C.L.C.E. 2004. *Copyright in the Renaissance: Prints and the Privilege in Sixteenth-Century Venice and Rome*. Leiden: Brill.
- Yavuz, M. 2018. "A Comparative Study of Epiphytic Lichens Mentioned by Ibn Sina and Ibn al-Baytar", *Medicina nei Secoli-Arte e Scienza* 30 (2): 617–640.
- Yavuz, M. 2020. "Lichens in al-Biruni's *Kitab al-Saydanah fi al-Tibb*", *Early Science and Medicine* 25 (2): 152–172. doi: 10.1163/15733823-00252P03.
- Yavuz, M., P. Herraiz Oliva. 2020. "Botany as a New Field of Knowledge in the Thirteenth Century: On the Genesis of the Specialized Sciences", *Teorie vědy / Theory of Science* 42 (1): 51–75. doi:10.46938/tv.2020.478.