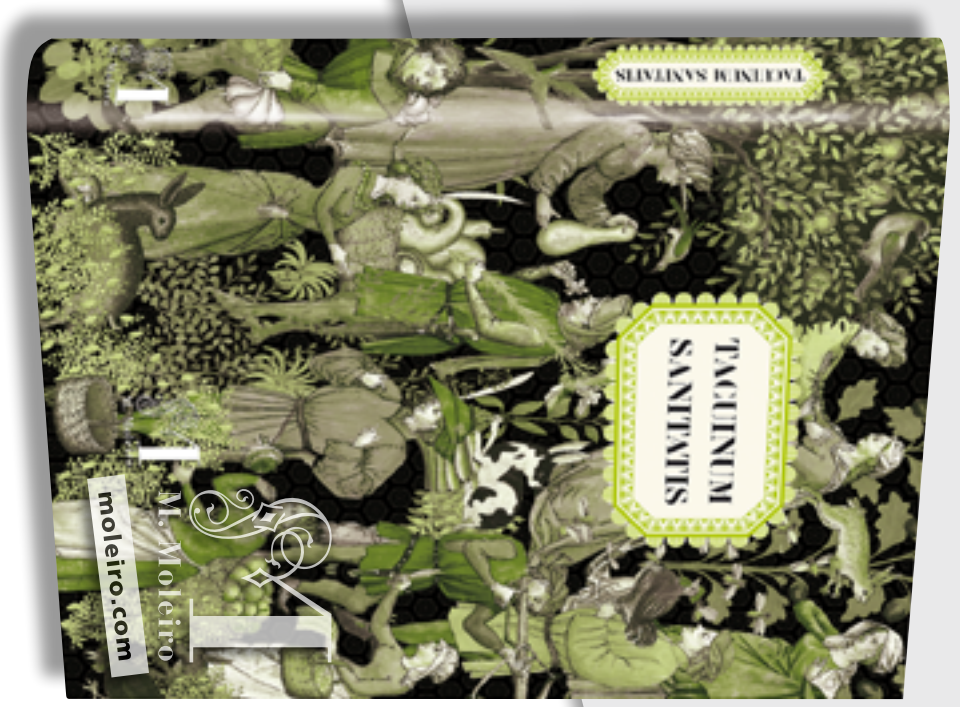


(3)

Health, disease and therapeutics

Alain Touwaide, Smithsonian Institution

Health, disease and therapeutics

Islamic medicine is traditionally believed to have been introduced into the Latin West from the 11th century onwards[1] thanks to a series of translations begun by a man called Constantine the African (who died after 1087 and before 1098-1099 AD). Traditionally believed to be from Carthage although, as revealed by recent studies, he may have been from Kairouan, his interest in the activities of archbishop Alphanus of Salerno (c. 1015-1085)[2] drove him to cross the Mediterranean in 1077 from North Africa to Italy, to Salerno to be precise. This was when he is said to have became a monk at Monte Cassino and to have translated countless Arabic medical writings into Latin.

To avoid dwelling any longer than necessary on his background, real or otherwise, and all the questions it raises, we would merely point out that, as revealed by recent research[3], his intention was not so much to disseminate Islamic medicine as to use it as a stepping stone to Greek medicine, the fundamental texts of which were not necessarily still available in the West. There was great interest in Greek medicine and Greek culture in general at that time in southern Italy. Alphanus had travelled to Constantinople and brought back and translated into Latin *De natura hominis*, a fundamental text by Nemesius (4th century AD)[4], the first person to define the new medicinal anthropology proposed by the Christian world after Christianity was imposed on society in the early centuries AD and science and medicine, as mentioned earlier, were transformed in connection with the physician saints Cosmas and Damian.

Greek medical treatises continued to be translated into Latin by judge Burgundio of Pisa (c. 1110-1193)[5], who took advantage of his frequent and sometimes extended stays in Constantinople to learn Greek. He produced Latin translations of many works not only about medicine but theology and philosophy too. Subsequently, Petrus of Abano (c. 1250-1315 or 1316) who taught in Padua, also travelled to the capital of the Byzantine Empire and brought back Greek texts which he translated into Latin[6]. These writings spanned Dioscorides and Galen's works, including Burgundio's unfinished translation of Galen. Finally, Niccolò da Reggio (active from 1308 to 1345) worked in the Angevin court in Naples translating a considerable number of Galen's treatises from Greek into Latin[7].

No matter how keen and productive this interest in Greek medicine in its original language was, it neither put an end to nor competed with the translation from Arabic into Latin of scientific texts on medicine and other subjects. The translation activity begun in Salerno subsequently spread to other cities beginning with Toledo, as demonstrated particularly by Gerard of Cremona (c. 1114-1187)[8] and Mark of Toledo (on record from 1193 to 1216)[9]. The hub then shifted to Montpellier and Arnaldus of Villanova (c. 1240-1311)[10]. Gerard's main translations in the realm of medicine were Avicenna's *Canon* and Mark's *Corpus galenicum*, whilst Arnaldus produced a Latin version of Avicenna's *De viribus cordis*, Galen's *De rigore*, and *De medicinis simplicibus* by the Arab physician of the 11th and 12th centuries Abū s-Salt Umaya ibn ᶜAbd al-ᶜAzīz ibn abī s-Salt (1068-1134)[11].

The picture would be incomplete without Sicily, often omitted when discussing the transfer of knowledge from the Arab-Islamic world to the West. We have already mentioned that the illustrations in Frederick II's treatise on falconry *De arte venandi cum avibus* resembled images in Arabic manuscripts. Indeed, Michael Scot (d. before 1236)[12] translated scientific works from Arabic into Latin at the court of Frederick II. The translations produced in Palermo probably included other texts and possibly translations from Arabic into Greek too. It was perhaps in Palermo that *Zād al-musafīr* by Ibn al-Jazzār (died c. 980), the physician from Kairouan, was translated into Greek under the title *Efodia*[13].

▲ Turnips, f. 50

▶ Turnips, *Tacuinum* Nouv. Acq. Lat. 1673, f. 43

It was undoubtedly in Sicily too that the *Taqwīm* was translated from Arabic into Latin in the latter half of the 13th century[14]. This translation faithfully reproduced the text of the *Taqwīm*, with forty tables each featuring fifteen columns (identified in this Latin translation by the word *domus*, house) and seven elements. This Latin text subsequently migrated from the south of Italy to the north at a moment yet to be defined where it was completely overhauled: not only, as pointed out earlier, was it abridged but above all, the text was enhanced with illustrations, thereby becoming what we have called the *Tacuinum*.

Full details of the text's migration from the south to north and its transformation are not known at present. After much debate by art historians, it is now generally accepted that the most splendid, extant, illustrated manuscripts – i.e. the Vienna, Paris and Rome codices[15] – are closely related and may have been made in Pavia in the workshop of the artist Giovannino de Grassi (d. 1398), who was moreover known for having worked for Giangaleazzo Visconti from 1370 onwards[16]. The Liège manuscript, on the other hand, may be from Veneto[17].

However, an in-depth comparison of their contents[18], including our manuscript, makes it necessary to modify this opinion. Although not all these manuscripts feature one hundred or so chapters from the *Taqwīm* and consequently, when all is said and done, date back to a common ancestor, it is also true that none of them (including ours) can have descended from either of them. Judging by their current condition (for, as rightly recalled by the Liechtenstein manuscript, some folios may have been manuscripts in their own right and been in circulation separately), all of them include chapters from the *Taqwīm* not appearing in others, or have chapters exclusive to them or, on the contrary, do not contain chapters appearing in one or more of the others. The added and missing sections never coincide, therefore none can be a copy of one of the others mentioned here, with the possible exception of the Vienna codex which contains nothing that does not also appear in the Rome codex, and yet, lacks two of the latter's chapters[19].

Materia medica

With no further ado, we will consider the elements all these manuscripts have in common and the particular traits of Latin 9333. The list of the *Taqwīm* chapters not retained is quite long, consisting of some 136 of the 280 numbers in the *Taqwīm*, i.e. about half its elements.

Whereas it is quite surprising that simples such as celery, chicory, tarragon and marsh mallow are omitted, others including the Nabatean leek and *mahalab* plum were undoubtedly omitted because they were rather obscure, oriental species. Similarly, thrushes are absent as are the bustard, *mamqur* fish and chickens. The Khorasan earth used for therapeutic purposes is missing, as are the minerals litharge and orpiment.

Apart from these omissions, most of which are understandable because of the rarity or high cost of these unusual, exotic products in the West, the majority of the other absent elements are omitted because of the difference between these two worlds. Hence, none of the *Taqwīm*'s cooked dishes are included, be they main courses, desserts, delicacies or pastries, and neither are massages, oil for massages, chilled water or even toothpaste. In addition to the different types of cuisine, there is also a question of different customs: the baths so typical in the Arab world were not customary in the medieval west or at least, not in the world reflected in the *Tacuinum*.

The products introduced by the *Tacuinum* are no less significant[20]. The plants are in fact those typical of a Mediterranean vegetable and medicinal herb garden: absinth, celery, aniseed, capers, fennel, hyssop, lovage, marjory, horehound, turnips, parsley, leeks, liquorice, rue, sage and broad beans.

Several fruits can be seen: sweet and sour cherries, bitter oranges, peaches and plums. There are also sweet almonds, chestnuts and pine nuts and finally, laurel berries. Grapes and figs can be seen along with what was undoubtedly a rather exotic fruit: the sweet, ripe date.

This list of products, which suggests a vegetable garden containing possibly medicinal simples alongside an orchard or wood, is complemented by the list of cereals including spelt, millet, rye and sorghum.

Meat includes pork, quails, pheasants and turtledoves, with a fish (lamprey) and crustaceans (crabs) listed too.

The other additions to the *Tacuinum* are manufactured products ranging from curds and ricotta to olive oil, white bread and wheat or barley gruel. Verjuice, white wine and vinegar are here too, as are gelatine and sour syrup.

▼ Capers, bitter oranges, common millet and lampreys, ff. 21v, 16v, 46 and 82

Finally, two weather conditions – east and west winds – are introduced, since the *Taqwīm* only mentions north and south winds. Woollen garments complete the panorama, undoubtedly to cope with the northernmost winter weather.

Just one undoubtedly rare and obviously expensive product is added to the list: saffron.

Rather than detailing all the additions to the other manuscripts, we will mention just a few to give an idea of the range of the items.

The Rouen manuscript, for example, complemented by Sam Fogg's, includes an aromatic plant, rosemary; a cereal, oats; an oil described as *violaceum*; and an exotic, rare and probably expensive substance, aloe wood.

The Liège *Tacuinum* introduces not only common plants such as juniper, clover and mushrooms, but also prepared dishes including different types of roasted, raw, salted and preserved meat. It also includes two rarer and exotic substances: ostrich eggs and cinnamon.

Finally, the Paris manuscript (Nouv. Acq. Lat. 1673) adds just a few new products: a single vegetable: cabbage; two fruits: blackberries and lemons; and rabbit meat.

These different additions suggest repeated attempts to tailor the *Tacuinum* to changes in taste, circumstances and resources depending on places and, undoubtedly, times, trends and purchasing power. There is, however, nothing extraordinary in any of these manuscripts, apart from the occasional more exotic and probably more expensive product such as saffron, aloe wood and cinnamon, the only apparent problem being ostrich eggs[21].

It is important not to consider the addition of these elements from a strictly linear, on-going and cumulative viewpoint for although it is true that each of these manuscripts incorporates new products, they all omit others appearing in one or more of the others. Hence this is not a cumulative system progressing step by step until a certain total is achieved but rather a range of individual features, nonetheless rooted in a common pool of elements.

This might lead to the *Tacuinum* being interpreted somewhat differently from the usual manner. Although certain manuscripts were lavish, ostentatious items, the text itself could have been written directly from the medical practice it was said to reflect. Proof of our theory is required at this stage of our analysis. It must, however, now be said that the actual number of the substances in each manuscript moves in the same direction. Whereas, it will be recalled, there were 280 items in the *Taqwīm* (40 tables each with 7 elements to be precise), they were reduced to 237 in the Rouen/Fogg manuscript, 207-204 in the Vienna and Rome codices and ours, and 168 in the Liège manuscript. This reduction is no coincidence and is in keeping with the tendency often observed in traditional societies to reduce the range of medicinal substances to an ideal number permitting a balance between handling, needs and resources.

▲ Curds, f. 59v
◀ Saffron, f. 37v

Health and therapeutics

When viewed as a whole, the "elements", as we call them, in the *Taqwīm* – regardless of their type: materia medica in the strict sense of the term, activities, geographical locations and chambers, inter alia – involve a wide range of actions that could affect the human body, from reproduction to sports activities for example. The following table shows all the 125 different activities in the treatise, grouped as far as possible, given the considerable differences between the medieval school of medicinal thought and ours, into large, logical categories. The number next to each item in the list below is the number of instances. The items in each category and the categories themselves are in alphabetical order.

Body temperature regulation

- body temperature ... 2
- heat (increase) ... 1
- hot flushes ... 1
- joints (protect from cold) ... 1
- numbness caused by cold ... 1

Brain

- brain ... 6
- head ... 3
- meningitis ... 1
- migraine ... 1

Cardiovascular system and blood

- blood ... 3
- bloodletting ... 1
- blood vessels ... 1
- haemorrhages ... 1
- heart (strengthen) ... 3
- nosebleeds ... 1

Convalescence

- convalescents ... 3
- fortifier ... 2

Digestive system

- bowels (move) ... 2
- burping ... 2
- colic ... 4
- constipation (prevent or cause) ... 9
- diarrhoea ... 6
- digestion ... 15
- entrails ... 6
- evacuations ... 1
- excretions (reduce or facilitate) ... 2
- haemorrhoids ... 1
- intestinal worms ... 1
- intestines ... 3
- laxative ... 2
- liver ... 9
- motions (excess) ... 1
- secretions ... 3
- stomach ... 16
- ulcers (prevent) ... 1
- vomiting ... 7
- wind ... 1

Drunkenness

- drunkenness (prevent) ... 6

Fatigue, sleep, stress

- fatigue ... 1
- insomnia ... 3
- resisting fatigue caused by work ... 3
- rest ... 1
- stress (reduce) ... 1

Fever and inflammations

- fever ... 1
- inflammations (bring to a head) ... 1

General pathology

- elephantiasis ... 1
- fever recurring every 2 days ... 1
- illness in general ... 1
- jaundice ... 1
- measles ... 1
- serious illnesses ... 2
- smallpox ... 1

General physical condition

- general balance ... 1
- general health ... 3
- general well-being ... 2
- minerals ... 1

Injuries and scars

- scar formation ... 1
- wounds (drying) ... 1

Joints and bones

- bones ... 1
- gout ... 1
- joints ... 2

Mouth and teeth

- breath ... 2
- gums ... 3
- mouth (heat) ... 1
- teeth ... 7

Nervous system

- convulsions ... 1
- fainting ... 1
- hemiplegia ... 2
- movement ... 1
- nerves ... 2
- sciatica ... 1

Nutrition

- appetite ... 6
- hunger (assuage) ... 1
- nourish ... 1
- seasoning ... 1
- thinness (feed) ... 1
- thirst (slake) ... 2
- weight (lose) ... 1
- weight (put on) ... 3

Obstetrics and neonatology

- afterbirth (expel) ... 1
- fever during childbirth ... 1
- milk ... 1

Pain

- pain ... 1

Physiology

- animal principle of life ... 1
- bile ... 9
- obstructions ... 3
- phlegm ... 3
- thick humours ... 1

Psychology

- character ... 3
- intellect ... 1
- psychology ... 1

This alphabetical list is followed by the series of groups formed on the basis of the total number of times the different items in the groups appear. The other column states the percentage each group accounts for of the whole. This information is set forth in the following table 1.

Table 1 · Therapeutic properties in the *Taqwīm* by main categories

Category	Number of instances	Percentage of whole
digestive system	92	26.97
tonus	27	7.91
sexuality and sexually transmitted disease	25	7.33
physiology	17	4.98
urinary tract	17	4.98
nutrition	16	4.69
respiratory tract	15	4.39
mouth and teeth	13	3.81
skin and cosmetics	13	3.81
brain	11	3.22
cardiovascular system and blood	10	2.93
upper respiratory tract	10	2.93
fatigue, sleep, stress	9	2.63
general pathology	8	2.34

nervous system	8	2.34
overall physical condition	7	2.05
venoms and poisons	7	2.05
drunkenness	6	1.75
body temperature regulation	6	1.75
convalescence	5	1.46
psychology	5	1.46
sensory organs and sensorial perception	4	1.17
obstetrics and neonatology	3	0.87
joints and bones	3	0.87
injuries and scars	2	0.58
fever and inflammation	2	0.58
pain	1	0.29

In order to understand this table it must be compared with one or more other tables containing information organised in the same way. On the basis of Dioscorides' *De materia medica*, a similar table (table 2 below) is obtained. It features the total number of times the different ailments appear in the work according to the main categories.

Table 2 · Therapeutic properties in Dioscorides' *De materia medica* by main categories

Groups of ailments	Number of instances	Percentage
skin, nails, mucous membranes	626	11.64
gastrointestinal system	596	11.08
toxicology	481	8.94
gynaecology, obstetrics	377	7.01
urinary tract	348	6.47
respiratory system and tract	327	6.08
eyes and sight	316	5.87
bones, joints, fractures	231	4.29
wounds and ulcers	223	4.14
humours	140	2.60
inflammations	138	2.56
mouth, gums, throat, voice	130	2.42
ears, hearing	120	2.23
iatrogenic problems	120	2.23
nervous system, spasms and trembling	110	2.04
blood, veins	107	1.99

swelling, hydropsy	96	1.78
hepatic system	92	1.71
minor wounds	90	1.67
food, digestion	82	1.52
spleen	76	1.41
fevers	65	1.20
teeth	54	1.00
nerves, muscles, paralysis	51	0.94
gout	48	0.89
hair	36	0.66
tuberculosis	33	0.61
male genitals	28	0.52
flow	27	0.50
ganglion system	27	0.50
external parasites	24	0.44
pain	21	0.39
asthenia	20	0.37
psychology	13	-
equilibrium problems	9	-
lepromatous leprosy	6	-
overeating	5	-
sleep	4	-
contagious diseases	2	-

The similarities and differences in the two tables are eloquent. Digestive system disorders are clearly of considerable concern in both works, being positioned first in the *Taqwīm* and second in *De materia medica*. This is an indication of the frequency of the disorders caused by diet in two worlds: the Arab empire and, prior to that, the Roman Empire. Similarly, disorders of the urinary tract appear many times in the two works. Skin problems on the other hand, the ailment of greatest importance in *De materia medica*, are relegated to ninth position in the *Taqwīm* where they are mainly of aesthetic concern. Moreover, what we refer to as "tonus" in the *Taqwīm* has no equivalent in Dioscorides' work. What in fact is absent from *De materia medica* is diet and all the substances and living conditions related to sports activity and relaxation. The realm of sexuality caught Ibn Butlān's attention too for it is positioned third after the digestive system and sports. Whilst it is true that this group features one entry about sexually transmitted diseases, it includes mainly aphrodisiacs and products to promote sperm. Although Dioscorides' work mentions plenty of aphrodisiacs, they are nonetheless far less important than in the *Taqwīm*. Gynaecology, on the other hand, barely mentioned in the former, is the fourth category in *De materia medica*. Fatigue, sleep and stress, moreover, like physical condition, general well-being and psychology, are important areas in the *Taqwīm* but almost completely absent in Dioscorides' treatise. Finally, to conclude these very illuminating comparisons, we would say that the pathology and pain appearing in so many categories in Dioscorides' work, hardly appear in the *Taqwīm*.

The *Taqwīm*'s concern for convalescents may come as a surprise since this work seems to focus more specifically on healthy people. This is not, however, so strange since it is in fact merely another aspect of the research into well-being conveyed throughout the *Taqwīm*. This is undoubtedly the main difference between the two treatises: Dioscorides' *De materia medica* aims not to look after people's well-being – even though this is, by definition, the purpose of medicine – but to provide guidance for people and, even more, their physicians when choosing the natural substances best able to remedy or cure the diseases affecting the citizens and others living in the empire. Written in the Roman world of the 1st century AD, i.e. a world whose size was about to peak, he sought to provide a comprehensive insight into the realm of materia medica in order to serve the populations of the empire better. The *Taqwīm* seems almost hedonistic in comparison and certainly makes no attempt to be universally useful like *De materia medica*. It is apparently a work written if not for an elite class, at least for a much smaller readership undoubtedly not driven by disease like the patients and physicians who consulted Dioscorides' encyclopaedia. On the contrary, the people consulting and using Ibn Butlān's text were concerned about resting, looking healthy and having good breath, perhaps about being rather stout – because emaciated bodies were certainly not in fashion – and having enough vigour and strength to play sports or even go hunting, and relaxing, dressing to suit the different seasons and finally, eating and drinking to their fill without suffering the consequences of eating too much rich food or even drunkenness.

▲ Barley gruel, f. 42v

From the *Taqwīm* to the *Tacuinum* and manuscript Latin 9333

The time has come to analyse the Latin translation of the *Taqwīm* and more specifically, the illustrated version of this text. In our preceding analysis of the elements not appearing in the *Tacuinum* we suggested their absence was due to a lack of availability or because of different customs. It was on this basis that we advanced our theory that the practice of medicine may have played an important role in this shift from the *Taqwīm* to the *Tacuinum*.

We will now pursue our analysis by addressing the elements eliminated from the *Taqwīm* text. At this stage, we will focus on the elements missing from all the similar *Tacuinum* versions. They are listed in the following table with categories like those mentioned above about the uses made of all the elements in the full Arabic text of the *Taqwīm*. Again, as in that case, the name of each item is followed by the number of times it is mentioned.

Body temperature regulation
body temperature 2
hot flushes 1

Brain
head 1

Cardiovascular system
bloodletting 1

Digestive system
colic 1
constipation 1
diarrhoea 1
digestion 3
burping 2
stomach 6
excretions (reduce) 1
flatulence 1
liver 4
intestines 1
laxative 1
secretions 1
ulcers 1
bowels (move) 1
entrails 4
vomiting 3

Drunkenness
drunkenness 5

Fatigue, sleep, stress
insomnia 1

General pathology
jaundice 1

Injuries and scars
scar formation 1

Joints and bones
joints 2

Mouth and teeth
teeth 4
gums 3
breath 2

Nervous system
hemiplegia 1
nerves 2
sciatica 1

Nutrition
appetite 5
seasoning 1
hunger (calm) 1
thinness (nourish) 1
nourish 1

Obstetrics and neonatology
fever during childbirth 1
afterbirth (expel) 1

Overall physical condition
general health 3

Physiology
bile 4
obstructions 2
phlegm 2

Respiratory tract
chest 3
lungs 1

Sexuality
aphrodisiac 7
sperm 2

Skin and cosmetics
detergent 1
emollient 1
skin 3
dry wounds 1
freckles 1

Tonus
flesh (fortify) 1
body (fortify) 4
mind (fortify) 3
for hunters 1
sporting people 5

Upper respiratory tract
cough 1
trachea 1

Urinary tract
diuretic 3
swelling in lower limbs 1
kidney 1
urine 2

To appreciate the significance of the different reductions, they must be analysed and compared with the total number of times the therapeutic properties appear in the *Tacuinum* and, more specifically, in our manuscript. A first assessment is, however, possible by lining up the total number of times the items appear in the *Taqwīm* and are absent in the *Tacuinum*. The outcome is shown in table 3 below. The categories which are the same in the two versions are shown in bold. In the column listing the instances in the *Tacuinum*, we also mention the difference between the number of instances in comparison with the *Taqwīm*. Subtracting this number from the total number of times this category appears in the *Taqwīm* gives the exact number of instances in the *Tacuinum*.

Table 3 · Comparison of therapeutic properties in the *Taqwīm* and the *Tacuinum* manuscripts as a whole

Category	*Taqwīm*		*Tacuinum*	
	Number of instances	Percentage	Number of instances	Percentage
digestive system	92	26.97	- 32 = 60	27.69
tonus	27	7.91	- 14 = 13	5.99
sexuality and sexually transmitted disease	25	7.33	- 9 = 16	5.90
physiology	17	4.98	- 8 = 9	3.22
urinary tract	17	4.98	- 7 = 10	3.69
nutrition	16	4.69	- 9 = 7	2.95
respiratory tract	15	4.39	- 4 = 11	4.05
mouth and teeth	13	3.81	- 9 = 4	1.47
skin and cosmetics	13	3.81	-7 = 6	1.84
brain	11	3.22	- 1 = 10	3.69
cardiovascular system	10	2.93	- 1 = 9	3.32
upper respiratory tract	10	2.93	- 2 = 8	2.95
fatigue, sleep, stress	9	2.63	- 1 = 8	2.40
general pathology	8	2.34	- 1 = 7	1.47
nervous system	8	2.34	- 4 = 4	1.47
general physical condition	7	2.05	- 3 = 4	1.47
venoms and poisons	**7**	**2.05**	**7**	**2.40**
drunkenness	6	1.75	- 5 = 1	0.36
body temperature regulation	6	1.75	- 3 = 3	1.10
convalescence	**5**	**1.46**	**5**	**1.84**
psychology	**5**	**1.46**	**5**	**1.84**
sensory organs and sensorial perception	**4**	**1.17**	**4**	**1.47**
obstetrics and neonatology	3	0.87	- 2 = 1	0.36
joints and bones	3	0.87	- 2 = 1	0.36
injuries and scars	2	0.48	- 1 = 1	0.36
fever and inflammation	**2**	**0.58**	**2**	**0.73**
pain	**1**	**0.29**	**1**	**0.36**

The most drastic reductions concern the mouth and teeth (- 2.35%), skin and cosmetics (- 1.97%), "tonus" as we call it, i.e. the tonic substances needed for sports activities (- 1.92%), the urinary tract and diet (both reduced by 1.75%), and sexuality and drunkenness (both reduced by 1.40%). Obstetrics and neonatology disappear almost completely. The higher percentage of other groups is relative, being the result not of increased importance but the fact that the total number of articles fell whilst the number of instances remained unchanged.

So the balance would seem to have been redressed, in line, at this stage of our analysis, with less concern for dental aesthetics, mouth hygiene and cosmetics, a reduction in the support for the physical effort needed in sport; less attention to urinary disorders and diet (the reductions in the two areas may be related) and fewer substances to invigorate sexual intercourse and reduce the effects of drunkenness! In short, different aspects of life that were obviously not those of a working population more concerned about daily survival, no matter how positive these aspects of life may have been and are to personal development and well-being.

The first indications provided by this analysis are confirmed if one takes into account, not just the elements present and absent in the *Taqwīm* and *Tacuinum* respectively, but all the elements in the *Tacuinum* and, more specifically, our manuscript Latin 9333. This includes the additions to the *Tacuinum* in general and to our manuscript in particular. Once again, we provide first a table of the instances by category using the same format as above, followed by a tabular summary.

Body temperature regulation

cooling	1
body temperature regulation	2
hot flushes	1

Brain

brain	6
intellect	2
migraine	2

Cardiovascular system

heart	6
haemorrhages	1
nosebleeds	1
blood	1

Convalescence

convalescents	3

Digestive system

colic	5
diarrhoea	1
digestion	9
dysentery	1
stomach	32
stools	1
expulsion	1
haemorrhoids	1
hernias	1
indigestion	1
sickness	1
spleen	1
retention	1
digestive system	19
belly	13
worms	5
entrails	1
vomiting	1

Drunkenness

drunkenness	2

Fatigue, sleep, stress

insomnia	3
bodily relaxation	1

Fever

fever	2
inflammations (bring to a head)	1

General pathology

leprosy	1
diseases	3
cold diseases	1

General physical condition

complexion	1
general physical condition	1
vital faculty	1
general weakness	2
hectics	1
recuperation	1
animal life	1

Gynaecology

menstruation	2

Joints and bones

joints and bones	1
gout	1

Mouth and teeth

teeth	1
gums	1
breath	1

Nervous system

epilepsy	1
movement	1
nerves	2
paralysis	2
sciatic	1
fainting	3

Nutrition

foods	1
appetite	7
meat seasoning	1
hunger (calming)	1
fat (remove excess)	1
nourish	6
weight (put on)	8
flavours	1
thirst	5

Obstetrics and neonatology

milk	2

Pain

pain	2

Physiology

yellow bile	13
humours	9
obstruction	11
liver obstruction	2
phlegm	1
sweat	1

Psychology

fear	1
anxiety	1
depression	1
pleasure	2
psychology	3
dream	1

Respiratory tract

Consumption sufferers 1
chest 14
lung 3

Sexuality and sexually transmitted diseases

aphrodisiac 1
intercourse 12
generative faculty 1
gonorrhoea 1
sperm 4

Sensory organs and sensory perception

ophthalmia 1
sensory organs 1
sense 1
sight (those who cannot see at night) 1
sight (improve) 1
sight (sharpen) 1
eyes 1

Skin and cosmetics

black skin ailments 1
corns 1
removes blotches 1
skin 1
dandruff 1

Tonus

body (fortify) 2
mind 1
active persons 6
tonus 4

Upper part of the body

upper part of the body 2

Upper respiratory tract

hoarseness 1
throat 4
upper respiratory tract 9

Urinary tract

stones 1
sand 1
urinary tract 23
bladder 1

Venoms and poisons

intoxication 1
poisons 2
venoms 4

This information is summarised in the following table showing the total number of times each article appears according to the different categories we have identified.

Table 4 · Therapeutic properties in the Paris *Tacuinum* (Latin 9333) by main categories

Category	Number of instances	Percentage
digestive system	95	26.98
physiology	37	10.51
nutrition	31	8.80
urinary tract	26	7.38
sexuality and sexually transmitted diseases	19	5.39
respiratory tract	18	5.11
upper respiratory tract	14	3.97
tonus	13	3.69
brain	10	2.84
nervous system	10	2.84
psychology	9	2.55
cardiovascular system	9	2.55
general physical condition	8	2.27
sensory organs and sensory perception	7	1.98
venoms and poisons	7	1.98

general pathology	5	1.42
skin and cosmetics	5	1.42
fatigue, sleep, stress	4	1.13
body temperature regulation	4	1.13
mouth and teeth	3	0.85
convalescence	3	0.85
fever	3	0.85
joints and bones	2	0.56
pain	2	0.56
gynaecology	2	0.56
drunkenness	2	0.56
obstetrics and neonatology	2	0.56
upper part of the body	2	0.56

To see the exact changes between the *Taqwīm* and our manuscript and their specificity, we compared the different categories in the two versions of Ibn Butlān's text and then each of them to each other and to their equivalent in Dioscorides' *De materia medica*, a sort of yardstick, particularly because he sought to cover all the medical conditions of a population, which was, moreover, about to peak. In both respects we believe the treatise provides statistically significant evidence of the normal, so to speak, epidemiology of an entire population in the ancient Mediterranean world at a specific time in its history.

To make the information easier to understand, we have assigned each category a number according to its position in the table in the work to which it belongs (see table 1 for the *Taqwīm*, table 2 for Dioscorides and table 4 for the *Tacuinum* in Latin 9333). The order of the categories in table 5 below is the same as in manuscript Latin 9333.

Table 5 · Importance of the main categories of therapeutic properties in Latin 9333 (column 1), Dioscorides' *De materia medica* (column 2) and *Taqwīm* (column 3)

Category	Latin 9333	Dioscorides	*Taqwīm*
digestive system	1	2, 18, 20, 21	1
physiology	2	10	4
nutrition	3	20, 37	6
urinary tract	4	5, 17	5
sexuality and sexually transmitted diseases	5	28	3
respiratory tract	6	6	7
upper respiratory tract	7	6	12
tonus	8	-	2
brain	9	-	10

nervous system	10	24	15
psychology	11	34	21
cardiovascular system	12	16	11
general physical condition	13	-	16
sensorial organs and sensory perception	14	7, 13	22
venoms and poisons	15	3	17
general pathology	16	27, 36, 39	14
skin and cosmetics	17	19	9
fatigue, sleep, stress	18	33, 38	13
body temperature regulation	19	-	19
mouth and teeth	20	12, 23	8
convalescence	21	-	20
fever	22	22	26
joints and bones	23	8, 25	24
pain	24	32	27
gynaecology	25	4	-
drunkenness	26	-	18
obstetrics and neonatology	27	4	23
upper part of the body	28	-	-

These three texts coincide as regards the attention paid to the digestion and urinary systems, the respiratory tract, the cardiovascular system and fevers, giving them all more or less the same weight, although our two texts apparently place more emphasis on the cardiovascular system than Dioscorides. However, the *Taqwīm* and our version of the *Tacuinum* are apparently more concerned, to more or less the same degree, with physiology, the nervous system, psychology, fatigue (together with sleep and stress), pain, with slightly more attention paid in the *Tacuinum* to physiology, the nervous system and pain, and considerably more to psychology. This work is not, however, as concerned about fatigue, sleep and stress as the *Taqwīm*. On the contrary, neither the latter nor the *Tacuinum* pay any attention to gynaecology: a key area in *De materia medica*. Our text makes up for this imbalance somewhat, albeit in a different way, since, on the one hand, it features gynaecology (albeit only in passing, this being the 25th category), a subject totally missing from the *Taqwīm* and, on the other, it reduces the importance of obstetrics and neonatology, but not radically.

In addition to the similarities and differences in our two texts in comparison with Dioscorides, there are also differences between them. The Paris *Tacuinum*, for example, attaches greater importance to diet than the *Taqwīm*, increasing its already important role in our two works. Similarly, our manuscript reveals greater interest in the upper respiratory tract, thereby giving this subject the same importance as in Dioscorides' work. Although it does the same for the sensorial organs and sensory perception, moving them up from the 22nd to the 14th position, it does not give them the same importance as in *De materia medica*.

These areas receive more attention whilst others receive less, beginning with the prevention and treatment of drunkenness, which falls to the bottom of the categories in our manuscript. The difference of 8 positions in the list between the latter and the *Taqwīm* is the same as regards skin and cosmetics. Cosmetics are not, however, moved as far down as the previous subject, remaining 17th in our manuscript, down from 9th in the *Taqwīm*. Finally, the interest in sexuality falls slightly in Latin 9333, down from 3rd to 5th place, although this change is hardly radical given that it is placed 28th in *De materia medica*.

Hence the approach of our text is apparently quite realistic since it redresses the weight of certain items in comparison with the *Taqwīm*, giving them about the same importance as in Dioscorides' text. This new balance is accompanied by a certain shift in the centre of interest towards the vital functions and essential systems. The overall framework is, however, characterised by a certain hedonism, more typical, as we said before, of the *Taqwīm*. In other words, an effort had been made to bring Ibn Butlān's writing more into line with the daily needs of the population attended by the medieval physicians duly accredited by universities.

Therapeutics and scholarly medicine

The scholarly nature we perceive in the revision can be seen more clearly in the list of the properties attributed to the elements. We have in fact pointed out that the effects of the elements in Ibn Butlān's text are described by several parameters, i.e. their properties (hot, dry, wet and cold) expressed in degrees (on a scale of 1 to 4).

Although the descriptions in the *Tacuinum* are exactly the same as in the *Taqwīm* in many instances, others do differ as regards either the identification or degree of the properties, as shown by the following examples.

Table 6 · Properties of the elements in the *Taqwīm* and the *Tacuinum*

Element	*Taqwīm*				*Tacuinum*			
	first property		second property		first property		second property	
	property	degree	property	degree	property	degree	property	degree
asparagus	hot	1	-	-	hot	1	wet	1
aubergines	hot	2	dry	2	hot	4	wet	3
barley water	wet	2	cold	1	cold	2	dry	2
beans	hot	2	-	-	hot	1	wet	1
lettuce	cold	3	wet	2	cold	2	wet	2
black olives	hot	-	wet	-	hot	-	dry	-
salted fish	hot	-	dry	-	hot	2	dry	2
prunes	cold	2	wet	2	cold	1	wet	2
rice	hot	1	dry	2	cold	2	dry	2
fragrant old wine	hot	2	dry	3	hot	2	-	-

Despite appearances, these changes were probably not random but the result of an analysis of materia medica and the Galenic tradition in this realm[22]. Galen did indeed create this system for describing the properties of medicinal substances, a system that was then adopted and even taught in medieval universities, as mentioned in the study of this subject by Arnaldus of Villanova. The description of the properties of the elements added to the *Tacuinum* according to this system, reveals the undoubtedly learned nature of these additions, which was in fact university medicine[23].

This aspect is confirmed by studying the elements that the *Tacuinum* adds to the *Taqwīm* because the former are described by the same model used for the elements in the original text, i.e. with their properties and degrees.

Hence, the author of the *Tacuinum* additions did not simply introduce these new elements to the knowledge he may have had of them, but conveyed his knowledge by means of Ibn Butlān's system. He must therefore have been aware of this system and the respective theory and applied them to good end.

One last modification will finally convince us that the shift from the *Taqwīm* to the illustrated *Tacuinum* was in fact the work of scholars. In the original work, the main subjects in the tables containing the different elements are arranged as follows:

Main groups of elements	Tables
vegetable world	1 – 11
animal world	12 – 19
cooked dishes	20 – 24
substances linked to human activities	25 – 30
human activities	31 – 32
hygiene	33 – 35
personal care and clothing	36 – 38, no. 5
geographic and sanitary setting	38, nos. 6 – 40

In the *Tacuinum* and, specifically, the group our manuscript belongs to[24], this order is modified as follows:

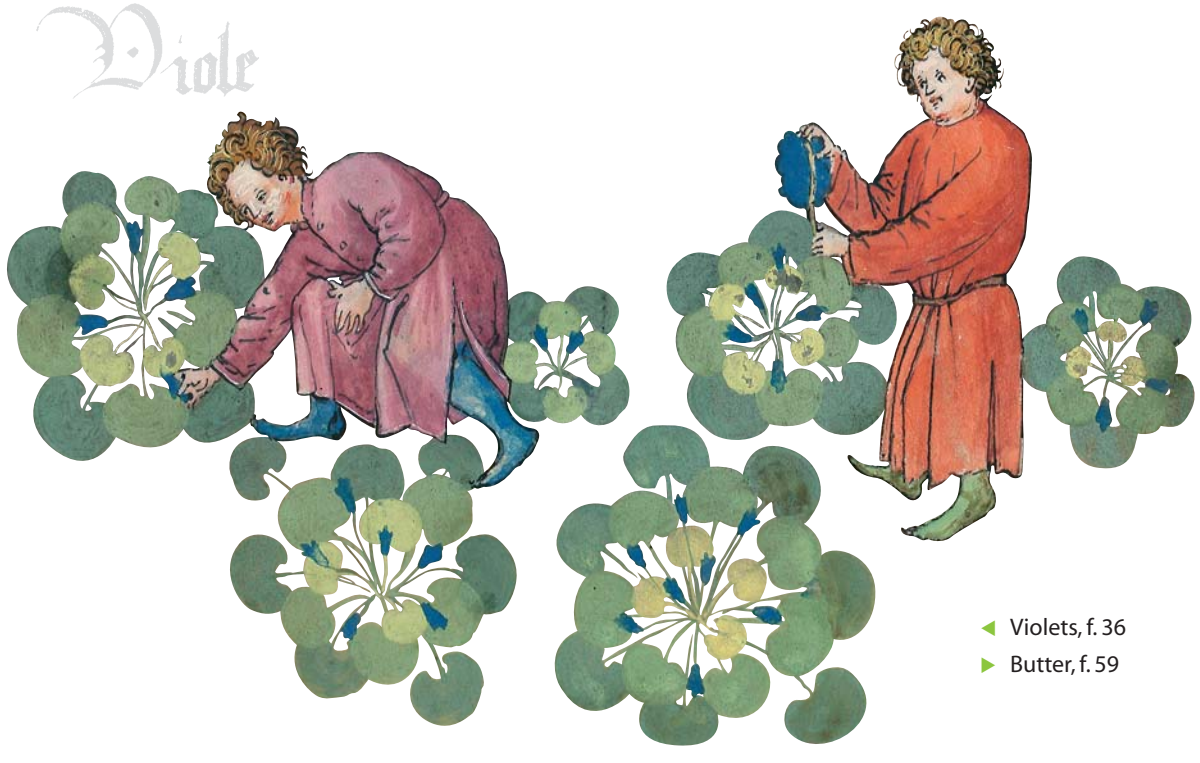
Main groups of elements	Folios
vegetable world (including theriac)	1v – 51v
seasons and winds (including raisins and dried figs)	52r – 56v
dairy products and bread	57r – 62v
animal world (including ambergris)	63r – 82v
liquids	83r – 92r
candles and sports activities	92r – 93v
houses	94r – 94v
feelings (including drunkenness)	95r – 96v
human activities	97r – 102v
clothes	103r – 104r
birds	104r

Besides the obvious differences, there are other, more subtle changes which emphasise a different concept of the work. Although both versions begin with the vegetable world, they finish on opposite points: the *Taqwīm* ends in fact with plague-laden air and theriac, said to remedy diseases borne by plague-laden air; whilst our manuscript closes with birds, which are, as mentioned earlier, considered to be hot and dry and aphrodisiacs. In other words, a rather pessimistic, alarming vision dominated by the image of possible death in the Arabic work and, on the contrary, a positive aspect of life in the Latin version in our manuscript.

The different ways in which the *Taqwīm* and the group of manuscripts that our codex belongs to are brought to a close is all the more interesting because two other copies of the *Tacuinum*, i.e. Paris, Nouv. Acq. Lat. 1673 and Liège, whilst featuring the same chapter about birds, include it in the series about poultry (Nouv. Acq. Lat. 1673, f. 72r and Liège, f. 55v). Hence there were apparently two versions of the sequence of chapters, as suggested by the fact that in the Rouen/Sam Fogg manuscript, the two versions are present. An image of the birds does in fact appear in the poultry series (Rouen, f. 52r) and the other at the end of the manuscript (Sam Fogg, no. 130). This rules out that this chapter was relocated as a result of a folio being accidentally inserted into a codex that was subsequently copied and formed the basis of our group of three manuscripts. On the contrary, it would seem that it was a deliberate decision.

Interventions of this kind can be seen elsewhere in the manuscripts[25]. In Nouv. Acq. Lat. 1673, for example, the basil described as *curatum* (f. 22v) is listed amongst edible herbs (rocket [f. 21v], a wrongly identified fragrant basil [f. 22], glove-scented basil [f. 22v], mustard [f. 23] and aniseed [f. 23v]). This is also the case in the Liège codex although it does not include aniseed (rocket [f. 10], fragrant basil [f. 10v], glove-scented basil [f. 11] or mustard [f. 11v]). In our group of manuscripts, this *curatum* basil is one of the fragrant plants (f. 36v), along with the rose, lily and violet (ff. 35-36)[26]. Another case is that of olive oil which in manuscript Nouv. Acq. Lat. 1673 (f. 15), for example, follows the chapter about olives (f. 14v), whereas in our manuscript and those of Vienna and Rome, it features in the chapter about prepared products (f. 88v in our manuscript).

The text in the Liège manuscript was apparently reshuffled more, leaving the main products in the following order:



◀ Violets, f. 36
▶ Butter, f. 59

Main groups of elements	Folios
dairy products	38r – 41r
eggs	41v – 42r
meat	42v – 50r
poultry	50v – 55v
liquids	56r – 58v
fish	59r – 61v
sugars	62r – 63v
rose	64r
human activities	64v – 72v
clothes	73r-v
waters	74r – 76v
chambers	77r – 78r
winds, seasons, regions	78v – 82v
four heterogeneous elements[27]	84v – 86r

It is undoubtedly significant that this order resembles the order in the *Taqwīm* more than the one in our manuscripts, even though the latter is different from the *Taqwīm* order too. Indeed, the latter includes dairy products (nos. 80-85), eggs (nos. 89-91), meat (nos. 92-100), poultry (nos. 101-112) and fish (nos. 113-119).

Hence the order of the chapters in our manuscript and the group it belongs to are not random but a deliberate arrangement that drifts slightly further away from the Arabic original than the Liège manuscript. However, the path leading from the vegetable world to the conclusions we have emphasised above differs in the *Taqwīm* and in our manuscript and its group. It is quite simple in the *Taqwīm* with a three-part structure – nature, humans, setting – and more complex in our *Tacuinum* and its family. The seasons and winds are repositioned after the vegetable world as if to emphasise the cycles of nature, and raisins and dry figs are included: fruits also in line with a certain lifestyle, harvested as they are in autumn and eaten in winter. Dairy products, the fruit of human labour (as are the wheat gruel and theriac that precede this section about seasons and winds) forge a link with the animal world coming afterwards which ends with fish, providing a logical link to liquids. The candles on folio 92v mark an even clearer break for no text accompanies their illustration, making the image stand out even more. Leafing the rest of the manuscript makes its meaning clear because all the ensuing chapters, without exception, are about human activities. The first activities are outdoor, and probably strenuous, and include hunting and a sort of fencing, and then indoor, with the shift highlighted by the chapters about winter and summer chambers. This is the backdrop for the analysis of feelings and excessive drinking, rest, sleep and love; activities involving motion but probably less energetic than the preceding ones. The last focal

point of attention is personal hygiene and clothes, with the book ending on an upbeat note as mentioned earlier, i.e. birds with aphrodisiac properties.

This extremely meticulous, almost literary composition is highlighted by the colour scheme which, as mentioned earlier, ranges from the rich variety of nature to cooler tones in the less elaborate scenes depicting animals, and an even more accentuated coldness in all the animal slaughter and butcher scenes. Images with more colourful touches herald in the return to human activities depicted with warmer, almost palpable hues, as in the portrayals of fabrics.

Hence, the *Tacuinum* in our manuscript opens with the lushness of nature and concludes with an aspect of human life that links the human world to nature, thereby emphasising the basic link between well-being and the many resources in the world.

There can be no doubt that this is not so much a brilliant exercise as a thorough understanding of Ibn Butlān's work and a human concern extending beyond the traditional interpretation of *Tacuinum* manuscripts, no matter how splendid some of these books may be. Beneath this new interpretation of the *Tacuinum* one can sense the intangible presence of one or more successive generations of physicians striving to tailor the work to cater for a society other than the one for which it was written. And these men who were so aware of the wants and needs of their patients were served particularly well by the artist of our manuscript, an artist who successfully depicted the results of the work of these physicians so familiar with both their own discipline and humanity, thanks to not only their scientific education probably acquired at university, but also their daily practice of the art of therapeutics.