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# MEDICAL AND VETERINARY SCIENCES

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# Part One

# MEDICINE, PHARMACOLOGY AND VETERINARY SCIENCE IN ISLAMIC EASTERN IRAN AND CENTRAL ASIA

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During the period under discussion, Central Asia's contribution to what might initially be called the elaboration, and subsequently, the flowering and continuance of Islamic civilization and culture can hardly be overestimated. Admittedly, in the early centuries, such contributions were often 'indirect', i.e. made as the result of a substantial 'brain drain' towards the central regions of the caliphate, and more specifically towards its capital, Baghdad. However, even during the heyday of the ᶜAbbasid regime, the centre by no means drained the provinces of all intellectual and artistic potential, and with the emergence of increasingly autonomous regional power centres all through the ninth century, talent had ever less far to travel in search of instruction and employment. Limiting ourselves to medicine and the allied disciplines – and bearing in mind the prominence of the polymath as a model of medieval scholarship – we need only mention Ibn Sīnā (Avicenna), al-Bīrūnī and Ismāᶜīl al-Jurjānī from the many names that come to mind in order to grasp the magnitude and the 'centrality' of Central Asia's contribution to medical learning in Islam (and beyond). It goes without saying that while individual genius can never adequately be explained with reference to the respective socio-cultural environment, it is equally true that talent does not as a rule unfold and take shape in a vacuum. Thus the presence of genius presupposes that of numerous lesser talents and of a certain material support structure – in the given context, the availability of books on the market and in libraries, whether a professional scholar's modest holdings or lavishly appointed, encyclopedic princely collections.

Owing to the nature of most extant sources, both textual and monumental, and to the bias of most existing research, the present survey concentrates on the formal, written tradition of medicine and on the institutions dedicated to its transmission and its practice in the

service of public health. If 'vernacular' and folk medicine are by necessity neglected, this is not to deny them their rightful place in a true history of medicine, nor to claim that formal and vernacular medicine existed in separate spheres without interaction between them. It remains a task for future research to examine the manuscript tradition for testimonies of medical practice at variance with the formal prescriptive texts; the study of present-day popular and folk medicine as a potential witness to past conditions also awaits.

## The growth and consummation of a scholastic tradition; the emergence of regional differentiation (750–1050)

In the present context, there is no need to rehearse once more the development of medical scholarship in Islam until Abū Bakr al-Rāzī (865–925).[1] The ease with which men and ideas traversed the vast expanse of the caliph's dominions hardly permits of identifying regional features in the works then composed. Furthermore, by way of the ᶜAbbasid capital Baghdad as the great emporium of material and intellectual goods, such regional peculiarities as can be detected were fast distributed even to the remotest provinces.

As concerns Central Asia in particular, we know of Yahyā b. Khālid al-Barmakī (d. 805)[2] as a patron of physicians and, specifically, of the translation of Hindu medical works into both Arabic and Persian. In all likelihood, however, his activity took place in the orbit of the caliphal court in Iraq where, at the behest of Hārūn al-Rashīd (786–809), such books were translated into Arabic. Thus Khurasan and Transoxania were effectively bypassed in this transfer of learning from India to Islam, even though, undeniably, the Barmakids' cultural outlook owed something to their land of origin, northern Afghanistan, and Yahyā al-Barmakī's interest in medicine may have derived from a no longer identifiable family tradition.[3]

This may also hold true for the Muslim scholar of Khurasanian Christian origin, ᶜAlī b. Sahl Rabbān al-Tabarī (d. *c*. 864),[4] the author of the earliest Islamic medical pandects to be preserved, the *Firdaws al-hikma* [Paradise of Wisdom]; yet it would be inappropriate simply to view him as a representative of eastern Iranian or Transoxanian learning. Rather, he

[1] Obviously, only a few select references (each including further references) about al-Rāzī can be given here: Iskandar, 1990, pp. 370–7; *EI*$^2$, Vol. 8, ' al-Rāzī, Abū Bakr' (L. E. Goodman); Richter-Bernburg, 1994, pp. 377–92; *EncArLit*, 1998, 'Al-Rāzī, Abū Bakr' (G. Endress).

[2] See Sezgin, 1970; generally on Yahyā al-Barmakī, see *EI*$^2$, 'Yahyā b. Khālid' (K. V. Zetterstéen); *EIr*, 'Barmakids' (I. Abbas). He can hardly be credited with the learned tracts attributed to him in some manuscripts.

[3] See *EIr*, 'Barmakids' (I. Abbas), esp. at Vol. 3, p. 806.

[4] Isaacs, 1990, pp. 345–6, 350; Sezgin, 1970, pp. 236–40.

illustrates the above-mentioned gravitation of talent towards the caliphate's central lands. His *Firdaws*, dedicated in 855 to the caliph al-Mutawakkil (847–61) in Samarra, represents medical scholarship as available there and then; even if it were to contain specifically Khurasanian and Transoxanian lore (which would first have to be identified as such) it was instantly fused into the generic profile of metropolitan Islamic medicine of the period. With the possible exception of Hindu sources made available through the interest of Yahyā b. Khālid (see below), even the unequivocally 'eastern' materials in his *Firdaws*, viz. its 'Indian books', had been imported directly from the Indus valley to Iraq and, as mentioned above, translated into Arabic there.

While commerce of men and ideas continued unimpeded throughout the caliphate in the generations following al-Rāzī, in the regions under discussion here, the tenth century saw a fundamental change in intellectual production. Its most manifest marker was linguistic: the adoption of the vernacular, Persian, for literary purposes in all fields, including religion and theology; in the event, in these areas (as well as, to a lesser degree, in scholarship generally), Arabic was to retain, or regain, its pre-eminent position. Nevertheless, alongside Arabic, Persian took its place as a medium of intellectual expression of ever greater ambition and complexity.

This is not the place to disentangle the still confusing web of motives which propelled the use of Persian instead of Arabic.[5] However, it may not be amiss to state the obvious once more: medical subjects are among the first to be treated in 'early New Persian' literature, both prose and verse, of the tenth and eleventh centuries.[6] Moreover, Persian medical writing exhibits irreducibly Iranian features, notwithstanding its evident literary dependence on Arabic models and a common foundation in Galenic humoral physiology and pathology, which again, was largely derived from authors writing in Arabic. For one thing, the very language, Persian, encompasses a body of knowledge of health matters which owes nothing to the Arabic transmission, although the impact of the latter is visible not least from the massive proportion of technical terminology. The extent of this 'native' medical knowledge still remains to be mapped, especially with respect to earlier, pre-Islamic stages of learned exchange with Greek and Indian science. On the other hand, it bears repeating that during the tenth and eleventh centuries in Khurasan, Transoxania and the neighbouring regions, Arabic remained the preferred idiom of the most brilliant minds, in medicine as well as in all other disciplines.

[5] Lazard, in *CHIr*, Vol. 4, pp. 628–32; Richter-Bernburg, 1974, pp. 55–64; and above, Chapter 4, Parts One and Two.

[6] For precise references, see below.

If al-Rāzī is taken as a chronological signpost in the history of medicine in Islamic Central Asia, this is not to deny the existence of medical learning in the region before and during his lifetime; yet it seems fair to attribute such learning to imports from the caliphate's central provinces, including re-imports of the fruits of the labours of migrant countrymen. Admittedly, one of the first, if not the very first, medical treatises likely to have been composed in the region, and not merely by a native of the region, is the *Masālih al-abdān wa 'l-anfus* [Regimen of Body and Soul] by Abū Zayd al-Balkhī (850–934), the polymath of wide renown and eponym of a 'school' of geography (see above, Chapter 8).[7] In the generations following al-Rāzī, however, Iran and the neighbouring regions to the east contributed a generous share to the burgeoning, throughout the caliphate, of literary activity in the medical disciplines. Just as in the preceding century, authors, regardless from which province of the empire they came, represent a common cultural and 'academic' tradition, certain references to regional conditions notwithstanding.

In the sphere of general education, perhaps more strikingly than from within the medical profession proper, the unity of medicine in this period is demonstrated by Abū ᶜAbd Allāh al-Khwārazmī (*fl.* second half of tenth century) in his concise encyclopedia of the sciences, the *Mafātīh al-ᶜulūm* [Keys of the Sciences].[8] Thus no dividing line can be drawn between, for example, Abu 'l-Hasan Ahmad b. Muhammad al-Tabarī (*fl. c.* 970),[9] Abū Sahl Bishr al-Sijzī (*fl. c.* 980)[10] and ᶜAlī b. al-ᶜAbbās al-Majūsī (d. 994?),[11] as representatives of medicine in Iraq and western and central Iran on the one hand, and authors such as Rabīᶜ

[7] Sezgin, 1970, p. 274; generally on al-Balkhī, see *EIr*, 'Abū Zayd al-Balk̲ī' (W. M. Watt). The very title of al-Balkhī's treatise expresses the congruence between medicine and philosophy as it had been perceived ever since the Platonic Socrates, medicine tending the body's and philosophy the soul's health. Incidentally, rather than al-Balkhī's writing, it was a genetic contingency which gained him notoriety in the history of medicine; his springtime allergy to roses prompted al-Rāzī to devote a special work to its cure (Sezgin, 1970, pp. 275, 287 et seq., n. 24).

[8] Written between 976 and 983; see on him *GAP*, Vol. 3, p. 294b, 'al-H̲wārazmī, Abū ᶜAbdallāh; *EI*$^2$, Vol. 4, 'al-Kh$^{w}$ārazmī, Abū ᶜAbd Allāh' (A. I. Sabra).

[9] In his encyclopedic *magnum opus, al-Muᶜālajāt al-buqrātīyya* [Hippocratic Cures], which for long did not receive the recognition it deserved, he was the first to describe the parasite causing scabies, *Acarus scabiei*. Nothing of his life is known except that he and al-Majūsī both studied medicine with Abū Māhir Mūsā b. Yūsuf b. Sayyār; see *GAP*, Vol. 3, p. 122 (G. Endress); Ullmann, 1970, p. 140; Sezgin, 1970, pp. 307–8.

[10] Bishr b. Yaᶜqūb dedicated his pandects, *al-Kunnāsh*, to the Saffarid amir Khalaf b. Ahmad; see Sezgin, 1970, pp. 325–6; Dietrich, 1966, pp. 65–9.

[11] Of deserved fame as the author of *al-Kitāb al-Malakī – kāmil al-sināᶜa al-tibbiya* [The Royal Book: A Complete Exposition of the Art of Medicine], which he dedicated to, and named for, the Buyid ᶜAdud al-Dawla. Little is known of him except what has been derived from his single great work; see, e.g. *EncArLit*, Vol. 2, pp. 497–8, 'al-Majusī' (L. I. Conrad); Savage-Smith, 1996, Vol. 3, pp. 903–62, esp. pp. 917–20; Micheau, 1994, Vol. 10; *GAP*, Vol. 3, pp. 296a, 'al-Maǧūsī' (ref. to G. Endress); Richter-Bernburg, 1980, pp. 277–90; Ullmann, 1978, pp. 77 et seq.; 1970, pp. 140–6; Sezgin, 1970, pp. 320–2.

b. Ahmad al-Akhawaynī al-Bukhārī,[12] Abū Sahl al-Masīhī,[13] Abū Mansūr al-Qumrī.[14] and al-Husayn al-Nātilī,[15] who were active further east, on the other hand. Further, such a division would ignore the phenomenon of the migrant scholar and 'expert', so prominent in the high caliphal and later periods of Islamic history; in addition to the preceding names, al-Hasan b. Suwār b. al-Khammār.[16] can be cited as an example.

The above-mentioned names, while by no means exhaustive, are meant to highlight, for the middle to late tenth century and for the regions roughly circumscribed by the borders of the Samanid domain, the vibrant interest that medicine aroused among the educated élite, and the medical profession's thorough command of the theory and practice of their discipline. Without meaning to impose a teleological perspective on history, it might be said that the stage was thus set for the author whose works would dominate medicine for centuries to come, Abū ᶜAlī Ibn Sīnā, the medieval Latin Avicenna (*c*. 980–1037).[17] However, before the discussion turns to him, his scholarly ancestors deserve some mention.

As alluded to above, the tenth century saw far-reaching changes in intellectual life, at first in the Samanid territories and subsequently in the entire Iranian world: Arabic was no longer the sole medium of educated speech and writing, whether in verse or in prose, and medicine was among the first subjects to be treated in the new idiom. Of the three known medical texts in early New Persian, one even bears a precise date: in 980, at the age of 46 and after 3 years' work, Hakīm Maysarī completed his medical *mathnawī* (poem in couplets) of some 4,500 lines, entitled the *Dānish-nāma* [Book of Knowledge].[18] The author's choice of mnemonic verse for his medical compendium and its dedication to a member of the administrative-military élite, one Nāsir al-Dawla Sipahsālār-i Īrān,[19] underline the integration of medicine into the syllabus of general education at least at the level of courtly society. Maysarī gives a brief account of therapeutics, first of localized diseases in the conventional order from the crown of the head to the sole of the foot, then of generalized affections, such as fevers, and he concludes his work with a summary of diagnosis by uroscopy and taking the pulse. Like many of his fellow medical authors, Maysarī shares the exalted view of his discipline as a science on a par with *fiqh* (jurisprudence) and fashions

[12] *EIr*, Vol. 1, pp. 706–7, 'Akavaynī Bokarī'(H. H. Biesterfeldt), and below.
[13] *GAP*, Vol. 3, pp. 52, 123, 133, and below.
[14] Ullmann, 1970, pp. 147, 236, 320, and below.
[15] Gutas, 1988, esp. p. 24, n. 9; Ullmann, 1970, pp. 260–1 and below.
[16] Ullmann, 1970, esp. p. 152, n. 5; Sezgin, 1970, pp. 322–3.
[17] The conventionally accepted date of his birth has given cause for serious doubt and should consequently be moved back up to five years; see *EIr*, Vol. 3, p. 69 (D. Gutas).
[18] De Blois, 1997, pp. 184–5, n. 96.
[19] Following de Blois, 1997, the titles would seem to identify Maysarī's dedicatee as Abu 'l-Hasan Muhammad b. Ibrāhīm b. Sīmjūr, Samanid governor of Khurasan (on him, see Bosworth, 1996, p. 175).

a descent from a chain of illustrious intellectual forebears for himself. The most recent among them, and the only one from the Islamic period, is Abū Bakr al-Rāzī; however, for reasons of self-promotion, Maysarī may well have concealed his proximate source or sources.

The other two texts, while undated, can also safely be assigned to the last decades of the tenth century. By far the most substantial of the three works is Abū Bakr al-Akhawaynī's the *Hidāyat al-muta$^{c}$allimīn fi 'l-tibb* [Learners' Guidance to medicine], the earliest medical pandects in Persian prose. In contrast to Maysarī's *Dānish-nāma*, al-Akhawaynī's book did not owe its existence to the conventions or demands of a court; apparently in Bukhara or nearby, the author composed it out of familial and wider professional concern for a son of his and other younger adepts. In 182 unnumbered chapters he presents a complete course of physiology, anatomy, therapeutics (in the received order *a capite*, including gynaecological diseases, and followed by dermatological, orthopaedic and other non-localized disorders), hygiene, and diagnosis by uroscopy and the pulse.[20] Other than Maysarī, al-Akhawaynī openly acknowledges his debt to his teacher, Abu 'l-Qāsim Tāhir b. Muhammad b. Ibrāhīm Maqāni$^{c}$ī; through Maqāni$^{c}$ī (who was a student of al-Rāzī's), al-Akhawaynī, in turn, is affiliated to the great master himself. It would also seem clear that al-Rāzī -was al-Akhawaynī's proximate source for quotations from earlier authorities. Al-Akhawaynī's use of written materials needs further examination, however. His teacher Maqāni$^{c}$ī, from whom he acquired a sense of responsibility in medical practice, does not appear to have left written records. Combining a solid grounding in theory with a clear practical orientation, the *Hidāyat al-muta$^{c}$allimīn* is vivid testimony to the high level of school medicine in eastern Iran two generations after al-Rāzī; it is none the inferior for being written in Persian. This fact also points to the emergence of an audience interested in learning, but unable or unwilling to acquire Arabic first.

The third incunabulum of Persian medicine, the *Kitāb al-Abniya $^{c}$an haqā'iq al-adwiya* [Book of the Foundations Concerning the True Essence of Drugs and Medicines],[21] covers, as the title indicates, an indispensable ancillary subject, pharmacology. Its author, Abū Mansūr Muwaffaq Harawī, is, just like his contemporaries Maysarī and al-Akhawaynī, unknown except from the manuscript transmission of his book.[22] Regrettably, only the

[20] In the printed edition (ed. Jalāl Malīnī, Mashhad, 1344/1965), the text comprises 798 pages, with an average of 16 lines on each page.

[21] See *EIr*, Vol. 1, pp. 336–7, 'Abu Mansūr Haravī'(L. Richter-Bernburg); Sezgin, 1970, p. 201, 'Śrībhārgavadatta'.

[22] The unique extant copy is deservedly famous, both on account of the person of its transcriber and as the oldest New Persian manuscript extant; the poet-lexicographer $^{c}$Alī b. Ahmad Asadī Tūsī completed and dated it in Shawwāl 447/December 1055: see *EIr*, Vol. 2, p. 699, 'Asadī Tūsī'(Dj. Khaleghi-Motlagh); de Blois, 1997, pp. 83–90, n. 37.

approximate date of composition, *c*. 980–90, can be inferred on the basis of internal evidence. Harawī's work comprises, in the order of the Arabic alphabet and by Arabic lemmata, 584 articles on simple drugs; notwithstanding the author's manifest dependence on Arabic literary models, his uniquely eastern Iranian outlook expresses itself in fulsome praise for Indian *materia medica*, and a small number of quotations from (contemporary or near-contemporary?) Indian authorities such as 'Srīfargavadat' (Śrībhārgavadatta) not to be encountered elsewhere.

In their time and place, the three authors just discussed stand out for their use of Persian. As for the intrinsic quality of their work, they easily compare with their Arabic-writing contemporaries, thus documenting that, at least at the highest level of medical learning, equality had been achieved between writers of Persian and of Arabic.

Of authors writing in Arabic in the medical field, special mention must be made of al-Husayn b. Ibrāhīm al-Nātilī (*fl. c*. 985–90),[23] Abū Mansūr al-Hasan b. Nūh al-Qumrī (*fl. c*. 995–1000)[24] and Abū Sahl ᶜĪsā b. Yahyā al-Masīhī (970–1001)[25] as representatives of the flourishing medical learning of their time; in terms of social and professional standing, however, they cannot, as members of a court-oriented élite, be taken as representative of the medical profession at large. Al-Nātilī's edition of the Arabic Dioscorides, however meagre his revisions of Hunayn-Istifān's version and however crude the accompanying illustrations may be, testifies to the continuing challenge which this authority of Greek pharmacognosy was felt to pose to comprehensible translation. Al-Qumrī and al-Masīhī each composed as major works a voluminous encyclopedia, entitled respectively the *Kitāb al-Ghinā wa'l-munā*, [Book of Self-sufficiency and Wish-fulfilment] and *al-Kutub al-mi'a*, [The Hundred Books]. In this genre of writing, the content is not subject to great material variation, given the general uniformity of the Galenic tradition. However, authors do differ in their attitude to astrology and other occult disciplines; in openness to 'clinical' experience; in adherence to religious precepts in case of conflict with medical tenets; in familiarity with the received authorities of the discipline; and formally, in their approach to the presentation of their subject. They may opt for a mosaic structure of attributed quotations or prefer to recast their gleanings into a continuous text of their own.

Regardless of their apparent conventionality, extant texts deserve far closer attention than most of them have so far received. Future study will have to assess, for example, whether or not al-Qumrī's and al-Masīhī's minor works offer more stimulating answers to

[23] Gutas, 1988, p. 24, n. 9, leaving open the disputed question of the identity of this Nātilī and Ibn Sīnā's teacher, Abū ᶜAbdallāh al-Nātilī; Ullmann, 1970, pp. 152, n. 6, 260–1; Sezgin, 1970, p. 315.

[24] Ullmann, 1970, pp. 147, 236, 320; Sezgin, 1970, p. 319.

[25] *GAP*, Vol. 3, p. 52 (G. Endress) and index; *EI*$^2$, Vol. 6, pp. 726–7, 'al-Masīhī'(A. Dietrich); Ulllmann, 1970, p. 151; Sezgin, 1970, pp. 326–7.

the queries of the contemporary student of medical history than their extensive synopses. Mention of a few titles will have to suffice here, such as al-Qumrī's *Kitāb al-Tanwīr fi 'l-mustalahāt al-tibbiyya* [Book of Enlightenment on Medical Terminology] and al-Masīhī's *Kitāb Izhār hikmat Allāh ta*$^{c}$*ālā fī khalq al-insān* [Book of the Demonstration of God the Exalted's Wisdom in the Creation of Man] as well as his two short tracts on smallpox and the plague.[26] Al-Masīhī was active both at the Samanid court in Bukhara and at that of the Ma'mūnid Khwarazm Shahs in Gurganj. Comparable to al-Rāzī before him and to his own younger contemporary Ibn Sīnā, al-Masīhī represents the physician-philosopher of classical and Islamic tradition. From the point of view of religious history, it is also of interest that he was descended from Iranian Christians and held, albeit discreetly, to his faith.

While al-Qumrī and al-Masīhī attest to learning and science in late tenth-century Transoxania, they do no more than highlight the region's diverse cultural and intellectual activities in this period. In a culture which laid great store by written documents, whether scripture or texts of human authorship, well-appointed libraries occupied a crucial position as storehouses of the fruits of intellectual productivity past and present. At this time, the Samanid court at Bukhara could boast a splendid library; by happy coincidence, information on it survives from the pen of one of the great minds in history who grew up and received his education there, Abū $^{c}$Alī al-Husayn b. $^{c}$Abd Allāh Ibn Sīnā.[27] This is not the place to expand either on his life or on his philosophy beyond what is indispensable for an understanding of his attitude to medicine and of his medical writings. His self-image as expressed in his 'autobiography' and the scope of his philosophical works, first and foremost, his *Kitāb al-Shifā*' [Book of Healing], clearly show that Ibn Sīnā saw himself as a second Aristotle, reformulating, wherever necessary, clarifying and re-ordering 'the First Teacher's' thought; like him, Ibn Sīnā's objective was to devise a unified system of philosophy which incorporated every particular discipline and assigned to it its logical place.[28]

In this scheme, medicine occupied a relatively inferior position; unlike geometry, it could never aspire to universality and deductive incontrovertibility since it attained its objectives by application to contingent, individual cases only. From Ibn Sīnā's point of view, not only was medicine as a science 'not difficult', but because of its inferior systematic rank, medicine's supreme authority, Galen (129–209), had to cede to Aristotle as well. Truth being just as monarchical and exclusive in the realm of human inquiry and

[26] See on these, note 25 above.

[27] Of the extensive bibliography for Ibn Sīnā, in addition to Gutas, whose focus, however, is philosophical, see *EncArLit*, Vol. 1, pp. 373 et seq., 'Ibn Sīnā'(H. Landolt); *GAP*, Vol. 3, p. 295 (index), 'Ibn Sīnā'; Isaacs and Gómez, 1990, esp. pp. 356–8, 389–404; *EIr*, Vol. 3, pp. 66–110, 'Avicenna'(M. Mahdi et al.).

[28] See Gutas, 1988, esp. pp. 194–8, 286–96, and *passim*.

knowledge as it was in religion, disagreements between Aristotle and Galen were impossible to sustain; either Galen had to be proven wrong outright, or if the weight of his empirical evidence, especially in physiology and anatomy, did not make that feasible, a graduated system of truths had to be devised in order to safeguard Aristotle's overall authority in natural philosophy while conceding, in the 'particular' field of medicine, the validity of Galen's doctrine. Appropriately enough, Ibn Sīnā presents his arguments in full detail in the zoology section of his *Shifā'*,[29] his philosophical *summa*, and not in his medical encyclopedia, the *Qānūn*.[30]

With *al- Qānūn fi 'l-tibb* [The Canon of Medicine], or in Gerard of Cremona's Latin version, *Canon medicinae*,[31] Ibn Sīnā followed in the footsteps of authors such as Ibn Sarābiyūn (Serapion), al-Rāzī, ᶜAlī b. al-ᶜAbbās al-Majūsī, Abū Sahl al-Masīhī and others in undertaking to compress medical knowledge into one all-encompassing book. From the medical viewpoint, Ibn Sīnā's *Canon* is by no means inherently superior to his predecessors' productions; however, whether for its philosophically informed persuasiveness and clarity of presentation, or perhaps for its deference to religious precepts, or a combination of both factors, it was to overshadow all earlier works and to dominate medical learning for centuries to come, within Islam as well as without. The five 'books' into which the *Canon* is divided deal with: (a) general principles (*kulliyyāt*): definition of medicine; physiology; anatomy; nosology, aetiology, semiology; preconditions of health, disease and death; principles of therapy; (b) simple drugs (in the order of the North Semitic [*abjad*] alphabet); (c) particular diseases *a capite* and skin disorders; (d) non-localized affections: fevers, tumours and ulcers, wounds, fractures, dislocations; poisons; cosmetics; and (e) compound drugs by genera and by indication. One parameter of the impact which the *Canon* had on subsequent generations is the number of epitomes and commentaries which carry the reference to it in their very titles and of extensive textual borrowings in ostensibly independent works. From outside the medical profession, weighty testimony is provided in the fourth discourse of Nizāmī ᶜArūdī Samarqandī's *Chahār maqāla* [The Four Discourses] (1155); for him, the *Canon* simply contains all there is to know in medicine.

The *Canon* being an intellectually demanding and voluminous reference work, and expensive to acquire, Ibn Sīnā met the practitioners' and interested lay readership's needs with several shorter monographs, in prose as well as mnemonic verse;[32] among the best-known of them are a handy vade-mecum, the *Urjūza fi'l-tibb* [Versification in Rajaz Metre

[29] See *EIr*, Vol. 3, 'Avicenna', esp. pp. 94b–97b (B. Musallam).
[30] Richter-Bernburg, 1996, esp. pp. 95–6, nos. 10, 13.
[31] On the reception of Ibn Sīnā's medical works in medieval Europe, see *EIr*, Vol. 3, pp. 107–10 (U. Weisser).
[32] Ullmann, 1970, p. 156.

on Medicine] and a *Maqāla fī ahkām al-adwiya al-qalbiyya* [Discourse on the Principles of Cardiac Medicines].[33] The latter's popularity partly derived from the fact that emotional and mental states were commonly thought of as organically manifested, either as cause or effect, by the heart; thus Ibn Sīnā's treatise also covered the field of what today would be called psychopharmacology. Consideration for one of his princely patrons, the Kākūyid ᶜAlā' al-Dawla of Isfahan (r. before 1008–41), also led him to compose introductory and practice-oriented works in the vernacular, i.e. in Persian; here, medicine is represented by his treatise on phlebotomy, the *Andar dānish-i rag* [On Knowledge of Veins].[34]

Abū Rayhān Muhammad b. Ahmad al-Bīrūnī (973–1048), Ibn Sīnā's older contemporary and scientific correspondent, may be better known for his brilliant work in the mathematical sciences and in intellectual and cultural history – not to mention the breadth of his intellectual horizon – than for his contributions to the medical disciplines.[35] However, his two treatises pertaining to health sciences, on mineralogy and on *materia medica*, assure him of a prominent place in medical history as well. Political vicissitudes compelled him to leave his native Khwarazm for the Samanid capital Bukhara, the dominions of Qābūs b. Wushmgīr, and eventually, for the court of Mahmūd b. Sebüktegin and his successors at Ghazna. It was there that he wrote his *Kitāb al-Jamāhir fī maᶜrifat al-jawāhir* [Comprehensive Book on the Knowledge of Precious Minerals] and, late in life, the *Kitāb al-Saydana fi 'l-tibb* [Book of Pharmacognosy in Medicine].[36] Both treatises exhibit some of al-Bīrūnī's salient qualities, his command of existing scholarship in the given field and his far-reaching interests, which included the 'humanistic' aspects of the two areas of study as well as the more narrowly scientific subject-matter. Yet in the field of *materia medica*, it may be said that he attained, but did not transcend, the limits of book-based learning.

## The continuing elaboration and 'Islamic naturalization' of Galenism; the consolidation of Arabic-Persian bilingualism (1050–1220)

This period, roughly from the consolidation of Seljuq power to the Mongol invasion of Central Asia, saw undiminished interest in medical learning and writing. However, the towering figures of the preceding period cast long shadows; as indicated above, educated society at large often saw Ibn Sīnā's *Canon* as the embodiment of medical learning.

[33] Ibid., pp. 154–6.
[34] *EIr*, Vol. 3, pp. 99–100 (M. Achena).
[35] *GAP*, Vol. 3, esp. pp. 133–5,142–3, and index, 'al-Bīrūnī'; Saliba, 1990, pp. 405–23; *EIr*, Vol. 4, 'al-Bīrūnī, Abū Rayhān', esp. pp. 274–6 (C. E. Bosworth).
[36] Saliba, 1990, esp. pp. 418–21; *EIr*, Vol. 4, pp. 281–2 (G. C. Anawati).

Numerous medical authors abridged, recast and otherwise drew on it and other earlier works; commentaries and specialized monographs became quite popular. It goes without saying that such developments affected the entire Islamic world; however, it will be seen that long-distance intellectual exchange, especially from the 'periphery' to the 'centre', was by no means guaranteed. Another process occurring in this period, and one which was not restricted to any particular region of the Islamic world, was what A. I. Sabra has termed the 'Islamic naturalization' of science;[37] naturally, academic medicine continued to be Galenic, but it lost its more obviously foreign features, and the massive medical tradition of the preceding Islamic centuries asserted itself. Specifically, in the region with which we are concerned, medical scholarship became increasingly bilingual, Persian maintaining and strengthening the position it had first won in the tenth century.

The earliest author we shall mention is Abu 'l-Qāsim ᶜAbd al-Rahmān, called Ibn Abī Sādiq al-Naysābūrī (d. after 1068), who won fame in Khurasan, at least, as the 'Second Hippocrates'.[38] If the Arabic biobibliographical sources call him a disciple of Ibn Sīnā, they may refer to literary dependence rather than to personal acquaintance; nearly every medical author by that time bore a heavy debt to Ibn Sīnā. Contrary to what has been remarked above, Ibn Abī Sādiq's attention was focused on Hippocrates and Galen and only secondarily on Hunayn b. Is'hāq, the early ᶜAbbasid mediator of Greek science to the Arabs, and al-Rāzī; he apparently intended to bypass the syntheses of the recent past and to renew medicine by re-presenting core classics through his elucidations. A report by the biographer of medical men, Ibn Abī Usaybiᶜa, would seem to suggest that it took close to two centuries for his Arabic works to reach Damascus.

Two generations after Ibn Abī Sādiq, Muhammad b. ᶜAlī al- Īlāqī (d. 1141) similarly passed as Ibn Sīnā's disciple, on the basis of his abridgements of sections of the *Canon*. His major distinction may have been the grievous nature of his death, since he was killed in the battle of the Qatwan steppe in 1141 when the Seljuq Sultan Sanjar suffered a crushing defeat at the hands of the Kara Khitay (see Volume IV, Part One).[39] Another two generations later, the philosopher-theologian Fakhr al-Dīn Muhammad b. ᶜUmar al-Rāzī (1148–1209), the object both of adulation and of vitriolic attack, paid his respects to Ibn Sīnā, the medical scholar as well as the philosopher, and compiled a commentary on the *Canon* in addition to a handbook on therapeutics.[40]

[37] Sabra, 1987, pp. 223–43, reprinted in Sabra, 1994, and also in F. J. Ragep and S. P. Ragep, 1996, pp. 3–30.

[38] *EIr*, Vol. 7, p. 663, 'Ebn Abī Sādeq'(L. Richter-Bernburg); Ullmann, 1970, p. 160.

[39] Brockelmann, 1937–49, Vol. 1, p. 485; Suppl., Vol. 1, p. 887.

[40] *EI*$^2$, Vol. 2, pp. 751–5, 'Fakhr al-Din al-Rāzī'(G. C. Anawati); Brockelmann, 1937–49, Vol. 1, p. 457 (n. 82a); Suppl., Vol. 1, p. 824 (n. 82a), p. 924 (n. 34).

The tradition of study and productive engagement of the *Canon* continued unabated for centuries. In our period, Najīb al-Dīn Abū Hāmid Muhammad b. ᶜAlī al-Samarqandī (d. 1222) was one of the most influential adapters of Ibn Sīnā's work; yet in his book *al-Asbāb wa 'l-ᶜalāmāt* [Causes and Signs], which enjoyed wide circulation and was in turn repeatedly made the basis of commentaries and abridgements,[41] al-Samarqandī also relies on the other great authors of the tenth century, al-Rāzī, al-Majūsī and Ahmad b. Muhammad al-Tabarī, whereas in his shorter treatises on *materia medica* and pharmacology, including cardiological therapy, he takes Ibn Sīnā as his model. In general, his writings were intended to serve the needs of practitioners.

Concern for practical utility also expressed itself in handbooks on pharmacology; possibly in 1194, Badr al-Dīn Muhammad b. Bahrām al-Qalānisī compiled his voluminous *al-Aqrabādhīn* [Dispensatory].[42] He introduces his material, compound drugs arranged by mode of preparation, with a complete survey of pharmaceutical methods. Al-Qalānisī's quotations in his book attest to his wide reading in the field; besides Ibn Sīnā, a whole range of authors, of whom al-Bīrūnī is the latest datable one, is represented.

As indicated above, Persian maintained and strengthened its position as an idiom of learning and science in the period between Ibn Sīnā and the Mongol invasions. From this time onwards, Persian medical literature came to be dominated by the towering figure of Zayn al-Dīn Ismāᶜīl b. al-Husayn al-Jurjānī (*c.* 1042–1140?).[43] His medical writings, among which the *Dhakhīra-yi Khwārazmshāhī* [Repository of the Khwarazm Shah] takes pride of place, are vivid testimony to his multifarious scholarship as well as to his attention to professional and lay needs. They cover the entire range from a concise vade-mecum of preventive and curative medicine (*Khuffī-yiᶜAlā'ī* [ᶜAlā"s Bootbook]) and a practitioner's handy reference (*Yādgār* [Memorandum]) to the advanced learner's textbook (*al-Aghrād al-tibbiyya* [Medical Pursuits]) and the complete scholar's encyclopedic synthesis (the *Dhakhīra*). Most if not all of these Persian books of al-Jurjānī date to within a few years after his arrival at Khwarazm in 1110, when, as a septuagenarian, he entered the service at the court of the then Seljuq governor, the Khwarazm Shah Qutb al-Dīn Muhammad b. Anūshtegin (1097–1127).

[41] Ullmann, 1970, p. 170; Brockelmann, 1937–49, Vol. 1, p. 489; Suppl., Vol. 1, p. 895, n. 28.

[42] Fellmann, 1986, pp. 1–2, on the dubious date as given in Brockelmann, 1937–49, Vol. 1, p. 489; Suppl., Vol. 1, p. 893, n. 23; and by Ullmann, 1970, pp. 307–8.

[43] Richter-Bernburg, 1978, pp. 2–8; Storey, 1958–71, pp. 207–11, n. 361; Thierry de Crussol des Epesse, 1998, n. 872.

However, al-Jurjānī also took took care to disseminate the fruits of his labour in Arabic,[44] the prestige language of learning, through original works and translations from Persian. Arabic, after all, was the writing medium of his teachers, especially Ibn Abī Sādiq, and the authorities whom he quotes; the only exception to this rule is the still shadowy Ahmad-i Farrukh, the author of the medical compendium, the *Kifāya* [Sufficiency].[45] It stands to reason that al-Jurjānī was heavily influenced by Ibn Sīnā, but in spite of at times extended literal quotations, his *Dhakhīra* cannot be dismissed merely as a Persian *Canon*; the author's reading includes, but is not limited to, the most important writers of the tenth and eleventh centuries. Al-Jurjānī's works in *hadīth*, ethics and anti-philosophical polemics, besides occasional comments in his medical treatises, betray his orthodox religious persuasion and thus illustrate the above-mentioned 'Islamic naturalization' of Hellenistic science, in this case, of Galenic medicine.

Contrary to chronological sequence, Ismā$^{c}$īl al-Jurjānī has been given precedence here among Persian-writing medical authors on account of the breadth of his learning and of the subject-matter in his works. However, in one of the specialized, and most vital, sub-disciplines of medicine, ophthalmology, he was, as a Persian author, preceded by an older contemporary, Abū Rawh Muhammad b. Mansūr al-Jurjānī, called Zarrīndast, who in 1087 dedicated his *Nūr al-$^{c}$uyūn* [Light of the Eyes] to the Seljuq sultan Malik Shāh (1073–92);[46] following well-established precedent, for example that of Hunayn b. Is'hāq in his *Masā'il fi 'l-$^{c}$ayn* [Questions on the Eye], Zarrīndast adopted the catechetic form. Given the lack of biographical information about the author, it may be rash to include him among Central Asian physicians merely on account of his attachment to the Seljuq court; a Seljuq preference for Persian may, however, be linked to their Central Asian background.

Still during the Seljuq period, most probably during the first half to the middle of the twelfth century, the Jewish physician Abū Sa$^{c}$d, called Zardgilīm, compiled as a practitioner's manual of theoretical medicine and therapeutics a *Mukhtasar andar $^{c}$ilm-i tabīb* [Abridgement Concerning the Physician's Science].[47]

Islamic civilization had taken over hospitals and dispensaries as charitable institutions from the older civilizations of the Fertile Crescent. Just as Rayy boasted a hospital during Abū Bakr al-Rāzī's lifetime, it may well be that similar establishments also existed in Samanid dominions from that time onwards, though we have no specific information.

[44] Richter-Bernburg, 1978, pp. 2–8; Ullmann, 1970, p. 161; Brockelmann, 1937–49, Vol. 1, p. 487; Suppl, Vol. 1, pp. 889–90, n. 15.
[45] Richter-Bernburg, 1978, pp. 3, 189; Thierry de Crussol des Epesse, 1998, pp. 8, 14.
[46] Richter-Bernburg, 1978, p. 1; Storey, 1958–71, p. 205, n. 359; Thierry de Crussol des Epesse, 1998, p. 14.
[47] Storey, 1958–71, pp. 211–12, n. 362; Ullmann, 1970, p. 164.

Of Ismāᶜīl al-Jurjānī, who was the Khwarazm Shah's physician-in-ordinary, the sources relate that one of his charges was the court dispensary, which obviously served an important function in public health; after al-Jurjānī retired from his position, much concern was shown in the selection of a qualified successor.[48]

Finally, the position of medicine in the syllabus of élite education during the twelfth century is neatly attested by Nizāmī ᶜArūdī Samarqandī's *Chahār maqāla*, composed for presentation at the Ghurid court in 1155. Here, medicine figures as one of the four disciplines which a ruler should have represented among his trusted servants. At the same time, the author provides his readers with a remarkably extensive medical bibliography, noteworthy not least for its combination of Arabic and Persian texts. Al-Akhawaynī, Ahmad-i Farrukh and Ismāᶜīl al-Jurjānī are given their due along with their great Arabic-writing predecessors and contemporaries. Unfortunately, Nizāmī ᶜArūdī does not give any hint as to which of the books in his list he himself has seen, and if so, where; thus the degree of realism in his impressive tableau is difficult to assess.

## Commentaries, encyclopedias and inter-Asian exchanges (1220–1500)

The invasions of the Middle East by Chinggis Khan and his successors had long-lasting effects even on regions spared wholesale bloodshed and devastation. Mesopotamia, the erstwhile heart of the caliphate, became peripheral to the new centres which emerged either further west in Egypt and, eventually, in Asia Minor, or further east on the Iranian plateau and in Central Asia. Also, the ethnic composition of the Islamic world altered; successive waves of Turkic pastoralists were swept westwards by the upheavals, including into the Central Asian border provinces of the Iranian world. The process of Turkicization which had proceeded there since the tenth century was perceptibly accelerated. However, in literary terms, the injection of a sizeable Turkic segment into the potential Persian audience may have meant an increase in numbers of such a readership rather than a decrease. Certainly, scholarly writing flourished in Persian, as did translation from Arabic.

From the point of view of political history, the scant three centuries between Chinggis Khan and the establishment of Safavid power in Iran and of the Turkic Shaybanid dynasty in what was later to become Uzbekistan was interrupted by Timur's bid for world domination (1370–1405) and the concomitant disturbances, which included forced migrations, deportations and resettlement of large segments of the population. As far as the history of medicine is concerned, however, such a division of the period would not seem to be

[48] Richter-Bernburg, 1978, p. 3.

justified. Profound changes had taken place in the wake of the Mongol expansion of the thirteenth century, and would also be brought about by the European discovery of the New World and the constituting of the Mughal empire in India. The facilitating of inter-Asian communication under the Mongols led to the importation of Chinese fine art and science into Il Khanid Iran. However limited the results of such exposure to Chinese learning may have been, cross-Asian exchanges as such were given an impetus during this period.

Literary production in Arabic never ceased in any region of the Islamic world; just as evident, though, was the fact that with the Mongols, Persian became the language of choice for writers in Iran and Central Asia. In medicine, the number of translations from Arabic into Persian increased and the range of subject-matter expanded steadily. Monographs were devoted to theoretical fields such as anatomy and to practice-oriented areas such as pharmacology and sexual medicine, and handbooks on general therapeutics continued to be compiled as a matter of course; some of the post-Mongol works came to acquire the status of classics in their own right. Older standard texts were repeatedly made the subject of commentaries, and it does not come as a surprise that neither Ibn Sīnā's *Canon* nor al-Jurjānī's *Dhakhīra* were emulated by efforts on a similar scale.

Once a semblance of order was re-established after the turmoil of the Mongol invasions, the circulation of books between Iran proper and the regions to its north-east probably continued during the thirteenth and fourteenth centuries; thus those medical works which were produced at the Il Khanid and subsequently at provincial courts must have become accessible in Central Asia as well. Titles which come to mind here include the *Ghiyāthiyya* [Book for Ghiyāth al-Dīn] by Najm al-Dīn Mahmūd b. Ilyās Shīrāzī; Mahmūd b. Muhammad Chaghmīnī's epitome of the *Qānūn*, the *Qānūnja* [Little Canon]; Zayn al-Dīn ᶜAlī b. al-Husayn al-Ansārī's *Ikhtiyārāt-i Badīᶜī* [Selections for Badīᶜ al-Jamāl], a treatise on *materia medica* which was to gain wide circulation for centuries; his son Husayn, called Ibn Hājjī Zayn al-ᶜAttār's *Dastūr al-atibbā'ᶜan qawāᶜid al-hukamā'* [Instruction of the Physicians about the Principles of the Sages); and finally, two works by Mansūr b. Muhammad b. Ahmad, the medical pandects *Kifāya-yi Mujāhidiyya* [Sufficiency for Mujāhid al-Dīn] and the anatomical treatise *Tashrīh-i Mansūrī* [Mansūr's Anatomy], which commands interest especially for its anatomical illustrations.[49]

While in the pre- Timurid period some authors can clearly be located either in the Il Khanid orbit or that of provincial courts in Fars, the dearth of biographical information about others does not permit us to situate them in Central Asia; these include Masᶜūd

[49] Richter-Bernburg, 1978, pp. 25 et seq., n. 17, 28–9, n. 19, 29–33, n. 20,43–6, n. 31,46–7, n. 32, 51–2, n. 38; Storey, 1958–71, pp. 220–3, n. 380.

b. Muhammad al-Sijzī,[50] Fakhr al-Islām al-Arghandī al-Khurāsānī[51] and Shihāb al-Dīn b. ᶜAbd al-Karīm Nāgawrī.[52] Regrettably, it is not possible to determine the context of the dedication of an Arabic commentary on Hippocrates' *Aphorisms* to the Batu'id Khan Jalāl al-Dīn Jānī Beg Mahmūd (1342–57) of the Blue Horde; in particular, it is not known whether or not its author, Ahmad b. Muhammad b. Qāsim al-Kaylānī, was in the Khan's regular employment. Apparently it was only with the patronage of Timur and his successors that intellectual production in Transoxania and the adjacent regions regained momentum. The first title to be mentioned here is a compendium of medicine, the *Sharā'it-i jarrāhī* [Requirements of Surgery], for Shāh Rukh (1404–46);[53] contrary to its title, the discussion of surgical operations is limited to just the ninth of its ten discourses. Nevertheless, this discourse would seem to merit closer study, informed as it clearly is by the author's personal experience.

Timur's grandson Ulugh Beg (1394–1449), himself an erudite patron of scholarship, employed Burhān al-Dīn Nafīs b. ᶜIwād al-Kirmānī as physician-in-ordinary.[54] Al-Kirmānī's literary production, sc. commentaries in Arabic on four of the most widely circulated medical classics, was to gain lasting popularity in its own right; he selected *al-Asbāb wa 'l-ᶜalāmāt* by Najīb al-Dīn al-Samarqandī; *Mūjiz al-Qānūn* [Abridgement of the *Qānūn*] by Ibn al-Nafīs, Hippocrates' *Aphorisms* and Galen's *Kitāb al-ᶜIlal wa 'l-aᶜrād* [Book of Illnesses and Medical Conditions]. In the second half of the fifteenth century, a remarkable author is encountered at the Timurid court of Badakhshan; in addition to a chapter on human anatomy in his encyclopedia of natural sciences, the *Dānish-nāma-yi jahān* [Book of Knowledge of the World], Ghiyāth al-Dīn ᶜAlī b. ᶜAlī Amīrān al-Husaynī al-Isfahānī compiled a treatise on *materia medica* in tabular form.[55] Sultān Husayn Bayqara's (d. 1506) splendid court at Herat did not fail to attract medical scholarship either; to be mentioned here are ᶜAbd al-Razzāq b. ᶜAbd al-Karīm al-Kirmānī, who dedicated his *Shifā' al-asqām* [Cure of Diseases] to the courtier and literary figure Mīr ᶜAlīshīr Nawā'ī (d. 1501),[56] and Qutb Muhammad Tabīb, who presented a Persian version of Ibn al-Nafīs' *Mūjiz al-Qānūn* to his patron, the poet Nizām al-Dīn Shaykh Ahmad Suhaylī (d. 1501).[57]

[50] Author of an Arabic 'medical dictionary', the *Haqāᶜiq asrār al-tibb* [Truths behind the Secrets of medicine], written before 1334 (Brockelmann, 1937–49, Suppl., Vol. 2, p. 299).
[51] Storey, 1958–71, p. 220, n. 378 (dating conjectural).
[52] Ibid., pp. 224–5, n. 383.
[53] Richter-Bernburg, 1978, pp. 54–7, n. 41.
[54] Ullmann, 1970, pp. 170, 173; Brockelmann, 1937–49, Suppl., Vol. 2, p. 299, n. 2.
[55] Richter-Bernburg, 1978, pp. 58 et seq., n. 43; Storey, 1958–71, pp. 357–8, no. 595.
[56] Storey, 1958–71, p. 230, n. 397.
[57] Richter-Bernburg, 1978, pp. 61–2, n. 45.

Finally, literary productivity in medicine did not cease in Transoxania with the end of Timurid rule; Sultān ᶜAlī Khurāsānī Gunābādī dedicated a manual of therapeutics, the *Dastūr al-ᶜilāj* [Rules of Treatment], to Abū Saᶜīd Bahādur Khan, the Uzbek ruler of Samarkand (1530–3).

## Veterinary science (750–1500)

From the distant pre-Islamic past onwards, horsemanship and falconry had a distinguished history in Iran, Transoxania and the adjacent regions; thus it does not come as a surprise that the practice and terminology of falconry in Islam were largely borrowed from this tradition and that certain Central Asian varieties of hunting birds and breeds of horses were much sought after in later periods as well.[58] However, if *bāz* (falcon) and *bāzdārī* (Arabized as *bayzara*, falconry) gained early currency, the corresponding terms of horsemanship were derived from Greek and Arabic, such as *baytār* and *baytara* for the veterinary specialist (originally just the hippiatrist) and his art, and *furūsiyya* for horsemanship and hippology as such. The apparent time-lag of Persian writing in these fields as against Arabic may not merely have resulted from the predominant cultural unity of the Islamic world in the pre-Mongol period but may also indicate the strength of a living tradition passed on by apprenticeship rather than by theoretical communication in writing. In principle, the tradition of theoretical reflection and book learning was much less strong in the veterinary arts than in medicine proper. Yet at the level of scholarship, both medical disciplines obviously shared the common basis of Galenic humoral physiology, even though the exact relationship between professing the dominant doctrines of 'school' medicine and practical adherence to time-tested veterinary cures remains to be investigated.

The first major Islamic author in this field, Muhammad b. Yaᶜqūb Ibn Akhī Khizām al-Khuttalī (*fl. c*. 865?),[59] has a Central Asian *nisba* (gentilic name),[60] but is reported to have served as an equerry at the ᶜAbbasid court. His book, the *Kitāb al-Khayl wa 'l-baytara* [Book of horses and Hippiatry] (with variants), became a standard reference text, seen in its ample direct and indirect transmission. Its hippiatric pedigree is Greek, and secondarily,

[58] On horsemanship generally, see *EIr*, Vol. 2, pp. 731–7, 'Asb. iii, In Islamic Times', and 'Asb. iv, In Afghanistan'(A. S. Gordfaramarzi and C. E. Bosworth, resp.) and pp. 724–31, 'Asb. i–ii, On Horsemanship during Pre-Islamic Centuries'(A. Sh. Shahbazi and F. Thordarson, resp.); cf. *EI*$^2$, Vol. 1, p. 1149, 'Baytar'(M. Plessner).

[59] Ullmann, 1970, pp. 219–20; Storey, 1958–71, pp. 396–7, n. 664. For earlier works in the field as they were (often pseudepigraphically) transmitted in Arabic and later also in Persian, see Ullmann, 1970, pp. 217 et seq., and Storey, 1958–71, p. 394, n. 662. The Persian versions of an allegedly Aristotelian 'book of horses' have not yet been located and dated; see Keshavarz, 1986, esp. pp. 353–4, n. 191.

[60] Admittedly, there are many variants for this: see Storey, 1958–71, p. 396, n. 664.

perhaps Sanskrit,[61] whereas for the practice of equitation itself it may well be indebted to Iranian and Turkic in addition to Arabian traditions. Ibn Akhī Khizām al-Khuttalī's hippiatric ambition expresses itself in the confident claim that his *Kitāb Hīlat al-bur'* [Method of Healing] enjoys a position similar to Galen's *Methodus medendi* in human medicine. The two extant Persian versions of his work are dated to 1330 only; similar problems are raised by the limited number of Persian hippiatric monographs datable to the period before 1500.[62]

In tracing the history of hippiatry (and by extension, veterinary art), which was of concern to a number of professions, it is not possible to ignore the evidence of texts from such fields as statecraft (including 'Mirrors for Princes'), the arts of war, agriculture and encyclopedias. Thus in his *Qābūs-nāma* [Book for Qābūs] (see above, Chapter 4), Kay Kāwūs b. Iskandar gives a detailed list of equine defects and diseases[63] and Fakhr-i Mudabbir Mubārak Shāh includes hippiatry in his manual of the arts of government at peace and war, the *Ādāb al-harb wa 'l-shajāᶜa* [The Correct Usages of War and Bravery].[64] While the two authors' connection with Central Asian lands was at best tenuous, their works may well have circulated there as well; the first was certainly to achieve at least three Turkish translations.

The vital importance horses had in civilian and military life is further mirrored in the relevant sections of various large encyclopedias. Fakhr al-Dīn al-Rāzī did not neglect the subject in *Jāmiᶜ al-ᶜulūm* [Comprehensive Work on the Sciences], the work he dedicated to the Khwarazm Shah Tekish (1172–1200), nor did Muhammad b. Mahmūd al-Āmulī (*fl. c*. 1315–50) in his widely known encyclopedia, the *Nafā'is al-funūn fī ᶜarā'is al-ᶜuyūn* [Precious Arts Concerning the Desires of the Eyes].

Persian literature on falconry differs notably from that on horsemanship.[65] For one thing, it expressly relies on translations from pre-Islamic Persian sources and at times on Central Asian Turkish traditions; also, it is attested from a considerably earlier period. The first extant treatise is Abu'l-Hasan ᶜAlī b. Ahmad Nasawī's *Bāz-nāma* [Book of Falcons];[66] the author, a native of Rayy, may have resided in Kākūyid territory in central Iran,

[61] He borrowed heavily from Theomnestus of Magnesia (*fl.* fourth century A.D.?) and also named an Indian king 'Jnh'as his source (Ullmann, 1970, p. 220).

[62] See *EIr*, Vol. 2, esp. p. 736, 'Asb. iii'(ᶜA. Soltāni Gordfarāmarzī); Storey, 1958–71, pp. 397, 400 et seq.; Keshavarz, 1986, p. 357–8, n. 195.

[63] Levy, 1951, pp. 114–16.

[64] *EIr*, Vol. 1, p. 445, 'Ādāb al-harb'(C. E. Bosworth); Vol. 2, p. 737a, 'Asb. iv'(C. E. Bosworth).

[65] *EIr*, Vol. 4, pp. 17–20, 53–8, 65–6, 'Bāz', 'Bāzdāri', 'Bāz-nāma'(H. Aᶜlam, M.-T. Danesh-pazhuh); Storey, 1958–71, pp. 402 et seq., 409–10; Keshavarz, 1986, pp. 348–51. See for the Arab regions, *EI*$^2$, Vol. 1, pp. 1152–5, 'Bayzara'(F. Viré); Möller, 1965; Ullmann, 1972, pp. 43–50.

[66] *EIr*, Vol. 4, esp. pp. 53–4, 'Bāzdāri'.

probably in the later eleventh century. As both an experienced falconer and a scholar, he gives much attention to the hygiene and health of hunting birds. His expertise, he asserts, is based on a thorough study of older authorities, among whom he mentions the Sasanians, Sogdians, Samanids, (contemporary?) Zoroastrians, Turks and the people of Iraq and Khurasan; regardless of a precise assessment of these claims, the privileged position of eastern Iran and Transoxania in his list stands out at first glance. It is possible that the author of the *Sayd-nāma-yi Malikshāhī* [Hunting Book for Malik Shāh], Muhammad b. Qalchak Nizāmī, represented those Irano-Turanian traditions in his own person. Nearly three centuries later, his book was revised and expanded by ᶜAlī b. Mansūr Khwāfī, and an abridgement of his version was in turn made soon afterwards. In 1455, towards the end of our period and clearly in the region, the encyclopedist Ghiyāth al-Dīn ᶜAlī b. ᶜAlī-Amīrān Isfahānī also compiled a *Bāz-nāma*.

## Conclusion

Neither in the veterinary arts nor in medicine did the establishment (around the turn of the sixteenth century) of Safavid power in Iran, of the Shaybanid dynasty in Central Asia and of the Mughals in the Indian subcontinent, mark a break in literary activity. Yet as well as the appearance of syphilis,[67] and the stimulus to exchanges between Galenic and Ayurvedic medicine under the Mughals,[68] political, social and religious changes in the period presented medical challenges which, at least in retrospect, appear to have been new at the time. The question of their actual effect on the theory and practice of medicine, however, goes beyond the scope of this section.

[67] In Persian, *ābala-yi Farang* or *ātishak* (Frankish pox or 'little fire', 'inflammation'); see Richter-Bernburg, 1978, pp. 60–5, 104–8, ns. 44, 45, 99.
[68] See Storey, 1958–71, pp. 229, 231 et seq., 249, ns. 394, 401, 402, 424.

Part Two

# MEDICINE AND PHARMACOLOGY: CHINESE, INDIAN, TIBETAN AND GRAECO-ARAB INFLUENCES

(*H. M. Said*)

Greek thought entered the Arab world through the school of Jundishapur in south-western Iran. We come across references to Greek authors such as Actius of Amida, Theophrastus, Paulus Aegineta, Rufus of Ephesus, Pythagoras, Plato, Philomenus of Alexandria, Dioscorides, Hippocrates, Galen and others in al-Bīrūnī's *Kitāb al-Saydana fi 'l-tibb*, an example of how those ideas spread through eastern Iran towards Central Asia.

## Chinese influence on Islamic medicine

Two great Muslim scholars of the natural sciences, Ibn al-Baytar (1197–1248) and Ibn Sīnā, discuss in their works the vegetable drugs that have their origin in China. Of Muslim scholars, Ibn al-Baytar is probably the best known among the botanists (the other being Muhammad al-Ghāfiqī, *fl.* twelfth century). It is certain that he never visited China, but in his *Kitāb al-Jāmi$^{c}$ li-mufradāt al-adwiya wa'l-aghdhiya* [Collection of Simple Drugs and Foodstuffs] he describes many of the Chinese drugs which later became part of the Graeco-Arab pharmacopoeia. According to Ibn al-Baytar, herbs like *bish* (*Aconitum* Sp.) and *rēwand chīnī* (*Rheum emodi*, *Ta-huang*) were originally native to China. *Dar chīnī* (*Cinnamomum zeylanicum*), *chūb chīnī* (*Smilax China*) and *mamīrān chīnī* (*Coptis teeta*) are some other valuable drugs named after their area of origin and existence. Cinnamon (bark), or *dar chīnī*, is not only regarded as a valuable article in Graeco-Arab medicine but in the Chinese system also; being aromatic, it has warm and dry faculties and possesses carminative, astringent and stomachic properties and is prescribed for bowel complaints.

Ibn Sīnā mentions a Chinese compound drug containing various herbal ingredients, named *suk*, the active ingredient of which is regarded as *aumlai* (in Chinese) or *amlaj* (in

Arabic); a useful hepatoprotective agent, it is also effective against palpitation. The Graeco-Arab physicians' awareness of Central Asian and Chinese drugs can also be traced historically through the assertion that Arab medieval scholars knew other Chinese plants little esteemed by Chinese themselves, such as *anba* (*Mangifera indica*), the Indian mango. It was found around the thirteenth century in China, and Ibn Baytar mentions in his book that a small number of mango trees were found in some parts of southern China. We also come across several examples where indigenous Chinese drugs are introduced to other areas and other systems particular to the Graeco-Arab system, for example, *ma-huang* (*Ephedra vulgaris*), camphor (*Camphora officinalis*), pomegranate (*Punica granatum*), angelica or *tang kuei* (*Angelica sinensis*), hemp (*Cannabis sativa*), calamus (*Acorns calamus*), castor oil plant (*Ricinus communis*) and several others.[69]

## Indian influence on Islamic medicine

India and Indian commodities were early known to the Arabs via Jundishapur, where Persian and Arab Muslim medical men came in direct contact with both Greek theories and the Indian views. The expansion of the Arab empire towards the east, the conquest of Sind and the Arab settlement there, brought the Arabs into contact with Indian culture and potentially with the ancient (Hindu) Ayurvedic medicine. The Arabs appreciated Indian advances in the field of medicine and mathematics, as stressed, for example, by al-Jāhiz of Basra (d. 869), by the historian and geographer al-Yaᶜqūbī (d. 897) and by Abū Maᶜshar al-Balkhī (d. 885).

During the ᶜAbbasid period, several Indian medical as well non-medical manuscripts were procured and translated into Arabic, and it is said that Indian medical men were invited to the caliphal court, so that some of the Muslim physicians became familiar with the Indian system of medicine and included discussion of it in their own works. The first important Arabic medical treatise to discuss the Indian system of medicine in detail is the *Firdaws al-hikma* of ᶜAlī b. Sahl Rabbān al-Tabarī (see on this, above). It deals not only with medical topics but also with philosophy, meteorology, zoology and astronomy. It is a fair-sized book divided into 7 parts, 30 discourses and 360 chapters.

Part VII, *maqāla* (discourse) IV, deals in 36 chapters with Indian medicine based upon Charaka, Susruta, Nidana and Astanga Hridaya. The topics covered are as follows: genesis and purpose of medical science; classification of this science; qualifications essential for a medical student; efficient treatment and the desirability of not beginning the treatment in haste; origin of mankind and the birth of animals; the embryo and its different

[69] Said, 1991, pp. 9–16.

parts; function of the humours; measures to be taken for the preservation of health and their advantages; the superfluous matters of the body, and the harm caused by suppressing them; the harm caused by taking different things in excess; different tastes and what the physician should know about them; different kinds of water and their properties; food and the arrangement of different courses; what should be taken with different kinds of wine; wine and how it should be drunk and persons who should abstain from it; the milk of different animals and its properties; measures to be taken in the different seasons of the year for keeping healthy; on universal morals (based on the work of the Indian physicians); general causes of diseases; different kinds of diseases; history of the patient; particular causes of diseases; what is caused by the preponderance of each humour; methods of treatment; hiccoughs; coughs and their treatment; thirst; symptoms of relaxation of the bowels and of consumption; fever and its symptoms; treatment of fevers; blood-letting and when it should not be resorted to; symptoms of convalescence and of death; evil spirits; purgatives and emetics; medicines for diseases of the uterus and cleaning of the face; and compound medicines and their preparation.

It seems that al-Tabarī may have studied Indian medicine thoroughly, as seen, for example, in his fourth chapter, concerning efficient treatment and the desirability of not beginning the treatment in haste. While some Islamic physicians became familiar with the Indian system of medicine through their own efforts, many could not follow it because it differed so much from the Greek system upon which their own medicine was substantially based. Al-Bīrūnī, in his *Kitāb al-Saydana*, which he composed towards the end of his life, writes, however, about some physicians' contact with Indian methods. Thus he mentions the class of Indian physicians called 'Poison-healers', and tells how a leading citizen of Gardiz in eastern Afghanistan was cured of haemorrhoids (after treatment by conventional means had proved ineffective) by an Indian physician's scarifying the sufferer's back and rubbing in aconite, and then administering it orally.

## Traditional Tibetan medicine

For over 2,000 years, the Lama physicians of Tibet have been practising the Tibetan system which states that the source of all medical knowledge comes from the Buddha. It is an ancient art comprising a complex system of diagnostic and therapeutic means, a psychosomatic model based on a doctrine of construction, as well as on cultural assumptions. Whereas the traditional Chinese medical system is based on the dualism of Yin and Yang, the Tibetan one invokes a tripartite system of analysis. The constituents of the body may exist on their own or as combinations and are loosely translated as wind, bile and

phlegm; these are similar in constitution to the *vaya*, *pitta* and *kapha* of Ayurveda and the four humours of the Graeco-Arabic medical tradition. Tibetan compound drugs are, like the Graeco-Arabic ones, primarily herbal. These are the common simple drugs of herbal origin easily available in Central Asia in wild as well as in cultivated states. The system is also known as the Amchi (Tibetan) system of medicine and is one of the major traditional systems of the region.

It is thus clear that herbal therapy forms the very basis of treatment in all the major indigenous systems of medicine established in ancient times in Central Asia, whether Greek, Chinese, Mongolian, Tibetan, Ayurvedic or Graeco-Arabic. In many cases, their ingredients are being tested today in sophisticated laboratories the world over, in the hope of evaluating their therapeutic effects.

## Graeco-Arab medicine in the Indo-Pakistan subcontinent

The Graeco-Arab medical system came to India with the Muslims, but was modified and enriched by the addition of Ayurvedic lore. The ancient Ayurvedic medicine, which had survived throughout the centuries, was by now undergoing change, with only faint traces of the works and methods of ancient masters visible. Muslims not only revived the works of Charak, Susruta, Wagbhat, Sarangdhar and other Ayurvedic authorities by borrowing suitable material from their works but also incorporated this material into their own system.

An attractive but wholly uncorroborated story in the Arabic sources states that the caliph Hārūn al-Rashīd once summoned an Indian physician called Manka who cured the caliph of his ailment. This Manka, who is said to have had a profound knowledge of Indian, Persian and Arabic languages, was attached to the hospital founded by the Barmakids and translated several books from Sanskrit into Persian and Arabic. Ibn Dhan was another experienced Indian physician said to have been active at Baghdad at the same time, heading the hospital of Yahyā b. Khalid b. Barmak. At his suggestion, Ibn Dhan allegedly translated many Indian medical works into Persian or Arabic. Sālih, the son or descendant of Bhela, was another famous Indian physician mentioned as a private practitioner at Baghdad during the ᶜAbbasid caliphate. The *Fihrist* [Index] of Ibn al-Nadīm (d. towards end of tenth century) gives the Arabic names of many works said to have been composed by Indian medical experts at this time.

# Medical works by Indo-Muslim authors

These include a Persian translation of al-Bīrūnī's Arabic *Kitāb al-Saydana* by Abū Bakr b. ᶜAlī b. ᶜUthmān Kāshānī, presented to the Delhi Sultan Iltutmish in the early thirteenth century; and the *Majmūᶜa-i Diyā'ī* [Compilation by Diyā], written in 1329 by Diyā Muhammad Masᶜūd Rashīd Zangī ᶜUmar Ghaznawī, alias Mubārakābādī, who was the physician of Sultan Muhammad b. Tughluq. This Persian work is derived from a *Majmūᶜ a-yi Shamsī* [Compilation by Shams al-Dīn], compiled by Khwāja Shams al-Dīn Mustawfī, which in turn is based on Sanskrit books of Indian physicians.

Sultan Fīrūz Shāh Tughluq (1351–88; see on him, Volume IV, Part One, Chapter 14) was greatly interested in works of public utility. According to one historian, during his reign there were 70 public hospitals in Delhi, including one built at his own expense, where arrangements were made for treating in-patients, and drugs and food were supplied free. It was after him that a medical work, the *Tibb-i Fīrūzshāhī* [Book on medicine for Firūz Shāh] was named; it is often mentioned by later medical writers, but does not seem to have survived.

From the fifteenth century, we know of the *Kifāya-yi Mujayyidiyya* [Sufficient Book for Mujayyid] by Mansūr b. Muhammad b. Yūsuf b. Ilyās, compiled during the rule of Sultan Zayn al-ᶜĀbidīn of Kashmir (1422–73): a comprehensive work, like the *Canon*, it deals with general principles, drugs and methods of treatment. The *Tashrīh-i Mansūrī* [Book on Anatomy for Mansūr], by the same author, is a collection of the anatomical knowledge of the period. Both these books long served as an important part of the medical education in Muslim India.

The second half of the century is distinguished for an important medical work, the *Shifā'-i Mahmūdī* [Book of the Cure for Mahmūd Shāh], a collective translation of important and famous Sanskrit Ayurvedic works by ᶜAlī b. Muhammad b. Ismā'īl Asawālī Asīlī made during the reign of Sultan Mahmūd Shāh Begrā of Gujarat (1458–1512), who was an active patron of the translating of notable Arabic and Sanskrit books into Persian. Although Charak, Sushruta and other Ayurvedic works had been translated much earlier, reportedly in the time of Hārūn al-Rashīd, translation of Ayurvedic works in India only began for certain with the compilation of the *Shifā'-i Mahmūdī*. This is based on Wagbhat's work, a composite collection of eight Ayurvedic books, dealing with: anatomy; treatment of children's diseases; demonic ailments; treatment of diseases; treatment of wounds resulting from arrows, thornpricks, etc.; treatment of bites and stings of poisonous animals; treatment of evil influences and possession by demons and fairies; and sexual potency. Wagbhat being a pioneer author on medical subjects and his book being the first collection, it

is not surprising that the material in different chapters and sections of his book is often intermixed and irregularly arranged. Sometimes the properties of drug disorders, and the causes of the disorders and their treatment, are all given in one section, while other sections are left incomplete in these details.