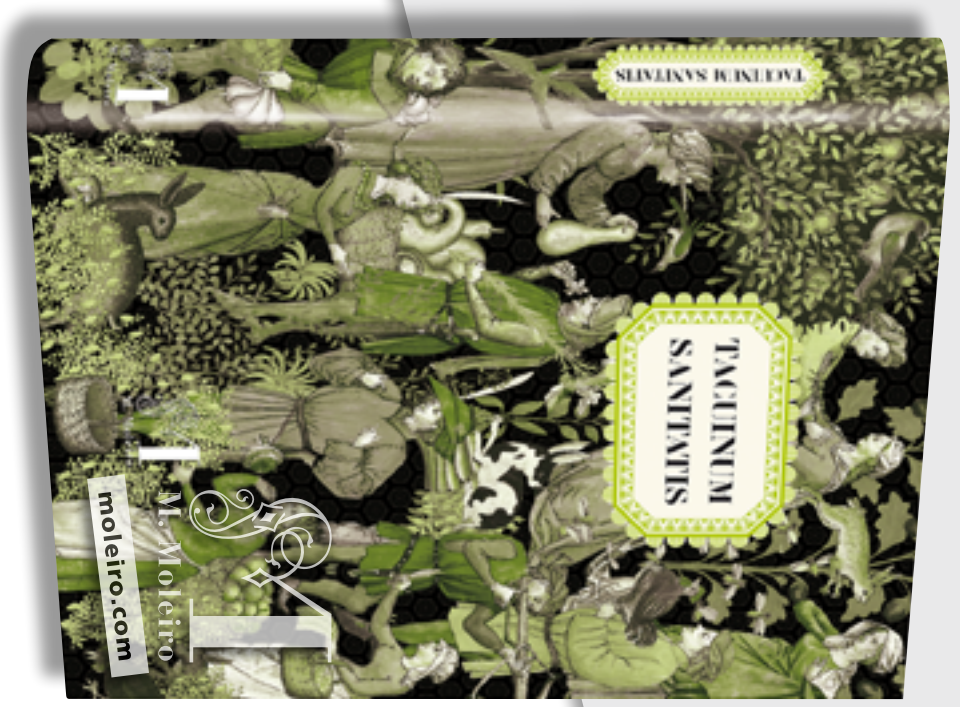

(1)

A way of life

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A way of life

Some ten late-medieval manuscripts[1] and several editions made at the printing house of Hans Schott (1500-1548) in Strasbourg between 1531 and 1533[2] feature variations of a Latin work entitled *Tacuinum sanitatis* (usually translated as *Table(s) of health*). The manuscripts were illustrated with polychromatic miniatures and the printed versions, with rudimentary etchings. This work, attributed to an author identified variously, depending on the copy, as Albullasem, Albulkasem, Ellbochasim or Ububhchasym of Baldach, consisted of a series of tables varying in number (forty in the longest version appearing in several manuscripts including ours) stating the characteristics of a long list of items grouped into "six things" and analysed according to five criteria[3].

As the introduction in our *Tacuinum* manuscript explains (f. 1), these "six things are the things necessary for a man to preserve his daily health with their effects and treatments" (… *tacuinum sanitatis de sex rebus que sunt necessarie cuilibet homini ad cotidianam conseruationem sanitatis sue [cum] rectificationibus et operationibus* …). The things said to be *"necessarie"* (necessary) here are described in medieval tradition as *"sex res non naturales"*, i.e. six non-natural things, which are as follows:

- the air surrounding us;
- food and drink;
- the movement of the body and rest;
- excess or, on the contrary, lack of sleep;
- the retention and elimination of humours, i.e. the liquids identified in ancient and medieval medicine as the physiological constituents of the body; and
- joy, fear and anxiety.

▲ Horehound, f. 33v

In short, everything that contributes to a person's physical and emotional well-being and which, when well balanced, ensures health and when imbalanced, illness.

The importance attached to the different "non-natural things" varies in this work. Food and drink take the lion's share, being featured in thirty of the forty tables, whilst the other "non-natural things" feature in one or more tables, but hardly ever more than four for a single "thing"[4].

The criteria used to describe each of the elements stemming from these six "things" are: the "nature" of the element, its "optimum type", its "benefit" for health, its possible "harm" for health (which would be called "toxicity" today) and finally, the "remedy for the harm"[5]. One example of this type of analysis is horehound (f. 33v): its nature is hot and dry in the third degree; the optimum type is cultivated and fresh; the benefit for health is that it is useful for the stomach and the damp chest; its harm for health is that it is difficult to digest; and the way to remedy this harm is with spices, grape juice and vinegar.

No matter how exact it may be, this general introduction to the work poses more questions than it answers. Who, in fact, is the author to whom the above names refer? What are these tables? Why was the work written like this rather than as a continuous text like so many other medical treatises of that time and in other periods? And what does the word *Tacuinum* used to describe them mean? What does the term

"non-natural things" mean? And finally, are the air inhaled by the lungs, food, movement, sleep, excretions and emotions not, on the contrary, the most natural things in human activity, experience and life? And finally, what do these comments about the "nature" and "degree" of the elements analysed in the work mean?

Ibn Butlān

This not being the moment to dwell upon the author of the work, we would simply say that he was the eleventh-century Arab physician Abū al-Hasan al-Mukhtār Ibn al-Hasan Ibn ᶜAbdūn Ibn Saᶜdūn Ibn Butlān usually referred to in contemporary historical literature as Ibn Butlān[6]. He was born a Christian (apparently a Nestorian) in Baghdad where he learnt medicine, leaving his birthplace in 1047 to journey around the Arab-Islamic world of that time. His travels took him to Aleppo (now in Syria), Antioch (now Antakya in Turkey), Laodicea (now Latakia in Syria), Jaffa (Israel) and finally, two years later in 1049, Cairo (Egypt). The aim of his journey was in fact to travel to Cairo to meet his colleague, the physician Abū 'l-Hasan ᶜAlī Ibn Ridwān b. ᶜAlī b. Ga'far al-Misrī (998 - 1061 or 1069)[7], or Ibn Ridwān as he was more usually known, and challenge him about the scientific controversy driving them apart[8]. The question – probably not as insignificant as it might seem – consisted of determining whether the chick is hotter than the hen. What was at stake was, in fact, ancient physiology and, consequently, nosology and therapeutics[9]. The debate quickly turned sour and degenerated into personal attacks that became neither of the two opponents. Although Ibn Butlān apparently had more knowledge of Greek medicine and was a more original theoretician with greater and more solid philosophical baggage, his adversary nevertheless had the advantage of being a scientist and practicing physician. Cut to the quick, Ibn Butlān left Cairo in 1054 for the capital of the Byzantine empire, Constantinople. Although he stayed barely a year in the city which had already fallen prey to a plague epidemic, he nonetheless had time to observe the clinical symptoms that precede the illness. He then set off for Antioch, where he took the cloth and entered a monastery where he died in 1066.

The *Tacuinum*

Ibn Butlān wrote several works[10] ranging from his treatise about the question he clashed with Ibn Ridwān on and the different answers to his opponent's attacks to two handbooks on medicine for monks, which he probably penned during the last period of his life. However, he also wrote an introduction to medicine, an abridged version of the huge work by the Greek physician from Pergamus Galen (129 - after 216 AD)[11], an essay on therapeutics, and several other works about food and what is known today as internal medicine. This was apparently his main interest: indeed, one of his treatises addressed *The treatment of illnesses due basically to usual foods and common medicines*, whilst another concerned *The ingestion of purgatives*, yet another was *On diet, digestion, the evacuation of the remainders of food from the body and purgatives*, and finally, the work entitled *Taqwīm al-sihha bi al-asabāb al-sitta* (*restoration of health by the six causes*)[12], of which *tacuinum sanitatis* is a version.

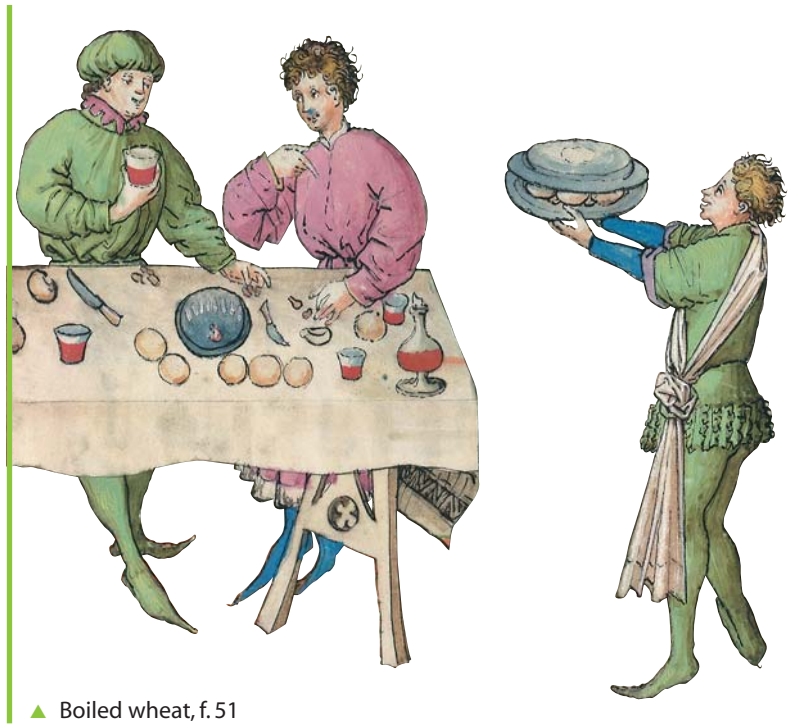
The original Arabic version of the treatise has forty tables each consisting of seven elements analysed according to fifteen criteria, instead of five as in the Latin version:

1	a sequential number running from 1 to 280;
2	the name of the element being analysed;
3	its nature defined according to four properties, i.e. hot, cold, dry and wet;
4	the degree of the property attributed above to the element, measured on a scale of four degrees;
5	the optimum sort of the element;
6	its benefit for health;
7	its harm (i.e. its toxicity);
8	the remedy for this harm;
9	the effect of the element;
10	the benefit for health depending on the constitution of the person using this element;
11	the benefit depending on the age of whoever uses it;
12	the benefit depending on the season when the element is used;
13	the benefit depending on the region;
14	the scientists prior to Ibn Butlān who had written about the element and the authority of those to whom Ibn Butlān refers;
15	other considerations such as the way the element in question is used.

In addition, at the top and bottom of these tables are several lines of continuous text which Ibn Butlān himself defines as *qānūn* (canon), usually written as such in scientific literature. Each of these forty canons offsets the possibly exceedingly brief details set forth in the tables by providing all sorts of comments: explanations of the information in the tables, definitions of the notions in the tables or their theoretical justification, and practical advice too.

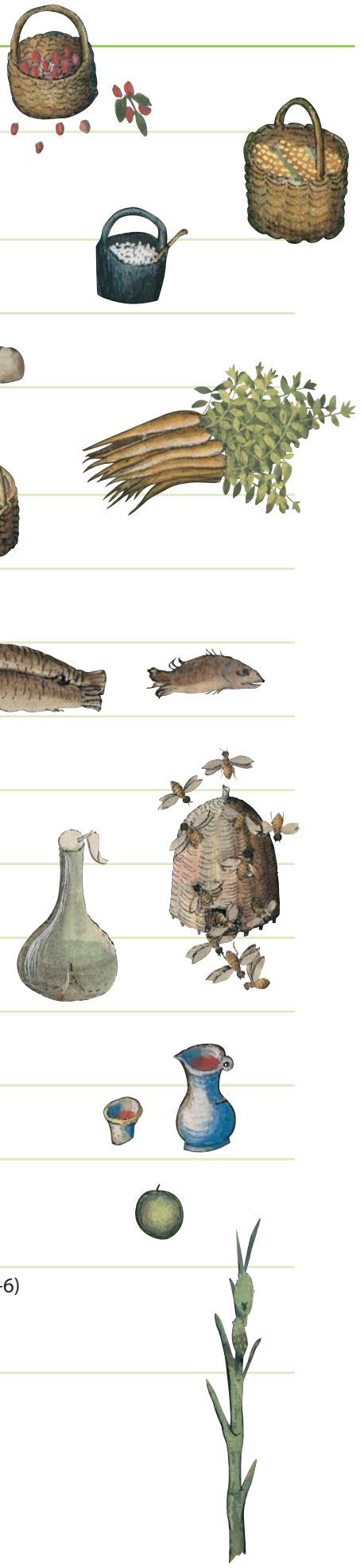
These canons are followed by astrological considerations (to be discussed later[13]) about the time of year when certain things must be done or avoided.

As in the Latin text, most of the elements analysed in the tables are foodstuffs. Indeed, thirty of the forty tables (i.e. three quarters of the work) concern foodstuffs and for each table or group of tables (never more than four, however), there is a well defined category of elements:



▲ Boiled wheat, f. 51

Table	Subject
1-4	fruits (tables 1-3) including dried fruits and nuts (table 4);
5	cereals (wheat [no. 1] and barley [no. 4]), and their by-products (flours and barley water);
6	rice (no. 1), starches (nos. 2-6) and boiled wheat (no. 7);
7	bread, including different types;
8-11	pulses and vegetables and seasonings (table 9, nos. 6-7 and table 10, nos. 1-2);
12-13	milk, dairy products and eggs;
14-16	meat and poultry;
17	fish;
18-19	parts of animals;
20-24	cooked dishes;
25	sugar, honey and pastries;
26	scented substances and soda (no. 4);
27	water;
28	wine, with almonds (no. 7);
29	scented plants and their fruit, including common basil (no. 3), lemon (no. 6) and mandrake (no. 7);
30	sugar cane (no. 1), a syrup (no. 2), an earth (no. 3), achenes (nos. 4-6) and currant bushes (no. 7).



The other tables cover a wide variety of subjects:

Table	Subject
31	music and dancing (nos. 1-3), feelings and characters (joy [no. 4], shame [no. 5] and anger [no. 6]) and litharge (no. 7);

32	drunkenness (no. 1) and vomiting (no. 2) (including radishes [no. 3], used to induce vomiting), and likewise sleep and wakefulness (nos. 4-7);
33	expulsion and retention (nos. 1-2), sexual activity (nos. 3-4), mouth hygiene (no. 5), drunkenness (no. 6) and a barley beverage (no. 7);
34	movement;
35	baths and a sweetmeat (no. 7);
36	products used for skin treatments (nos. 1-2, 4, 7), massages (no. 3) and clothes (nos. 5-6);
37-38	perfumes (table 37, nos. 1-5), syrups (from table 37, no. 6, to table 38, no. 5) and rooms (table 38, nos. 6-7);
39-40	the winds (table 39, nos. 1-4), seasons (from table 39, no. 5 to table 40, no. 1), and regions (table 40, nos. 2-5);
40	plague-infested air (no. 6) and its main remedy, theriac (no. 7).

The ancient heritage

Because of several features of Ibn Butlān's work – i.e. the many vegetable products in the form of foodstuffs, the emphasis on their therapeutic and toxic effects and certain portrayals of plants borrowed from the illustrations in herbals[14] – it is traditionally situated amongst ancient and medieval medical works (both Arab and Byzantine) about what is usually referred to as *"materia medica"* i.e. the substances in the three kingdoms of nature (animal, vegetable and mineral) formerly used as ingredients in medicines.

The most outstanding work in this realm is *De materia medica* by the Greek Dioscorides (1st century AD)[15] which influenced this discipline decisively. This treatise is in fact a veritable encyclopaedia used not only in Antiquity but also in Byzantium, the Arab world, the medieval West and during the Renaissance[16]. It was translated in the 9th century in Baghdad firstly into Syriac and then into Arabic by Hunayn ibn Ishāq Al-Ibādi (800-873 AD), a physician specialised in the assimilation of Greek medicine into Arab-Islamic scientific culture[17]. The information in the work and the underlying method gave rise to new studies by Arab scholars leading to them being associated with, inter alia, the Galenic system to be discussed later[18]. The discipline reached its zenith under Arab-Islamic physicians and pharmacologists, from Abū Rayan Muhammad ibn Ahmad al-Bīrūnī (973-1048)[19] to Ahmad ibn Muhammad al-Ghāfiqī (deceased in c. 1165)[20] and Abū Muhammad ᶜAbd Allāh b. Ahmad Ibn al-Baytār (c. 1190 - 1248)[21] and, of course, Avicenna, Abū ᶜAlī al-Husain ibn ᶜAbd Allāh ibn Sīnā (980-1037)[22].

However, although this approach was understandable – for the treatises by Dioscorides and his successors undoubtedly contributed to creating the heritage of information, knowledge and images upon which the *Taqwīm* and subsequently the *Tacuinum* drew – it was insufficient. The type of information and its presentation in what we will call the "Dioscorides tradition" differed in fact from their counterparts in the *Taqwīm* and *Tacuinum*, as can be seen in the case of horehound, whose entry in the *Tacuinum* is reproduced above and whose chapter in Dioscorides[23] reads thus:

> "**Horehound.** The horehound, but some call it *philophares*: it is a shrub that has many branches growing from a single root. It is somewhat hairy and white and it has quadrangular stems. The leaf is as big as the thumb, somewhat round, thick, somewhat wrinkled, and bitter in taste. Spaced on the stem at intervals are the seeds and flowers, as if they were vertebrae. They are rough. It grows around building lots and ruins.
> Its dry leaves are boiled in water with its seeds or are converted into juice when green, and the liquid is given with honey to tuberculars, asthmatics, and to people who cough. It also brings up congestive matter from the chest when mixed with dry iris. It is given to women that have not been cleansed to bring on the menstrual period and afterbirth, to those having difficult deliveries, to people bitten by wild animals, and to those who drank deadly poisons. But you should know that it is not suitable for the bladder and kidneys.
> The leaves, plastered on with honey, cleanse filthy sores, remove fleshy excrescences and spreading ulcers, and relieve pain on the sides. Also their juice, made by squeezing the leaves and condensing the liquid in the sun, is good for the same purposes.
> It sharpens the sight when anointed with honey, it purges jaundice through the nostrils, and it is suitable for earaches when instilled wither by itself or with unguent of roses."

The key to understanding the difference between the Dioscorides tradition of materia medica and the *Tacuinum* – in either the original Arabic text or its Latin version (the origin of which deserves further discussion[24] – is the work's complete title in Arabic: *Taqwīm al-sihha bi al-asbāb al-sitta*, which can be translated literally as the *Restoration of health by the six causes*. According to the generally accepted interpretation, these "six causes" are the "things" mentioned above and identified in the Latin text of the *Tacuinum* as the "six non-natural things".

The concept of six causes – or six non-natural things in the Latin version – was not invented by Ibn Butlān but inherited by him from Galen[25], who used it to the full in his *Ars medicina*[26] in which he sought to bring together in a unifying notion all the factors that have a decisive effect on human health without, however, specifying whether these causes were natural or not[27]. Furthermore, these different factors featured in Galen's work as healthy and necessary causes, i.e. according to his own explanation, "[causes] it is impossible not to be exposed to", listing ambient air, eating and drinking, being awake and sleeping as examples.

This was not a completely new approach for the different factors of human health had already appeared in a work dated well before Galen: a treatise entitled *Regimen* traditionally attributed to Hippocrates (460 - between 375 and 351 BC)[28], although this may not necessarily have been the case even though this work probably did date from the late 5th or first half of the 4th century BC[29]. After addressing how bodily composition varies with age in the first book and physical exercise in the third, the author then continues in this book to address the general principle stated below which justifies the attention paid to all the factors that influence human health[30]:

> "(…) needs change with age; and also with the situation of regions, wind changes, seasonal variations and the constitution of the year. Amongst foods themselves, there is a great deal of difference (…)"

Indeed, he had already discussed the differences between regions (book II, chapter 37), the winds (II.38), foodstuffs (II.39-56, mainly barley, wheat, spelt, oats, bread, starches, cereals, meat, poultry, fish and shellfood, eggs, cheese, drinks, honey, vegetables, fruits), baths (II.57), unctions, the sun, coldness and sexual relations (II.58), vomiting (II.59), sleep (and a lack of it) along with movement (and stillness) (II.60),

▲ Portrait of Dioscorides, *De materia medica*, f. 1v

▼ Symbolic print of Galenism, *Clave medico-chyrurgica universal*

physical exercise (II.61) and walks (II.62), running (II.63), what we would call gymnastics including combat (II.64) and the yearly regime (III.68). In other words, all the factors covered in Ibn Butlān's *Taqwīm*.

Back in the Arab world, Hunayn ibn Ishaq translated Galen's *Ars medicina* and also penned a work known conventionally as *Isagoge* (or *Introduction to medicine*)[31] according to the title of its medieval translation[32]. When he questioned Galen's six causes in the last work[33], he identified them as "natural"[34]. It was Arab-Islamic physicians who subsequently described these causes as "non-natural"[35], along with the Latin version of the *Tacuinum* and, in a more general manner, medieval medicine[36].

The ancient heritage had already been revived by Ibn Sīnā (Avicenna) in his *qānūn* (canon) in the summary in verse appearing in his *Urgūza fī 't-tibb* (*Poem on medicine*). Whilst in the former work Avicenna discussed at length the causes identified by Galen[37], amongst many other subjects, in the latter he set his thoughts forth more succinctly[38]. Consequently, in the preface to the latter, he announced that medicine is divided into theory and practice (v. 18) and that theory is subdivided into three sections (vv. 18 and 20): general concepts, symptoms and causes. In the realm of theory, he announced seven natural components of the body (v. 19) and six factors necessary (v. 19) for health. In his analysis of theory, after addressing the natural elements (vv. 23-130) including humours, amongst other things (vv. 80-95), he considers the necessary factors:

131	The necessary factors: firstly, air
162	Second necessary factor: food and drink
180	Third necessary factor: sleep and wakefulness
189	Fourth necessary factor: movement and rest
197	Fifth necessary factor: evacuation and retention
209	Sixth necessary factor: feelings

Ibn Butlān used these six necessary factors and set forth a certain number of elements for each. He did not stop here, however, proceeding to associate other causes borrowed from classic Greek medicine with this theory of the natural and non-natural causes or factors that influence health, starting with how the environment affects human health. The earliest clear mention of this theory known to exist is in the treatise *On airs, waters, places* attributed to Hippocrates, often considered to be the founder of geo-medicine or environmental medicine[39].

The treatise's underlying notion is how geo-physical conditions affect persons' constitution, state of health and psychology. Although this notion is barely surprising today, it was innovative at that time, even if only because of its forthright, broad-based wording. By way of example, we would mention the case of people living in towns exposed to hot winds[40]:

> "A city that lies exposed to the hot winds (…) the waters here are plentiful and brackish, and must be near the surface, hot in summer and cold in winter. The heads of the inhabitants are moist and full of phlegm, and their digestive organs are frequently deranged from the phlegm that runs down into them from the head. Most of them have a rather flabby physique, and they are poor eaters and poor drinkers (…) the endemic diseases are these (…) dysentery, diarrhoea, ague, chronic fever (…) cases of pleurisy, pneumonia, ardent fever[41] and of diseases considered acute, rarely occur (…) inflammations of the eyes occur with running (…)".

So as we can see, according to the Hippocratic treatise, the inhabitants of a region with these characteristics all have certain not only physical but also moral traits, plus the medico-nosological profile that these characteristics contribute to.

Although Ibn Butlān used the basic concept of *On airs, waters, places*, he transformed it too, for he expressed the influence of the environment according to the system of the four properties mentioned in ancient philosophical thought: hot, cold, dry and wet[42]. This system had, however, already been adopted by Galen[43] in his analysis of materia medica as shown by the horehound entry, for example[44]:

> "**Horehound.** The effect of the juice of the bitter horehound upon those who use it is to release obstructions of the liver and spleen, cleanse the chest and lungs and induce periods. But as a poultice, it also cleanses and eliminates [harmful substances].
> Thus it is situated in the second degree of the scale (and even very high in the second degree) as regards what is hot, and in the third degree of what is dry (towards the middle of the third degree or even higher).
> Its juice is used with honey to improve the sight, and also to remedy jaundice [when applied] via the nostrils; it is also used for chronic earache, when necessary to eliminate obstructions and clean the duct, and likewise outgrowths of flesh."

In fact, by means of these four elementary properties, Galen sought to explain the action of materia medica, for he associated these properties with the four materials constituting the cornerstones of this world: fire, air, water and earth. One clear example of this connection is provided by Galen's description of the therapeutic action of olive pomace[45]:

> "**Olive pomace.** Olive pomace is made of a hot, earthy substance, although its heat is not sufficient to be clearly caustic. If it is boiled, it becomes even thicker and drier. It should be classified in the second degree of heating substances and in the second degree of drying substances (and possibly, more precisely, at the highest point in the second degree). So it cures injuries in bodies of a dry complexion and brings those in all others to a head (…)"

This association of properties and materials also enabled Galen to explain the therapeutic mechanisms of medicines, for a cold substance made of earth, for example, is heavy. According to the principle of treatment by opposites governing all ancient therapeutics[46], if a substance is administered as a medicine to remedy a body which is too hot as a result of an imbalance of any kind, it cools it and also eliminates the matter causing this high temperature, forcing it downwards by its weight[47].

This link between the pillars of the world also enabled Galen to introduce another concept into pharmacology: the idea that the substance of natural materials consists of particles of different shape, size and weight depending on the matter comprising them. The ability of natural materials to act selectively on one organ or another depends on the relationship between the particles in the materials and those in the receptor organs, which must match. This theory is obvious in some of Galen's comments, for example, about the corncockle[48]:

> "**The corncockle.** The corncockle dries and heats considerably, to the extent that, amongst acrid products, it is close to the iris. It does not, however, have particles as light as the iris, but differs little from it and could also be classified amongst the products least hot in the third degree, and products most dry in the second degree."

With these different modifications, Galen materialised ancient pharmacology and radically transformed the previously abstract discipline. Dioscorides used the *dunamis* (which may be translated by "property") concept to express the action of the different materials. Hence the properties attributed to materia medica can include hot, cold, dry and wet as in Galen's approach, it is true, but also, more precisely and by way of example, eliminating excess bile or kidney stones, removing marks from the skin, mending broken bones and a thousand other actions effectively brought about by plants and other natural products. However, unlike Galen, Dioscorides never explained these actions as the workings of material components.

Anthemon
phyllo des
theophr

Plantam

Plantago maior

Morelle

The Galenic standardisation arising from the systematic application of the theory of the four properties and, by extension, the four materials comprising the world together with their structure, reduced the explanation of the action of medicines, since many effects in Dioscorides' approach were restricted to four properties and four materials in the manner we suggested earlier. However, this reduction was offset by a considerable theoretical gain: the action of medicines was explained by means of a system also used to explain the physiological and pathological workings of the human body[49]. The gain was not inconsiderable and made the risk of reducing the countless effects of the materia medica described by Dioscorides – at best somewhat anarchical, and at worst impossible to master and explain in general terms using unifying concepts – to a four-facet system that was very worthwhile.

The physiological system Galen used to standardise therapeutics is, therefore, that of the four humours[50], presented as a theory for the first time in the 4th century BC by the Greek physician Polybus, Hippocrates' son-in-law, whose life spanned the closing decades of the 5th and the early decades of the 4th century BC[51]. In his treatise *On the nature of man*[52], he does in fact describe human physiology in these terms[53]:

> "The body of man has in itself blood, phlegm, yellow bile and black bile; these make up the nature of his body, and through these he feels pain or enjoys health. Now he enjoys the most perfect health when these elements are duly proportioned to one another in respect of compounding, power and bulk, and when they are perfectly mingled. Pain is felt when one of these elements is in defect or excess, or is isolated in the body without being compounded with all the others (…)"

By adopting earlier theories from the realms of medicine and philosophy, Galen introduced an innovation into the system he developed. Indeed, he measured the properties of materia medica on a four-degree scale, as seen in the examples mentioned above[54].

The summary by Ibn Butlān

Returning to Ibn Butlān, he adopted several ancient theories, either directly or via one or more earlier Arab-Islamic physicians such as Avicenna, and applied them to the entire field of causes deemed to influence human health. In his revival of ancient heritage, he extended the above system of analysis to include all the elements of the necessary causes in his treatise, regardless of their nature. Hence, he specified the properties – hot, cold, dry and wet – of each of these elements, along with their effect on human physiology, measuring the extent of their action on the four-degree scale mentioned earlier, and the phases of life and temperaments of the patients they suit best, and the seasons and regions where they are the most effective. Here is the entry for sleep by way of example[55]:

◀ Corncockle, *Book of simple medicines*, f. 144

Sleep

nature	rest of the senses
optimum	the eight hours after midnight
benefit	for rest and digestion
harm	it dries the body in excess
remedy for harm	by means of refreshing food
benefit according to temperament	phlegmatic
age	old age
the season	all
the region	all

▲ Sleep, *Theatrum sanitatis*, CXCIV

In this way, Ibn Butlān completely transformed the analysis of the causes affecting human health (regardless of whether they were deemed natural or not). Indeed, he applied the analysis method used previously only for materia medica to all the elements stemming from the necessary causes. In doing so, he revived a Greek medicinal tradition overlooked for centuries, the *diaita* or way of life[56], one of whose results, and possibly the most complete, was the *kalos kagathos* (handsome and good) quality of the citizens of Athens in ancient times, i.e. physical and moral excellence[57].

However, the *Taqwīm* transformed the realm of *diaita* by the links it created between the causes affecting human health (the "six causes") and the theories about materia medica and the world, their basic properties, their degrees and the possible variations depending on age, temperament, season and region. He thus brought humanity (back) into contact with the universe, by implicitly forging a link between on the one hand the world or *kosmos*, and on the other, food and drink, medicines, physical activities, feelings and psychological state, places and circumstances of life, the weather and even, without intending to be exhaustive, leisure activities and forms of personal expression, i.e. the hundreds of things that comprise a person's life and contribute not only to well-balanced development but also survival.

By providing the information in canons, Ibn Butlān may have given the impression that he created the information in the tables by means of experiments in the modern sense of the word or, at least, that he tried to confirm the information borrowed from different sources personally[58]. One of the arguments used to uphold such an interpretation is conveyed in the following passage:

> "Bitterness is neutralised by very sweet things. And vice versa. To correct the properties of one by the other: sweetness and acidity neutralise each other's excess. Acidity neutralises saltiness (…) This disperses the constant doubt about how to neutralise excess in the properties of food. As for the deductions made at the beginning of the experiments, the specific test confirms their accuracy, as does the evidence of the senses, perceived by taking one's pulse, breathing, and the sense of touch (…)"
>
> *canon* III[59]

The following passage – referring to hypotheses probably made when natural happenings began to be observed regularly and sometimes in an organised fashion – was used in the same way[60]:

> "Of the many investigations concerning eggs we will mention just a few to arouse curiosity, even if they lie outside the field under study here (…) Why is it not the male alone that sits on the eggs like the female (…)"
>
> *canon* XIII[61]

Care must be taken not to exaggerate the nature of the comments about possible experiments since they are just simple, common-sense thoughts which may stem not only from the author's personal experience but also from earlier literature, reproduced textually. The end of the *Taqwīm* confirms the impression conveyed by the book. Indeed, Ibn Butlān refutes in advance one objection he thinks he may have to face[62]:

> "A stubborn reader may reproach us about what we deemed to be an inherent part of a thing without any proof, arguing that the use of anything not based on proof must be rejected and ignored. We declare that there is no justification or reason for not using oxymel to soothe bile until the proof of this effect is determined. We use it simply on the basis of its constant and reiterative effect in most instances."

Rather than a methodological principle of experimental science this is, indeed, a common-sense comment by someone wishing to convey the results of his personal experience, as confirmed by daily practical experience of everyday things in life. The canons are full of this type of comments:

> "Milk varies according to the sort of animal, the time of year, the time elapsed since dropping and pasture."
>
> *canon* XIII[63]

> "Meat is a very nutritious foodstuff, it produces thick blood and is a part of the diet for those who practice sport (…)".
>
> *canon* XIV[64]

There are also common-sense principles:

> "Not everything suitable for animals is suitable for humanity. It is probable that one nature is advisable for another but not for a third (…)".
>
> *canon* XVI[65]

Practical culinary details abound:

> "As for condiments, begin by cooking the ones most difficult to cook, such as root vegetables, before the ones easy to cook, such as legumes."
>
> *canon* IX[66]

> "As for spices (…) do not add too many to cold dishes, for they cause indigestion."
>
> *canon* IX[67]

And yet again:

> "Remove the grilled meat from the fire whilst its juice is still inside (…) take care not to cover the game during cooking (…) take great care when trimming the waste from the meat (…) sharpen the cleavers to break the bones without splintering them (…) keep one knife for onions (…) keep a ladle and lid specially for each cooking pot (…)".
>
> *canon* XX[68]

▶ Sweet milk, f. 57

Personal opinions can be seen there too:

"Judge each dish on the basis of the main element, bearing in mind, however, that it will be slightly weaker due to the other ingredients (…)".

canon IX[69]

This information as a whole is complemented, in the case of some elements in the table, by astrological comments such as:

"Eating sweet watermelon is not recommended when the horoscope lies in a sign of fire [Aries, Leo or Sagittarius] or water [Cancer, Scorpio, Pisces] (…) ".

canon III.15[70]

Besides the colourful astrological language, whose value one would be wise not to misinterpret, this advice indicates in fact that watermelons are eaten in April-June and August-October, i.e. in spring and autumn.

"Signs of fire [Aries, Leo or Sagittarius] or air [Gemini, Libra, Aquarius] are chosen for fumigations (…)".

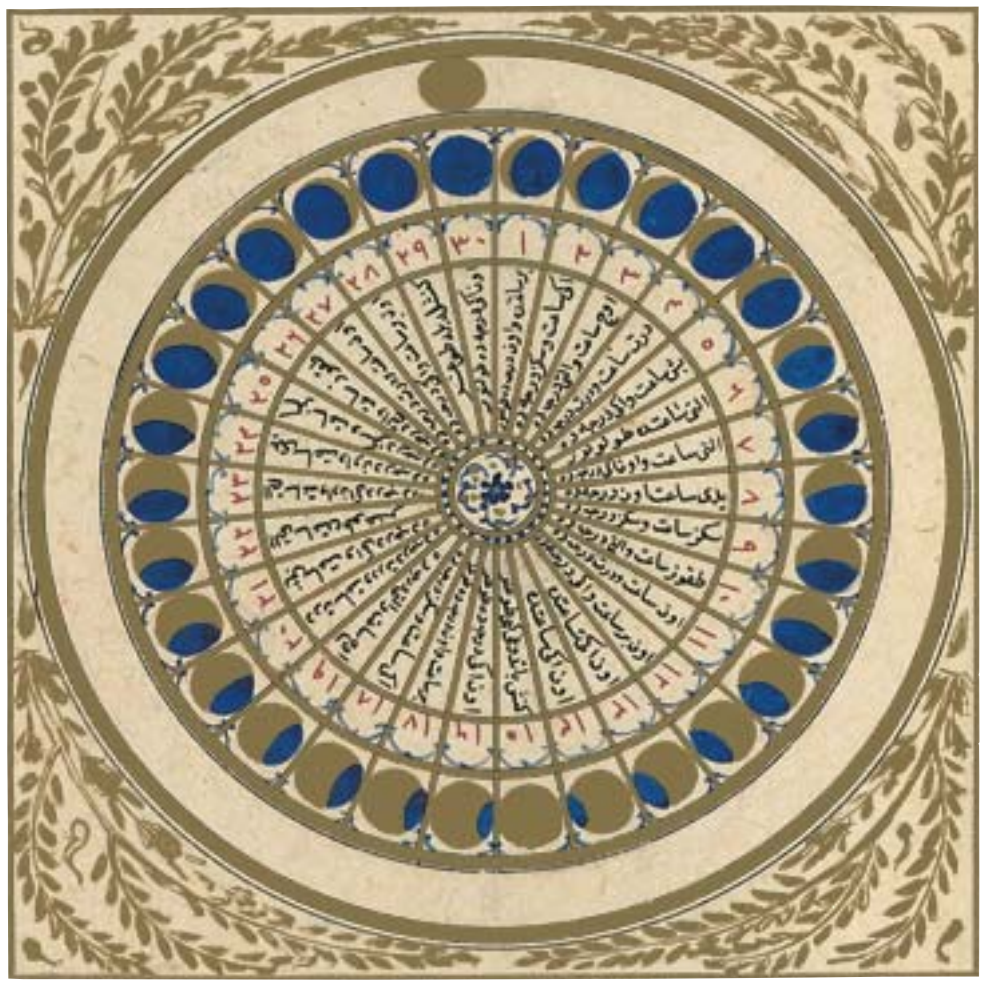
canon XXXVIII.253[71]

This advice means that fumigations must be carried out every two months between February 19th and March 20th, and between April 21st and May 20th, and so on. Strange as it may seem, this type of recommendation is based on the belief, possibly less unreasonable than modern scepticism would have us believe, that astral magnetic fields influence human health and physiology. Either way, this type of thought was readily accepted at that time, even by many scholars of the period.

Ibn Butlān's project

The main characteristic of these canons is that they contribute to creating a comprehensive, well-organised and structured discourse using the singular notions in the tables and the general notions in the canons. The procedure is economic for it makes it possible to avoid repeating information concerning several of the elements in the tables. In addition, the tables themselves have a systematic format enabling the same type of information to be provided in a regular fashion for each element analysed.

The sort of summary Ibn Butlān created made him close to other scholars of his period such as, for example, Avicenna. There is, however, a difference between the two scientists: whereas Ibn Butlān produced a summary in a single work, Avicenna created an encyclopaedia consisting of many and often voluminous works which together added up to all the knowledge of the period. In this respect, Avicenna resembles Galen, who also embraced all the knowledge of his time in a series of monographs which, as a whole, covered all the science of that period. Apart from that difference, Ibn Butlān and Avicenna did, however, resemble each other in one respect: they sought to move beyond the ancient heritage introduced into the Arab-Islamic world in the form of the translations mentioned here on several occasions, and to enlarge upon it and thus create a new science.



The circle of the different shapes of the Moon, *The Book of felicity*, f. 69

Ibn Butlān himself clearly describes the new science he sought to create in the short preface to his work[72]:

> "In our book we have attempted to abridge the long dissertations and gather together scattered notions. In this task, we follow the opinions of scholars old and new. We assert as our own only the introduction, the comparison [of notions], and the ensuing outcome (…)".

This image Ibn Butlān gives of himself is the same as the one stemming from the controversy with Ibn Ridwān: undoubtedly a learned scholar and excellent connaisseur of earlier medical and scientific literature, and possibly a good philosopher with excellent theoretical baggage too, but not necessarily a first-rate clinician with personal experience of physiology, pathology and therapeutics acquired from first-hand observation of patients. But this was possibly not what Ibn Butlān had in mind, his aim being perhaps rather to draw up rules contributing to a way of life based mainly on living in harmony with the environment and the world.

Ibn Butlān's comparison between the states of human health and the monthly lunar cycle in the book's introduction provides an insight into the author's thought[73]:

> "In most of his states, man resembles the phases of the moon. In one of its phases, for example, the moon has a corrupt nature: this is the new moon. It also has a phase in which its nature attains its plenitude: this is the full moon. In one phase it moves from plenitude to corruption: this is the waning between the full moon and the last quarter. This is also what happens to the human body: it can be corrupted (by poison, for example) or restored (by food, inter alia), although it can also be corrupted on the way to restoration (thanks to medication, for example), or by moving from health to corruption (due to the effect of a rotten foodstuff)."

The conclusion of the treatise takes up this parallelism between man and the world once again[74]:

> "A reader of my book may say, 'I have felt no need for the contents of this book in my life (…)'. If this reader took time to think, he would learn (…) that the human body is like the earth: when its owner keeps it in good condition for cultivation, giving it the right amount of water and eliminating surplus vegetation, production increases. And vice versa. What is right for the earth, is all the more so for the human body (…)".

This conclusion provides an insight into the author's intent and suggests we look upon the *Taqwīm* not as a work of experimental science but rather as an encyclopaedia in which man is an element of the cosmos subject to the rules governing it, and fed and cured by what it produces. In other words, for the reader able to understand and appreciate its implicit wisdom, it was a way of life that fostered health by linking humanity to the world and which undoubtedly led to a certain wisdom.