

# Abstract

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## **Maimonides on Medicinal Measures and Weights, from his Galenic Epitomes**

Some of the personal comments inserted by Maimonides in his epitomes of Galen's *Qātāḡānas* (*De compositione medicamentorum per genera*) and *Mayāmir* (*De compositione medicamentorum secundum locos*) are discussed. The most valuable of these comments, which have neither been edited nor studied to date, is undoubtedly a lengthy and detailed discussion of medicinal weights and measures employed in Galen and subsequent medical literature. The text of this comment, found on ff. 4b–6a (pp. 6–9) of his epitome of Galen's *Qātāḡānas*, as extant in MS Berlin 6231, is presented along with a translation. Maimonides' discussion of these weights and measures is interesting because it is based on prominent ancient sources, above all Yuḡannā Ibn Sarābiyūn (ninth century), that date from the period when the so-called canonical units were established.

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# Maimonides on Medicinal Measures and Weights, from his Galenic Epitomes<sup>1</sup>

## Introduction

The medical system developed by Galen of Pergamon (129–ca. 216) became dominant soon after his death, as it was generally adopted by subsequent generations in both the East and West. An important role in the propagation of his medical system was played, in addition to commentaries and encyclopedic compilations, by summaries or abbreviations of his works, which were considered to be too voluminous, unsystematic, complex, and repetitive for a physician to consult. The earliest summaries we know about are those compiled in Alexandria around 500. These summaries, which have been lost in the original Greek and are only known through the Arabic tradition, under the name *Ġawāmi‘ al-Iskandarāniyīn* (Summaria Alexandrinorum), are probably associated with those Galenic treatises, which formed a curriculum of sixteen books, that were taught with formal commentaries and read in a specific order in pre-Islamic Alexandria and in the early centuries of Islam.<sup>2</sup>

1. I thank Tzvi Langermann and the anonymous reviewers for their helpful comments and suggestions for corrections.

Later, in 1322, the *Ġawāmiʿ al-Iskandarāniyyīn* were translated into Hebrew by Simeon ben Solomon, under the title *Kibbuṣei Galenus*; this spread knowledge of Galen's medical system in Jewish circles.<sup>3</sup> The process of transmission of these summaries is exemplified in some of the Hebrew incipits. That of *De sectis*, for instance, reads: "This is the summary of Galen's book on the medical sects according to the Alexandrians, translated by Ḥunayn ibn Ishāk."<sup>4</sup>

In addition to the Galenic works that were part of the *Ġawāmiʿ al-Iskandarāniyyīn*, Arab physicians could familiarize themselves with Galen's doctrines and teachings through several other summaries. Important collections of such summaries were prepared by Thābit b. Qurra (834–901),<sup>5</sup> Ibn al-Ṭayyib (d. 1043),<sup>6</sup> and Maimonides' illustrious contemporary Ibn Rushd (1126–1198).<sup>7</sup>

### Moses Maimonides

Like his Arab colleagues, Moses Maimonides (1138–1204), the famous Jewish physician and philosopher,<sup>8</sup> was acutely aware of the problem of the inaccessibility of Galen's writings.<sup>9</sup> In order to facilitate the perusal of these works he composed several summaries, all of them in Arabic; they were also employed for the composition of his *Medical Aphorisms*,<sup>10</sup> in which he repeatedly criticizes Galen for his contradictory statements. The summaries produced by Maimonides are based on the same sixteen books that are treated in the *Ġawāmiʿ al-Iskandarāniyyīn* mentioned above. Maimonides, like everyone else, considered the *Ġawāmiʿ* to constitute the "core curriculum," but he used Galen, not the *Ġawāmiʿ*. Thus a colleague of Maimonides' son Abraham at the Nāsirī hospital in Cairo, the Arab bibliographer Ibn Abī Uṣaybiʿa, calls Maimonides' epitomes اختصار الكتب الستة عشرة لجالينوس (an epitome of Galen's sixteen books).<sup>11</sup> The famous physician ʿAbd al-Laṭīf al-Baghdādī, who traveled to Cairo especially to meet with three

prominent men, one of whom was Maimonides, is reported by Ibn Abī Uṣaybiʿa to have characterized Maimonides' epitomes more correctly as covering Galen's sixteen books and five others.<sup>12</sup> A similar statement

2. See: M. Ullmann, *Die Medizin im Islam* (Leiden and Cologne, 1970), pp. 65–67, 343; idem, *Islamic Medicine* (Edinburgh, 1978), p. 10; F. Sezgin, *Geschichte des arabischen Schrifttums*, III: Medizin-Pharmazie-Zoologie-Tierheilkunde bis ca. 430 H. (Leiden, 1970), pp. 140–50; E. Lieber, "Galen in Hebrew," pp. 167–86 in *Galen: Problems and Prospects*, ed. Vivian Nutton (London, 1981), esp. pp. 171–80; Peter E. Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine* (Edinburgh, 2007), pp. 12–15.
3. See Lieber, "Galen in Hebrew," pp. 168–71.
4. Trans. Lieber, *ibid.*, p. 168.
5. See Ullmann, *Die Medizin im Islam*, p. 124; Sezgin, *Geschichte des arabischen Schrifttums*, pp. 260–63.
6. Ullmann, *Die Medizin im Islam*, pp. 156–57.
7. *Talḥīsāt Ibn Ruṣd ilā Ġālmūs. Commentaria Averrois in Galenum*, ed. María de la Concepción Vázquez de Benito (Madrid, 1984); G. C. Anawati and Saʿīd Zāyed, *Rasāʿil Ibn Ruṣhd al-ṭibbiya (Les Traités médicaux d'Averroès)* (Cairo, 1987).
8. For the bio-bibliographical data of Maimonides as a doctor see Maimonides, *Medical Aphorisms, Treatises 1–5*, ed., trans., and annot. Gerrit Bos (Provo, UT, 2004), pp. xix–xx; Herbert Davidson, *Moses Maimonides: The Man and His Works* (Oxford, 2005), pp. 429–83.
9. Cf. Gerrit Bos, "The Reception of Galen in Maimonides' Medical Aphorisms," *The Unknown Galen* (London, 2002), pp. 139–52, and the introductions to the editions of *Medical Aphorisms: Treatises 1–5* (Provo, UT, 2004) and *6–9* (Provo, UT, 2007).
10. Cf. Y. Tzvi Langermann, "Maimonides on the Synochous Fever," *Israel Oriental Studies* 13 (1993): 175–98, on p. 177.
11. *ʿUyūn al-anbāʿ fī ṭabaqāt al-aṭibbāʿ* (Beirut, n.d.), p. 583; see also S. M. Stern, "Ten Autographs by Maimonides," *Maimonidis Commentarius in Mischnam*, vol. 3 (Copenhagen, 1966), pp. 11–29, on p. 12; Davidson, *Moses Maimonides*, pp. 436–37.

is made by Ibn al-Qifṭī in his article on Maimonides in his *History of Philosophers*: “He composed an epitome of twenty-one books by Galen, adding five to the sixteen books.”<sup>13</sup> While most of the epitomes compiled by Maimonides have been lost, some are extant today, in the following manuscripts:

1. MS Paris BNF, héb. 1203.<sup>14</sup> This manuscript contains: (a) *Aṣnāf al-ḥummayāt* (*De febrium differentiis*); (b) *Tadbīr al-ṣiḥḥa* (*De sanitate tuenda*); and (c) *Ḥīlat al-bur'* (*De methodo medendi*).<sup>15</sup>
2. MS Escorial 802. This manuscript contains: *Ḥīlat al-bur'* (*De methodo medendi*) on ff. 97b–144b;<sup>16</sup> *Tadbīr al-ṣiḥḥa* may also be extant in the same MS, along with a unique epitome of *De simplicium medicamentorum temperamentis et facultatibus* and of *K. al-aḡḍiyya* (*De alimentorum facultatibus*).<sup>17</sup>
3. MS Berlin 6231.<sup>18</sup> This manuscript contains three epitomes of works on drugs, namely: (a) *Qātāḡānas* (*De compositione medicamentorum per genera*), ff. 2a–55a = pp. 1–113); (b) *Mayāmir* (*De compositione medicamentorum secundum locos*), ff. 55b–235 = pp. 114–483; (c) *al-Adwiyya al-muqābila li al-adwā'* (*De antidotis*), ff. 235b–269b = pp. 484–552.

In addition to these manuscripts, Stern discovered and identified fragments from epitomes of *De temperamentis*, *De locis affectis*, and *De alimentorum facultatibus* in the Geniza fragments in Cambridge.<sup>19</sup> This makes a total of eleven extant Galenic epitomes by Maimonides (some complete and some fragmentary), of the twenty-one he is reported to have written.

As to the method followed by Maimonides in summarizing Galen's works, he himself informs us in his *Medical Aphorisms* that the passages chosen by him were copied verbatim from Galen.<sup>20</sup> ‘Abd al-Laṭīf al-Baḡhdādī remarks in the same vein: “He has written a book

on medicine, compiling it from Galen's sixteen books and five others, and making it his rule not to change even a conjunction—excepting such cases as the *wa*- of coordination or the *fa*- of connection—but to transcribe exactly the passage chosen.”<sup>21</sup> Ibn al-Qifṭī remarks that he

12. ‘*Uyūn al-anbā' fī ṭabaqāt al-aṭibbā'*, p. 687; Stern, “Ten Autographs,” p. 11; Davidson, *Moses Maimonides*, p. 437.
13. Ibn al-Qifṭī, *Ta'rīḥ al-ḥukamā'*, ed. J. Lippert (Leipzig, 1903), p. 319, as translated and emended by Stern, “Ten Autographs,” p. 12; see as well Davidson, *Moses Maimonides*, p. 437.
14. Cf. H. Zotenberg, *Catalogues des Manuscrits hébreux et samaritains de la Bibliothèque Impériale* (Paris: Imprimerie impériale, 1866). The manuscript is rather defective, because the folios are bound in the wrong order and there are several lacunae.
15. For a detailed description see: Stern, “Ten Autographs,” p. 12; Langermann, “Maimonides on the Synochous Fever,” p. 176. The epitome of *De methodo medendi* has been translated into English by U. Barzel, *The Art of Cure, Extracts from Galen* (Haifa, 1992).
16. Cf. H. Derenbourg, *Les manuscrits arabes de l'Escorial, 2:2: Médecine et histoire naturelle* (Paris, 1939), pp. 16–17.
17. The supposition that these three treatises are in fact epitomes prepared by Maimonides derives from Stern, “Ten Autographs,” pp. 12, 16. I was unable to verify his supposition, because I did not have access to these treatises of the manuscript.
18. See Wilhelm Ahlwardt, *Verzeichnis der Arabischen Handschriften der Königlichen Bibliothek zu Berlin*, vol. 5 (Berlin, 1893), pp. 500–501.
19. See Stern, “Ten Autographs,” pp. 13–17.
20. See Maimonides, *Medical Aphorisms. Treatises 1–5*, p. 1. See also: Maimonides, *Commentary on the Aphorisms of Hippocrates*, trans. F. Rosner (Haifa, 1987), p. 12; Langermann, “Maimonides on the Synochous Fever,” pp. 176–77; Davidson, *Moses Maimonides*, p. 436.
21. Cf. Ibn Abī Uṣaybi'a, ‘*Uyūn al-anbā' fī ṭabaqāt al-aṭibbā'*, p. 687 (trans. Stern, “Ten Autographs,” p. 12). See also Langermann, “Maimonides on the Synochous Fever,” p. 177.

abbreviated the text so much and left so little substance that he achieved nothing.<sup>22</sup> Maimonides himself informs us in his epitome of *Qātāḡānas* (see below) that of the many compounds mentioned by Galen, he will mention only those whose simple components are readily available; nor will he take the trouble to mention the original composers of the medicines he has selected, since it is his intention to omit what is not of [practical] utility.<sup>23</sup> On the basis of his analysis of the fragments of *De temperamentis*, *De locis affectis*, and *De alimentorum facultatibus* that he found in the Geniza and compared with the original Galenic text, Stern concludes that Maimonides was obviously guided “by practical considerations and leaves out the theoretical discussions.”<sup>24</sup> By contrast, Langermann, from his analysis and comparison of Maimonides’ epitome of *De februum differentiis* with the original Galenic text, concludes that Maimonides retained the theoretical material. Langermann adds that Maimonides wrote the epitomes as an aid to his daily review of the medical material and that one of the main aims of the review was “to provide the theoretical justification for whatever treatment he chose”; this can be understood in some sense as a “practical” justification for including theoretical material.<sup>25</sup> In my view the epitomes are more than a personal aide-mémoire; they were also intended for the instruction of medical students. This idea is supported by Maimonides’ explicit statement at the end of his list, where he remarks that he composed it as an exercise “in the estimation and appraisal [of the standard weights].” Moreover, were his discussion a mere aide-mémoire one would expect the wording to be brief and concise with short references, and not as extensive and elaborate as in the examples adduced below.

Our discussion thus far may give the impression that these epitomes are mere reproductions, admittedly abbreviated, of Galenic material, offering no additional information that might enrich our knowledge of Maimonides’ theoretical and/or practical medical knowledge. As Langermann has pointed out, however, Maimonides does occasionally insert short comments; he gives one example in which Maimonides

formulates what Galen actually means in a sharp and concise way.<sup>26</sup> Such additional comments appear in his epitomes of Galen’s *Qātāḡānas* and *Mayāmir* as well. Undoubtedly the most valuable of them is a lengthy and detailed discussion of medicinal measures and weights, as found in Galen and subsequent medical literature. This comment, which appears on ff. 4b–6a (pp. 6–9) of his epitome of Galen’s *Qātāḡānas* will be presented below (Arabic text and English translation). Other shorter comments, too, deserve to be quoted, because they show different facets of both his theoretical and practical medical knowledge. Thus in his epitome of Galen’s *Qātāḡānas* (f. 7b = p. 12) Maimonides discusses the unguent that Galen called φοινικίνη ‘palm unguent’<sup>27</sup> (= *al-marham al-nablī*)<sup>28</sup> and remarks that this compound, which Galen recommends for certain types of tumors and ulcers, is known in his place as “Galen’s salve” and is the black salve also called *lāzūq* (= *lazūq*), i.e., a sticking plaster (cf. al-Kindī, *Aqrābādīm*, f. 119b: *marhamum ... aswad lazūqun li-l- ḥurāḡ* [a black salve ..., a sticking plaster for an abscess]).<sup>29</sup> This

22. Ibn al-Qifṭī, *Ta’rīḥ al-ḥukamā’*, p. 319 (trans. Stern, “Ten Autographs,” p. 12). See also Davidson, *Moses Maimonides*, p. 438.

23. F. 4b, p. 6a.

24. Stern, “Ten Autographs by Maimonides,” p. 15. See also Langermann, “Maimonides on the Synochous Fever,” pp. 177–178.

25. Langermann (“Maimonides on the Synochous Fever,” p. 178) based his conclusion on what Maimonides himself wrote to Ibn Tibbon about his daily study of medical books (see also *ibid.*, p. 176).

26. *Ibid.*, p. 178.

27. Cf. *De compositione medicamentorum per genera* 1:4 (K 13:375).

28. See f. 6a (p. 9).

29. M. Levey, *The Medical Formulary or Aqrābādīm of al-Kindī* (Madison and Milwaukee, 1969), pp. 142–143; M. Ullmann (*Wörterbuch der klassischen arabischen Sprache* [Wiesbaden, 1957–], 2: 545) reads: *ḡirāḥ* ‘wounds’ instead of *ḥurāḡ* ‘abscess’.

sort of explanation shows Maimonides' concern with the correct identification of the medicines, which have different names in different regions, and the possibility of mistaking one for another. It was to prevent these possibly fatal mistakes that he composed his *Šarḥ asmā' al-‘uqqār* (Glossary of drug names).<sup>30</sup>

On f. 24b (p. 46) Maimonides introduces Galen's survey of remedies that have the property of drying ulcers without a burning or roughening effect (*De compositione medicamentorum per genera* 4:1; K13:658ff.), by stating that in book three of *De methodo medendi* (K10: 157–231) Galen informed us that as a general rule all ulcers need to be treated by drying, explained what kind of ulcers these are, and which ones need moderate drying and which more intense drying. Maimonides adds that he intends to give a selection from these drugs with their degrees of drying and manner of composition.

On ff. 28b–29a (pp. 54–55) Maimonides mentions, in the context of Galen's discussion of the treatment of foul ulcers in *De compositione medicamentorum per genera* 4:5 (K13:689), an unguent ascribed to Dioscurides. On ff. 44a–b (pp. 91–92) Maimonides introduces Galen's discussion of emollient drugs and plasters in *De compositione medicamentorum per genera* 7 (K13:946ff.) by stating that in *De simplicium medicamentorum temperamentis et facultatibus* Galen discussed the nature of the strength of emollients and dissolving drugs, and that here (in this epitome), he (Galen) explained their degrees of weakness and strength and also mentioned the compound emollients and dissolving drugs prepared by earlier physicians.

In the epitome of *Mayāmīr* Maimonides inserts the following comments. On ff. 75b–76a (pp. 104–105) he refers to Galen's discussion of a headache resulting from a blow or fall (*De comp. med. sec. loc.* 2:1, K12:520ff.) but omits the section completely, with the argument that in *De methodo medendi* Galen has already discussed what happens to the head as a result of a dissolution of continuity (*tafarruq al-ittiṣāl*),<sup>31</sup> in addition to the internal and external cephalic tumors that result

in headache and the rules for curing them. Maimonides probably considers Galen's discussion here to be superfluous, because a headache caused by a blow or fall belongs in the same category as a headache caused by a dissolution of continuity. This can be concluded from his explicit statement in *Medical Aphorisms* 25:21 (ed. and trans. Bos, forthcoming):

Others than us and many physicians have contemplated Galen's words on the causes of pain. We found that in a number of places he gives only one cause for it, namely a dissolution of continuity. He says about a hot cause of pain that it brings about a loosening of a tight structure, and about a cold cause of pain that it brings about contraction and thickening [cf. *De inequali intemperie liber* 6 (K7:745)<sup>32</sup>; *In Hippocratis librum de fracturis commentarius* 3 (K18B, p. 586)]. It is beyond doubt that if some parts of an organ become tighter, other parts become looser. All of it goes back to a dissolution of

30. M. Meyerhof, ed., Maimonides, *Šarḥ asmā' al-‘uqqār* (Cairo, 1940), in: *Islamic Medicine* vol. 63, ed. Fuat Sezgin (Frankfurt am Main, 1996); English: Moses Maimonides, *Glossary of Drug Names*, trans. F. Rosner (Haifa, 1995). See also Gerrit Bos, "The Creation and Innovation of Medieval Hebrew Medical Terminology: Shem Tov Ben Isaac, Sefer ha-Shimmush," pp. 195–218 in *Islamic Thought in the Middle Ages. Studies in Text, Transmission, and Translation in Honour of Hans Daiber*, ed. Anna Akasoy and Wim Raven (Leiden and Boston, 2008), on p. 200.
31. For this Galenic notion, known as συνεχείας λύσις, see Phillip de Lacy, "Galen's Concept of Continuity," *Greek, Roman and Byzantine Studies* 20 (1) (1979): 355–69; see also below.
32. See also Galen, *De malitia complexionis diversae*, critical edition of the Arabic, Hebrew, and Latin translations, ed. Gerrit Bos, Michael McVaugh, and Joseph Shatzmiller (forthcoming).

continuity. On this fundamental principle he [i.e. Galen] bases his statement in the fourth [book] of *De [morborum] causis et symptomatibus* and a number of other places [*De symptomatum causis* 1:2 (K7:87)]. Then he explains in his treatise *De inequali intemperie* that a varying [kind of] dyscrasy is one of the causes of pain [*De inequali intemperie liber* 6 (K7:745)]. This is correct and therefore every pain may have one of two causes: either a varying [kind of] dyscrasy or a dissolution of continuity. It is on this that he bases his assertion. There is no doubt that [initially] he had the first opinion and that then it became clear to him that the matter is as he mentions it later, namely that there are two causes of pain.

On ff. 78b–79a (pp. 160–161) Maimonides comments on Galen’s statement that if the [head]ache lasts longer<sup>33</sup> one should purge by means of a strong clyster (*De comp. med. sec. loc.* 2:1, K12:550). Maimonides remarks that Galen has also recommended bleeding if the age and strength of the patient are favorable, and a thinning diet if there is a large quantity of [superfluous] humors (cf. *De comp. med. sec. loc.* 2:1, K12:523, 550).

In the introduction to his survey of the compound remedies recommended by Galen in *De compositione medicamentorum per genera* Maimonides remarks that he thinks it appropriate to discuss first of all the measures and weights that are frequently used in the books on medicine and which recur throughout the *De compositione medicamentorum per genera* and similar books. Like other Arab physicians and pharmacologists, Maimonides knew very well that their metrological system had no uniformity or fixed standards and that in a practical science like medicine the use of inaccurate, equivocal terms could spell disaster for the patient. An awareness of the importance of a universal terminology can already be found in the Hippocratic writings and becomes especially prominent in Galen.<sup>34</sup> Galen repeatedly

complains that he does not know the exact meaning of some terms of measurement. For instance, in *De compositione medicamentorum per genera* 5:3 (K13: 789–790) he remarks:

But among those who have written about weights and measures there has been disagreement on how much the weight of the *mna* is: for, [sic!] some say that the *mna* consists of sixteen *unciae*, others of twenty, and still others draw a distinction, saying that the Alexandrian *mna* consists of twenty *unciae*, whereas the other consists of sixteen, and this is smaller. But among those who convert the *mna* into *drachmai* some say the *mna* consists of a hundred *drachmai*, others say of more, since most people also say that the *uncia* consists of seven and a half *drachmai*, while others say only seven and others again eight. This being so, it is difficult to discover how many *drachmai* one should calculate the *mna* recorded by Crito in his prescription to consist [sic!].<sup>35</sup>

But although Maimonides is thoroughly aware of the imprecise metrological terminology and the inherent risk of a wrong treatment, he remarks that he does not consider this a failure on the part of the physicians, since the [expert] physician uses his sound judgment and composes his medicines according to the individual condition of his

33. Galen actually speaks about the case that the headache becomes more severe (ἐπιτείνωτο).

34. Cf. H. von Staden, “Inefficacy, Error and Failure,” pp. 59–83 in *Galen on Pharmacology: Philosophy, History and Medicine*, ed. A. Debru (Leiden, 1997), on pp. 68–71.

35. Trans. von Staden, “Inefficacy, Error and Failure,” p. 71. See also “Maimonides on Medicinal Measures and Weights,” §2 (below, p. 268–270).

patient. Still, even the expert physician needs standard medicines, the components of which he can adapt to the individual patient. And since the composition of these standard well-known medicines is sometimes problematic, because of inaccurate metrological terminology, Maimonides gives an example of how a physician can train himself in the correct estimation and appraisal of the weights and measures needed for the preparation and preservation of those medicines.

Like Maimonides, several Arab doctors and pharmacologists knew about the problem of the inaccurate and polysemous metrological terminology and composed minor treatises, sometimes appended to their works, in which they explained the particular medicinal weights and measures.<sup>36</sup> A prominent and influential representative of this genre of literature, which was probably initiated by Pseudo-Galen's Περὶ μέτρων καὶ σταθμῶν (*De ponderibus et mensuris*) (K19:748–781), was Yuhannā Ibn Sarābiyūn (ninth century). Around 873 he composed a *Kunnāš* (medical handbook), which only survives in fragments and quotations. One chapter of this handbook on weights and measures was subsequently borrowed by Ibn Sīnā in his *K. al-Qānūn fī al-ṭibb* (vol. 3, pp. 441–42);<sup>37</sup> it is also an important source for Maimonides' discussion.<sup>38</sup> In two cases Maimonides quotes from Ibn Ḡanāḥ's lost book on medicines, the *K. al-Talbīs*.

Unfortunately, the Arabic literature on medicinal weights and measures has been severely neglected by research. Accordingly, it is almost impossible to convert the Islamic system of a particular period into our current system. So it is no wonder that equivalents are left out of Ullmann's survey of the most frequent Arabic metrological terms,<sup>39</sup> and that Kahl remarks that the data he provides should be looked upon as "preliminary evaluations, intending to give at least a rough idea of what the units most probably stood for."<sup>40</sup> Another problem pointed out by Kahl is that the standard work on Arabic metrology, Hinz's *Islamische Masse und Gewichte*,<sup>41</sup> is based to a large extent on geographical and not medical literature. Editions and translations of the

Arabic medical metrological treatises are thus an urgent desideratum.<sup>42</sup> Maimonides' survey of weights and measures seems to be particularly interesting, because it is based on prominent ancient sources that go back to the time when the so-called canonical units were established.<sup>43</sup>

36. Cf. Ullmann, *Die Medizin im Islam*, pp. 316–320; Sābūr ibn Sahl, *Dispensatorium Parvum (al-Aqrābādhīm al-saghīr)*, ed. and annot. O. Kahl (Leiden, 1994), pp. 224–28.
37. Ed. Bulaq 1877, repr. in 3 vols., Cairo, no date.
38. Cf. Ullmann, *Die Medizin im Islam*, pp. 102, 319.
39. *Ibid.*, pp. 317–19.
40. Sābūr ibn Sahl, *Dispensatorium Parvum*, ed. Kahl, p. 225.
41. W. Hinz, *Islamische Masse und Gewichte umgerechnet ins metrische System* (Leiden and Cologne, 1970).
42. One of the few texts published is that by 'Isā ibn Māssa; cf. O. Kahl, "'Isā ibn Māssa on Medicinal Weights and Measures,'" *Orientalia Lovaniensia Periodica* 23 (1992): 275–79.
43. Sābūr ibn Sahl, *Dispensatorium Parvum*, ed. Kahl, p. 225.

### Maimonides on Medicinal Measures and Weights, Translation, p. 1

1. Says the author: Some of the compound medicines which Galen included in his books were composed by himself and others were composed by famous earlier [physicians] and selected by him. He mentions many recipes of these [medicines as they were composed] by different [physicians]. But I will mention only those [medicines] which I have selected from those [medicines] whose simple [i.e., basic] components are easily obtainable as I said above. I will not take the trouble to mention the original composer of the medicines [which I select] since it is my intention to omit what is not of [practical utility].
2. I also found it proper to discuss here first of all the measures and weights which are frequently used in the books on medicine and which recur throughout this book and other similar ones. Galen says in this book (i.e. *Qātāḡānas*) and in other books [composed by him] that according to some a *mann*<sup>1</sup> is twenty *ūqiyyas*<sup>2</sup> while according to others it is seventeen *ūqiyyas*.<sup>3</sup> He also says that one

1 *Mann* = Greek μνά; cf. Ullmann, *Die Medizin im Islam*, p. 319 (hereafter Ullmann); Kahl, *Sābūr ibn Sahl*, p. 228; Hinz, *Islamische Masse und Gewichte*, pp. 16–23 (hereafter Hinz).

2 *Ūqiyya* = Greek οὐγγία or οὐγκία; cf. Ullmann, p. 317; Kahl, *Sābūr ibn Sahl*, p. 226; Hinz, pp. 34–35.

3 Maimonides' statement is not exact, since according to Galen a *mann* is either 20 or 16 *ūqiyyas*; cf. *De compositione medicamentorum per genera* 4:14 (C. G. Kühn, *Claudii Galeni opera omnia* [Leipzig, 1821–1833; repr. Olms, 1964–1967], 13:749) (hereafter: K): εἴρηται γάρ μοι καὶ διὰ τῶν ἔμπροσθεν ὑπομνημάτων ἐνίους μὲν εἴκοσιν οὐγγίων ἐνίους δὲ ἑκκαίδεκα νομίζειν τὴν μόνον (“Also in the previous commentaries I have said that according to some a *mana* is twenty *unciae*, while others think that it is sixteen *unciae*”); cf. *De comp. med. per gen.* 2:15 (pp. 427–8) and 5:3 (K 13:789). See also von

*ūqiyya* is eight *mitqāls*,<sup>4</sup> while in *Mayāmir*, book one, he says that one *mitqāl* is one and a half *dirhams*.<sup>5</sup> It is well known that one *dirham* is sixteen *harrūbas*<sup>6</sup> and that one *harrūba* weighs four barleycorns (*habbas*).<sup>7</sup> This is also the weight of the *qīrāṭ*<sup>8</sup> as al-Biṭrīq says.<sup>9</sup> Galen also says in *Mayāmir* that one *ūbālūs*<sup>10</sup> is one

Staden, “Inefficacy, Error and Failure,” p. 71, and our introduction. Ibn Sīnā (*K. al-Qānūn fī al-ṭibb* [Bulaq, 1877; repr. Cairo, n.d. (3 vols)], 3: 441 [hereafter Ibn Sīnā]) remarks that the Greek *mann* is twenty *ūqiyyas* and the Roman and Egyptian *mann* is sixteen *ūqiyyas*.

- 4 For *mitqāl* corresponding to Greek δραχμή, cf. Ullmann, p. 317; Kahl, *Sābūr ibn Sahl*, p. 228; Hinz, pp. 1–8. For the calculation cf. Galen, *De compositione medicamentorum per genera* 4:14 (K 13:789): ἐπειδὴ καὶ τὴν οὐγγίαν οἱ πλεῖστοι μὲν ἐπὶ καὶ ἡμίσεος δραχμῶν εἶναι φασιν, ἔνιοι δὲ ζ’ (“... since an *ūqiyya* is according to most [doctors] seven and a half drachmas, and according to some eight”).
- 5 *Dirham* = Greek δραχμή; cf. Ullmann, p. 318; Kahl, *Sābūr ibn Sahl*, p. 226; Hinz, pp. 1–8. This quotation from the *K. al-Mayāmir* (= *De compositione medicamentorum secundum locos*), book one (= K 12:378–497) could not be located.
- 6 For *harrūba*, cf. Hinz, p. 14. For the calculation of one *dirham* as sixteen *harrūbas* cf. H. Sauvaire, “Matériaux pour servir à l’histoire de la numismatique et de la métrologie musulmanes,” *Journal Asiatique* 3 (115) (1884): 429 [hereafter Sauvaire, *JA* 3].
- 7 For barleycorn (*habbatu šā’ir*) cf. Kahl, *Sābūr ibn Sahl*, p. 226, n. 198; Hinz, pp. 12–13. For the calculation of one *harrūba* as four barleycorns cf. Sauvaire, *JA* 3, p. 420.
- 8 For *qīrāṭ* from Greek κεράτιον; cf. Ullmann, p. 319; Kahl, *Sābūr ibn Sahl*, p. 228; Hinz, p. 27.
- 9 On the translators al-Biṭrīq and his son Yaḥyā al-Biṭrīq see D. M. Dunlop, “The Translations of al-Biṭrīq and Yaḥyā (Yuḥannā) b. al-Biṭrīq,” *Journal of the Royal Asiatic Society* (1959): 140–150; esp. p. 143; G. Endress, “Die arabischen Übersetzungen von Aristoteles’ Schrift *De Caelo*, Inaugural dissertation, Johann-Wolfgang-Goethe Universität, Frankfurt am Main, 1966, pp. 89–96. Maimonides held al-Biṭrīq in low esteem as a translator as is evident from his *Medical Aphorisms* 24:44 (forthcoming ed.

sixth of a *mitqāl*.<sup>11</sup> Likewise he says that one *uksūbāfun*<sup>12</sup> is one and a half *ūqiyyas*.<sup>13</sup> And he says that one *gramma*<sup>14</sup> is one third of a *mitqāl*.<sup>15</sup>

3. Ibn Sarābiyūn says that one *šāmūnā*<sup>16</sup> is one and a half *grammas* and is thus half a *mitqāl*.<sup>17</sup> Ibn Sarābiyūn also says that one *drachma* is one *mitqāl*<sup>18</sup> and one *dāniq*<sup>19</sup> one sixth of a *dirham*.<sup>20</sup> Al-Biṭrīq

and trans. Gerrit Bos). For the calculation cf. Ibn Sīnā: كل قيراط أربع شعيرات

10 *Ūbūlūs* = Greek ὀβολός; cf. Ullmann, p. 317.

11 This quotation from the *K. al-Mayāmīr* could not be located; but cf. Pseudo-Galen, *De ponderibus et mensuris* 14 (K19:775): Ἡ δὲ δραχμὴ ... ἄγει γράμματα τρία τουτέστιν ὀβολοῦς στ' ("one *drachma*...contains three *grammas*, i.e. six *oboloi*").

12 *Uksūbāfun* = Greek ὀξὺβαφον; cf. Ullmann, p. 317.

13 This quotation could not be located in Galen's works. According to Pseudo-Galen, *De ponderibus et mensuris* 14 (K 19:775) one *uksūbāfun* has two *ūqiyyas*.

14 *Gramma* = Greek γράμμα; cf. J. Berendes, *Des Pedanios Dioskurides aus Anazarbos Arzneimittellehre in fünf Büchern* (Stuttgart 1902; repr. Wiesbaden, 1970), p. 16.

15 Cf. Pseudo-Galen, *De ponderibus et mensuris* 6 (K 19:758): Ἡδὲ δραχμὴ γράμματα τρία ("One *drachma* is three *grammas*"; i.e. one *gramma* is one third of a *drachma* (= *mitqāl*)).

16 For *šāmūnā* cf. Ullmann, p. 318; Hinz, p. 34.

17 This quotation has not been preserved in Ibn Sīnā, the major source for Ibn Sarābiyūn's chapter on measures and weights from his lost *Kunnāš*; cf. my introduction. But cf. al-Zahrāwī, *K. al-tašrif*, following H. Sauvaire, "Matériaux pour servir à l'histoire de la numismatique et de la métrologie musulmanes," *Journal Asiatique* 4 (116) (1884): p. 240 [hereafter Sauvaire, *JA* 4]: "Le poids de la sāmoūnā est d'un gahrama (gramme) et demi." See also *ibid.*, n. 5.

18 Cf. Ibn Sīnā: الدرخمى مثقال.

19 For *dāniq*, from Persian *dānag*, *dāng* (see I. A. Vullers, *Lexicon Persico-Latinum Etymologicum* [Bonn, 1855–1864; repr. Graz, 1962], 1: 803) cf. Kahl, *Sābūr ibn Sahl*, p. 226; *idem*, "Isā ibn Māssa," p. 278.

says that one *kuwātūs*<sup>21</sup> which is also called *quwātūs*, and is called '[.]WLS, BW'LS? and [...] is one and a half *ūqiyyas*.<sup>22</sup> Ibn Sarābiyūn and Masīh<sup>23</sup> say that one *istār*<sup>24</sup> is six *dirhams* and two thirds [of a *dirham*].<sup>25</sup> One *ṭassūḡ*<sup>26</sup> is two *ḥabbas*.<sup>27</sup> Ibn Ġanāḥ<sup>28</sup> says that one *nāṭal*<sup>29</sup> is two *istārs*.<sup>30</sup> Ibn Sarābiyūn says that one large *muṣṭrūn*<sup>31</sup>

20 This quotation has not been preserved in Ibn Sīnā's *K. al-Qānūn fī al-tibb* (3: 441–42); for other parallels cf. Sauvaire, *JA* 4, p. 300.

21 *Kuwātūs* = Greek κῠαθος; cf. Ullmann, p. 319.

22 Cf. Ibn Sīnā: قواثوس أوقية ونصف; H. Sauvaire, "Matériaux pour servir à l'histoire de la numismatique et de la métrologie musulmanes," *Journal Asiatique* 7 (119) (1886): 460–61 [hereafter Sauvaire, *JA* 7]. For corruptions of this term, other than in our text see *ibid.*, n. 1.

23 Masīh, i.e. Masīh al-Dimašqī, a physician active under the Caliph Hārūn al-Rašīd and the author of a *Kunnāš*, a medical handbook that has been lost; cf. Ullmann, p. 112; Sezgin, *Geschichte des arabischen Schrifttums*, 3: 227–28.

24 For *istār*, from Gr. στατήρ via Syr. *esttrā*, cf. Ullmann, p. 317.

25 According to Ibn Sīnā, one *istār* is six *dirhams* and two *dāniqs*, i.e. four *mitqāls*; see also Hinz, p. 15, and Sauvaire, *JA* 3, pp. 375–79.

26 For *ṭassūḡ* see Ullmann, p. 318; Kahl, *Sābūr ibn Sahl*, p. 227; Hinz, p. 34.

27 For this calculation, cf. Sauvaire, *JA* 4, p. 257. Sauvaire (*ibid.*, p. 256) also notes that according to al-Zahrāwī one *ṭassūḡ* is two and a half *ḥabbas*.

28 I.e. Jonah ibn Ġanāḥ, also called Abū 'l-Walīd ibn Merwān, the undisputed master of Sephardi linguistics, who lived in the first half of the eleventh century (died after 1040); see *Encyclopaedia Judaica*, 1<sup>st</sup> ed., 8: 1181–86, s.v. "Ibn Janāḥ, Jonah" (D. Tenne). The quotation comes from his lost book on medicine, entitled *K. al-Talḥīṣ*, which is once quoted explicitly by Ibn al-Quff in the section on metrology in his *K. al-Ġirāḥa* (following Ullmann, p. 320).

29 For *nāṭal/naṭil/nayṭal* (see next note), cf. Ullmann, *Medizin* p. 329.

30 Cf. Ibn Sīnā: النيطل الواحد استاران; H. Sauvaire, "Matériaux pour servir à l'histoire de la numismatique et de la métrologie musulmanes," *Journal Asiatique* 8 (120) (1886): 272–73 [hereafter Sauvaire, *JA* 8].

is three *ūqiyyas*<sup>32</sup> and one small *muṣṭrūn* six *mitqāls*.<sup>33</sup> He also says that a large *ṣadafa* [seashell]<sup>34</sup> is fourteen *šāmūnās*,<sup>35</sup> which equals seven *mitqāls*, and a small *ṣadafa* six *šāmūnās*,<sup>36</sup> which equals three *mitqāls*. He says that a *mil'āqa* (spoon)<sup>37</sup> has the capacity of two *mitqāls* of medicine and four *mitqāls* of honey.<sup>38</sup>

4. Galen says in a number of places that a *riṭl*<sup>39</sup> is twelve *ūqiyyas*.<sup>40</sup> And in chapter four of this book (i.e. *Qātāḡānas*) he says that according to some a *qūṭūlt*<sup>41</sup> is seven *ūqiyyas* and according to others twelve *ūqiyyas*.<sup>42</sup> He also says that a *qisṭ*<sup>43</sup> is ten *ūqiyyas*,<sup>44</sup> and in *Mayāmīr*, book three, he says that it is one and a half

*riṭl*.<sup>45</sup> Ibn Sarābiyūn says that a *sukkurūḡa*<sup>46</sup> is forty *dirhams*,<sup>47</sup> a *dawraq*<sup>48</sup> eight *riṭls*,<sup>49</sup> and a *ḥarūs*<sup>50</sup> ten *riṭls*.<sup>51</sup> Ibn Ḡanāḥ states that a *kaylaḡa*<sup>52</sup> is one and a half *riṭls*,<sup>53</sup> and an *ibrīq*<sup>54</sup> is close to a *mann*.<sup>55</sup>

5. “Said the author: It is clear that there is no harm to us [physicians] in the different [opinions] concerning the quantity of the *riṭl*, *qisṭ* and *mann* and the other weights and measures, as long as we do determine the effect of each simple drug within the compound drug, its thinness and thickness, as well as the length of its [preparation by] cooking, depending on the sound judgment of the physician. [And this judgment is] according to the effects which he wants the

31 For *muṣṭrūn*, from Greek μύστρον, cf. Ullmann, p. 319.

32 Cf. Ibn Sīnā: مسطرون الكبير ثلاثة أواق.

33 Cf. Ibn Sīnā: مسطرون الصغير ست درخميات.

34 For *ṣadafa* (seashell), cf. Ullmann, p. 318.

35 Cf. Ibn Sīnā: الصدفة كبيرة أربع عشرة شامونة; see also Sauvaire, *JA* 4, p. 255.

36 Cf. Sauvaire, *JA* 4, p. 255: “Sarfah. La petite est égale à 6 chāmy”; according to Ibn Sīnā a small *ṣadafa* is seven *šāmūnās*: الصدفة الصغيرة سبع شامونات.

37 For *mil'āqa* (spoon), cf. Ullmann, p. 319.

38 Cf. Ibn Sīnā: وملعقة العسل أربعة مثاقيل ملعقة الأدوية مثقال واحد ودرهم; see also Sauvaire, *JA* 8, pp. 163–65.

39 For Arabic *riṭl*, from Greek λίτρα through metathesis, cf. Ullmann, p. 328; Kahl, *Sābūr ibn Sahl*, p. 227; Hinz, pp. 27–33.

40 Cf. Pseudo-Galen, *De ponderibus et mensuris* 3 (K 19:752): Ἡ λίτρα λι. ἔχει γο ιβ'; see also pp. 765, 771.

41 *Qūṭūlt*, from Greek κοτύλη; cf. Ullmann, p. 319.

42 Cf. Galen, *De comp. med. per genera* 4:14 (K 13:749).

43 For *qisṭ*, from Greek ἔσσης, cf. Ullmann, p. 318; Kahl, *Sābūr ibn Sahl*, p. 227.

44 Galen (*De comp. med. per genera* 2:16 [K 13:435]) remarks that a sextarius is generally held to be 20 uncias, and that some mistakenly assume that the Roman sextarius is eighteen uncias. For the same tradition cf. Ibn Sīnā.

45 The quotation does not appear in *De comp. med. ad locos*, but in Pseudo-Galen, *De ponderibus et mensuris* 7 (K 19:762). In *De comp. med. per genera* 2:16 (K13:435) Galen says that for the Romans a sextarius is one and four-sixths of a liter.

46 For *sukkurūḡa* cf. Kahl, *Sābūr ibn Sahl*, p. 227.

47 According to Ibn Sīnā, a *sukkurūḡa* is 6¼ *istārs*; according to Khwārizmī, *Mafātīḥ al-'ulūm*, ed. G. van Vlooten (Leiden, 1895, p. 180), a small *uskuraḡa* is three *ūqiyyas* and a large one nine *ūqiyyas*. See also Sauvaire, *JA* 7, p. 175f.

48 For *dawraq* cf. Ullmann, p. 318; Kahl, p. 227.

49 According to Ibn Sīnā, an Italian *dawraq* is eight *ḡawāḥīm* (for this term see Ullmann, p. 318); for one *dawraq* equal to eight *riṭls* see Sauvaire, *JA* 7, p. 170, quoting from an arithmetical compilation.

50 *Ḥarūs*; cf. Sauvaire, *JA* 7, p. 167, s.v. *ḥūruš*.

51 According to al-Aṭṭār's *Minḡāḡ al-dukkān* it is seven and a half *riṭls* (following Sauvaire, *ibid.*).

52 *Kaylaḡa*: cf. Sauvaire, *JA* 8, pp. 129–32.

53 Cf. al-Zahrāwī, *K. al-taṣṭīf*: “Elle est égale, comme le sâ', à quatre meudd et, dit-on, à un ratl et demi ...” (trans. Sauvaire, *JA* 8, p. 129).

54 *Ibrīq*; cf. Sauvaire, *JA* 7, p. 133.

55 For different computations cf. *ibid.*

compound medicine to have and according to the [condition of] the body which he wants to treat with it and according to the powers of every single ingredient and their strength and weakness. I only mentioned the weights and measures stated above as an exercise in the estimation and appraisal [of the standard weights] needed for the [right] way of preparation and preservation of the well-known compound medicines.

### Maimonides on Medicinal Measures and Weights, Arabic text

١. قال (fol. 4b) المؤلف: الأدوية المركبة التي ضمّنها جالينوس كتبه منها أدوية تأليفه ومنها ما ألّفه أشخاص مشاهير كانوا قبله فاختارها هو وذكر منها نسخا كثيرة لأشخاص مختلفة. فإذا ذكرنا نحن منها ما اخترناه ممّا يسهل وجود بسايطه كما قدمنا فلا أتكلّف أن أنسب ذلك الدواء لمركبه الأول قصدا ممّي لخذف ما لا فائدة فيه.

٢. وكذلك رأيت أن أتقدّم هاهنا الأكيال والأوزان الكثيرة الاستعمال في كتب الطب المتكررة في هذا الكتاب وغيره من ذلك. قال جالينوس في هذا الكتاب وغيره إنّ المنّ عند بعض الناس عشرون أوقية وعند بعض سبع عسرة أوقية وكذلك قال الأوقية (fol. 5a) ثمانية مثاقيل وفي أول الميامر قال إنّ المثقال درهم ونصف. ومن المعلوم أنّ الدرهم ستّة عشر خروبهة والخروبهة وزنه أربع حبات شعير وهذا هو أيضا زنة القيراط قال ذلك البطريق. وفي الميامر أيضا ذكر جالينوس أنّ أوبولوس سدس مثقال وكذلك ذكر اكسوبافن<sup>1</sup> أوقية ونصف وكذلك ذكر أنّ غرامي ثلث مثقال.

٣. وذكر ابن سراجيون أنّ شامونا غرامي ونصف فيكون إذا نصف مثقال. وكذلك ذكر ابن سراجيون أنّ الدرهمي مثقال والدانق سدس درهم. وكذلك ذكر البطريق أنّ كواثوس ويقال قواثوس ويقال [..] ولس ويقال بوالس؟ ويقال [..] زنته أوقية ونصف. وكذلك ذكر ابن سراجيون<sup>2</sup> وذكر مسيح أنّ الاستار ستّة درهم وثلثان والطسوج حبتان. وذكر (fol. 5b) ابن جناح<sup>3</sup> أنّ ناطل<sup>4</sup> استاران وذكر ابن سراجيون مسطرون كبير ثلاثة أواق ومسطرون صغير ستّة مثاقيل وكذلك ذكر أنّ صدفة كبيرة أربعة عشر شامونا فيكون ذلك زنة سبع مثاقيل. وصدفة صغيرة ستّة شوامن فيكون ذلك ثلاثة مثاقيل. وكذلك ذكر أنّ الملحقة تحتل مثقالين من الدواء وأربع مثاقيل من العسل.

٤. وقال جالينوس في عدّة مواضع إنّ الرطل اثنتا عشرة أوقية وقال في رابعة هذا الكتاب إنّ قوطولي عند بعض الناس سبع أواق وعند بعضهم اثنتا عشرة أوقية وقال إنّ القسط عشرة أواق وفي ثلاثة الميامر ذكر أنّه رطل ونصف. و[قال] ابن سراجيون إنّ السكرجة أربعون درهم وإنّ الدورق ثمانية<sup>5</sup> رطل وإنّ الحروس عشرة أطلال. وذكر ابن جناح أنّ الكليجة رطل (fol. 6a) ونصف والابريق قريب المنّ.

- MS اكشوثافن: emendation editor: اكسوبافن<sup>1</sup>  
 MS سراجيون: emendation editor: سراجيون<sup>2</sup>  
 MS نجاح: emendation editor: جناح<sup>3</sup>  
 MS منطل: emendation editor: ناطل<sup>4</sup>  
 MS ثمانين: emendation editor: ثمانية<sup>5</sup>

٥. قال المؤلف: وبين هو أن لا ضرر يدخل علينا في اختلاف الناس في مقدار الرطل والقسط والمن وغيرها من الأوزان والأكيال إذ تقدّر تقدير ما يجعل من كل دواء مفرد في دواء المركب وحال رقتة وثخانتة أيضا أو إطالة طبخه والتقصير في ذلك راجع لنظر الطبيب بحسب الأفعال التي يريد أن يفعلها الدواء المركب وبحسب البدن الذي يعالجه به وبحسب قوى كل واحد من المفردة وقوة أفعاله وضعفها وإنما هذه الأوزان والأكيال المذكورة للارتياض في الحدس والتخمين على صورة التركيب ولحفظ صورة الأدوية المركبة المشهورة.